



Report of Test LLI-19244-11

LED Roadway Lighting - Roadway luminaire. Product ID: QB 00 616S X 5 53 X 3G2G XXXX XXXX
Grey cast aluminum top housing and white plastic bottom housing with clear flat glass lens.
16 LEDs in 4 x 4 array with clear plastic sheet of individual lenses.
One Osram Optotronic LED driver. Model: QT50W/UNV/1250C/2DIMLT2/P6 set to 1050ma.
Operating at 120v AC and 60 Hz.



Performance Summary

Total Light Output	7192 lm	Min Power Factor	0.96 @ 277 V
Luminaire Power	57.0 W	Max THD(i)*	8.5 % @ 277 V
Luminous Efficacy	126.2 lm/W	0-90° Zonal Flux %	100.0 %
CCT	2990 K	80-90° Zonal Flux %	0.3 %
CIE(x,y) 1931	(0.439, 0.408)	BUG Rating*	B2-U0-G1
CRI	71	Street Classification*	Type II Very Short

PREPARED FOR : LED Roadway Lighting Ltd, 115 Chain Lake Drive, Halifax. NS Canada



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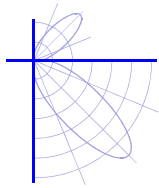
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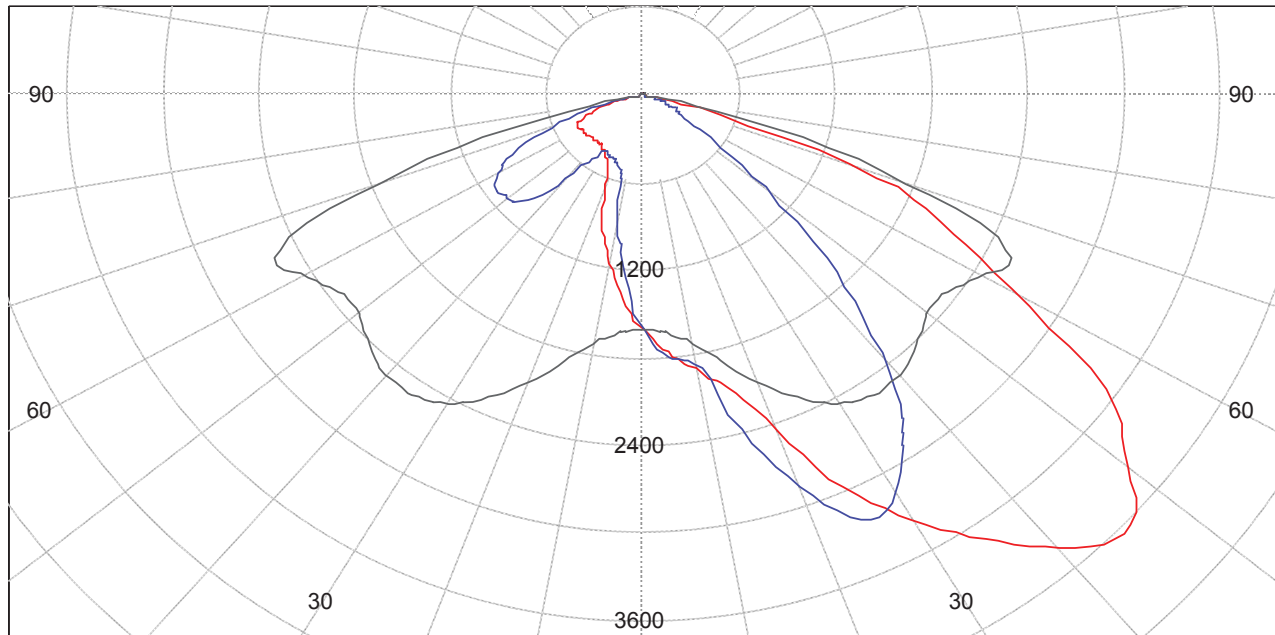
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Polar Light Distribution Curves



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 %	73.4 %	73.4 %
House Side	0.0 %	26.6 %	26.6 %
	0.0 %	100.0 %	100.0 %

Report data based on absolute values as measured.

Signed:

Rydel Tunney
Authorized Signatory

Date of test
Date of report

23-Sep-2019
24-Sep-2019



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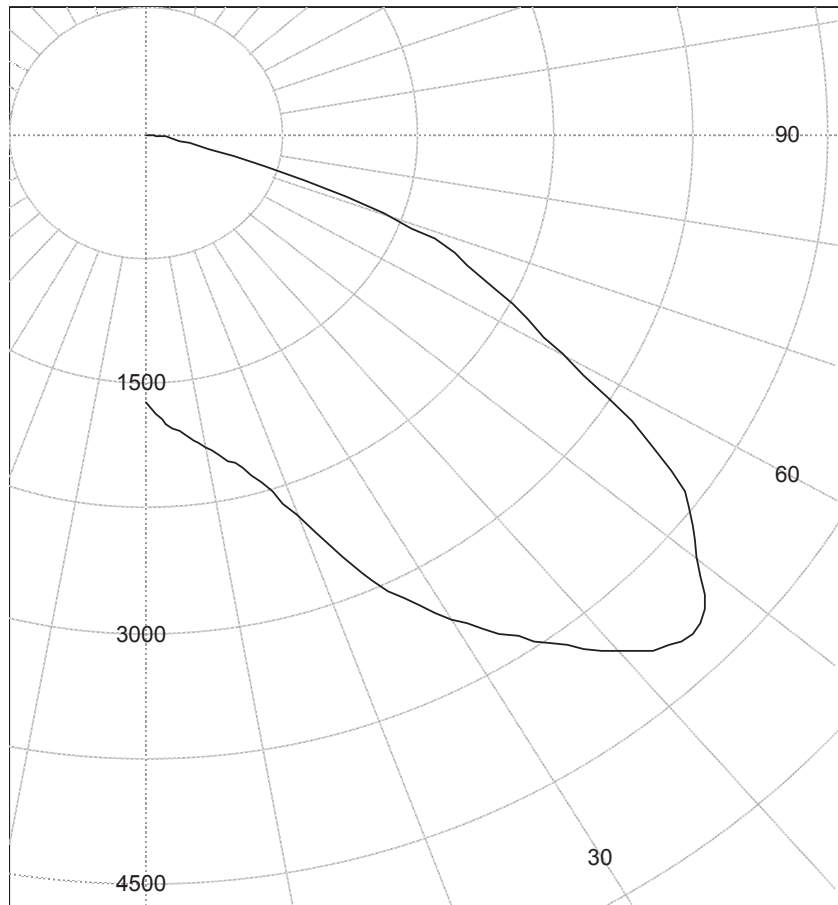
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Operating at 120v AC and 60 Hz.

Intensity in principal plane
(based on overall max intensity)

Vertical Angle (°)	Intensity (L50.0) (cd)
0.0	1614.3
10.0	1909.7
20.0	2435.1
30.0	3356.2
35.0	3714.0
40.0	4047.9
45.0	4250.6
47.5	4163.4
50.0	3952.7
52.5	3772.1
55.0	3527.4
57.5	3084.2
60.0	2645.8
62.5	2320.9
65.0	2047.8
67.5	1781.1
70.0	1385.2
72.5	797.5
75.0	359.9
77.5	168.4
80.0	90.0
82.5	37.0
85.0	10.0
87.5	3.7
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
2561.9 cd @ (90.0°, 63.5°)

Street side max intensity
4250.6 cd @ (50.0°, 45.0°)

Coordinates expressed in the C Type coordinate system

Data for the two symmetric halves of the luminaire has been averaged.



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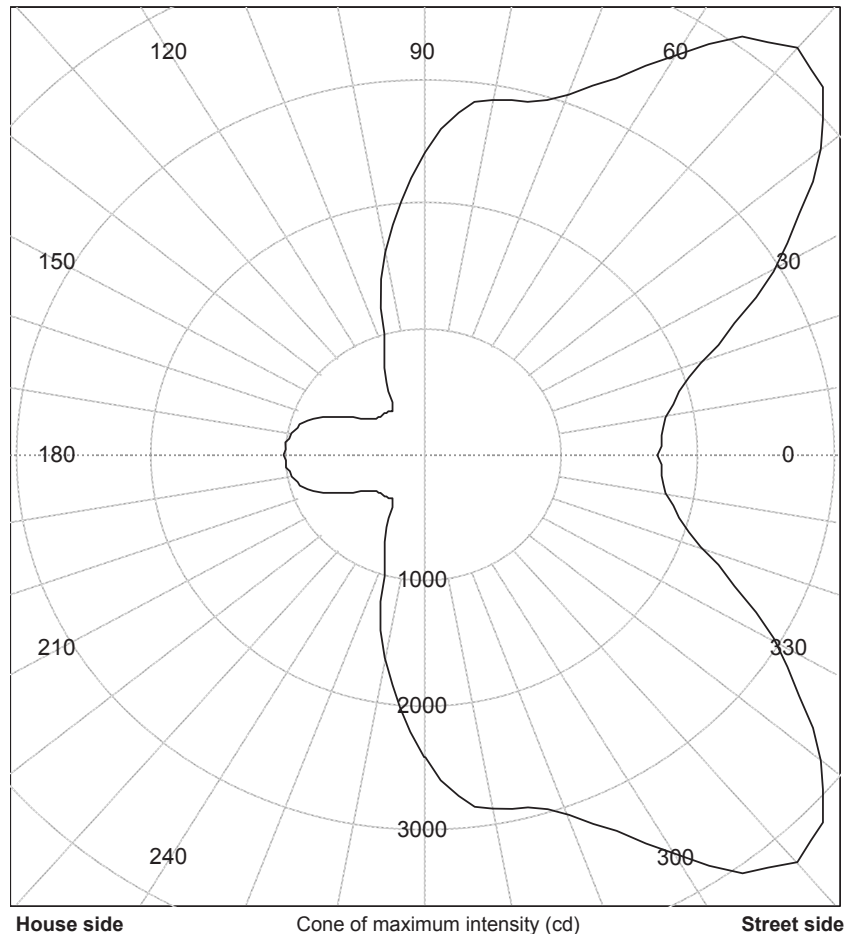
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Operating at 120v AC and 60 Hz.

Intensity in principal cone
(based on overall max intensity)

Lateral Plane (°)	(V45.0) (cd)
0	1717.6
15	1929.2
30	2951.3
40	3806.3
45	4153.7
50	4250.6
55	4069.9
60	3689.9
65	3315.0
70	3070.9
75	2921.5
80	2883.0
85	2756.3
90	2421.6
95	2032.9
100	1653.1
105	1217.2
110	848.6
115	643.3
120	491.4
125	423.9
130	428.2
135	438.4
140	450.7
150	610.9
165	934.5
180	1021.1

Principal Conical Surface



House side max intensity
2561.9 cd @ (90.0°, 63.5°)

Street side max intensity
4250.6 cd @ (50.0°, 45.0°)

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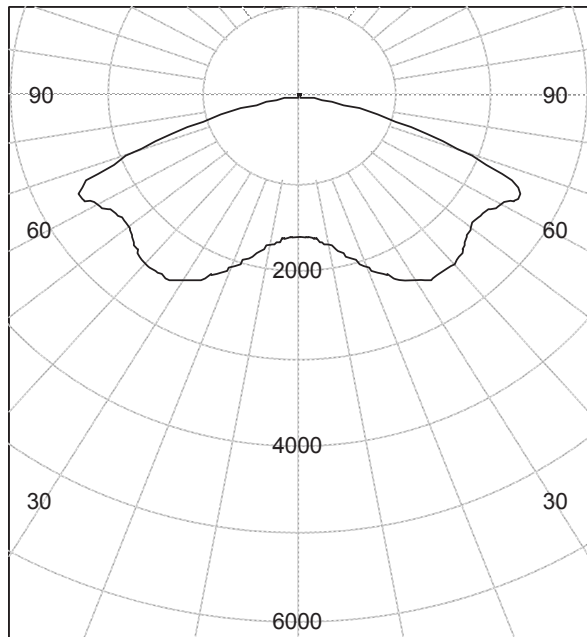
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Operating at 120v AC and 60 Hz.

Polar curve through L90 / L270

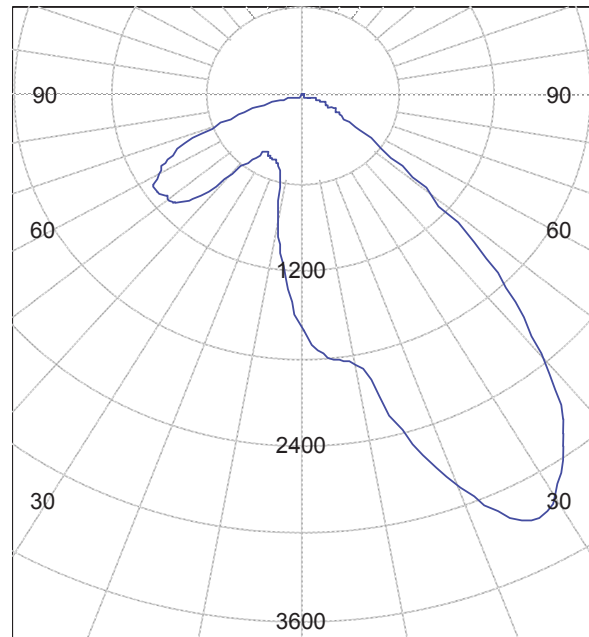


(L90)

(cd)

(L270)

Polar curve through L0 / L180



House side (L180)

(cd)

Street side (L0)



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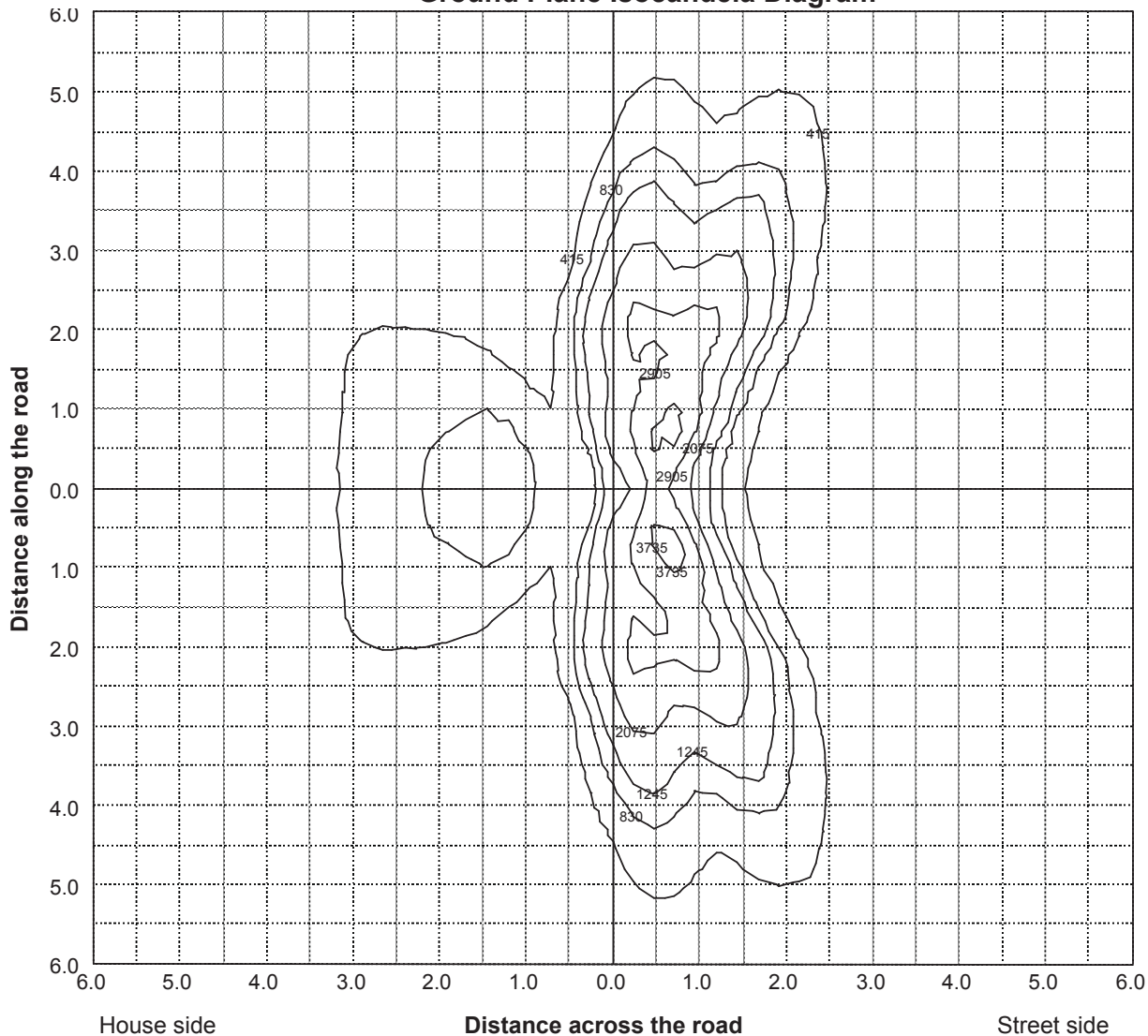
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Ground Plane Isocandela Diagram



The isocandela contour units are expressed as cd

Upstream and downstream sides have been averaged.



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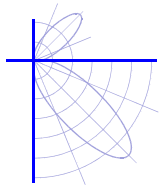
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Intensity data (cd)

Vertical	L-Plane								
	L0	L15	L30	L40	L45	L50	L55	L60	L65
0.0	1614	1614	1614	1614	1614	1614	1614	1614	1614
10.0	1865	1859	1884	1900	1906	1910	1910	1910	1905
20.0	2854	2813	2727	2642	2553	2435	2364	2345	2365
30.0	3152	3265	3488	3541	3467	3356	3236	3072	2879
35.0	2826	3032	3574	3864	3832	3714	3551	3359	3147
40.0	2314	2580	3442	4036	4124	4048	3830	3545	3273
45.0	1718	1929	2951	3806	4154	4251	4070	3690	3315
47.5	1387	1558	2665	3563	3942	4163	4072	3733	3324
50.0	999	1161	2128	3402	3751	3953	3957	3693	3314
52.5	743	849	1623	2879	3541	3772	3771	3555	3245
55.0	511	675	1263	2361	3020	3527	3606	3408	3136
57.5	353	489	896	2007	2519	3084	3415	3313	3035
60.0	278	347	647	1550	2155	2646	3152	3265	3010
62.5	241	266	464	1077	1751	2321	2933	3255	3076
65.0	209	228	334	764	1290	2048	2775	3274	3203
67.5	167	186	251	526	944	1781	2542	3035	3102
70.0	144	152	201	350	702	1385	2071	2659	2787
72.5	113	119	158	232	430	797	1382	1984	2328
75.0	83	91	121	167	212	360	734	1182	1652
77.5	57	60	83	120	135	168	318	567	815
80.0	35	35	49	73	80	90	122	247	354
82.5	17	19	24	32	35	37	47	77	96
85.0	7	7	8	9	10	10	11	11	10
87.5	3	3	3	3	4	4	4	4	4
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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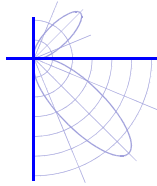
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Intensity data (cd)

Vertical	L-Plane								
	L70	L75	L80	L85	L90	L95	L100	L105	L110
0.0	1614	1614	1614	1614	1614	1614	1614	1614	1614
10.0	1889	1863	1827	1782	1727	1664	1599	1527	1450
20.0	2371	2351	2301	2219	2093	1928	1749	1552	1356
30.0	2787	2768	2739	2642	2439	2175	1871	1562	1253
35.0	2962	2890	2869	2758	2506	2193	1860	1513	1121
40.0	3064	2950	2927	2801	2499	2140	1782	1379	975
45.0	3071	2922	2883	2756	2422	2033	1653	1217	849
47.5	3048	2880	2832	2714	2369	1966	1572	1125	792
50.0	3020	2851	2783	2679	2323	1900	1486	1032	734
52.5	2974	2837	2773	2674	2306	1853	1408	942	673
55.0	2918	2842	2815	2718	2333	1835	1348	869	605
57.5	2854	2844	2880	2803	2392	1849	1316	801	536
60.0	2806	2846	2945	2879	2466	1902	1270	737	474
62.5	2854	2886	3018	2955	2547	1908	1188	663	392
65.0	2977	2924	3060	3000	2510	1743	1018	533	302
67.5	2879	2735	2885	2852	2186	1397	741	349	222
70.0	2413	2221	2513	2547	1749	945	417	199	176
72.5	1880	1565	1963	2047	1313	630	194	145	141
75.0	1344	969	1284	1396	840	356	113	108	106
77.5	730	485	637	702	401	147	72	72	73
80.0	323	204	237	249	151	62	41	41	42
82.5	75	53	50	43	36	22	19	20	20
85.0	10	9	9	9	8	8	8	8	8
87.5	4	4	4	4	4	3	3	3	3
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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Operating at 120v AC and 60 Hz.

Intensity data (cd)

Vertical	L-Plane								
	L115	L120	L125	L130	L135	L140	L150	L165	L180
0.0	1614	1614	1614	1614	1614	1614	1614	1614	1614
10.0	1372	1296	1227	1167	1115	1068	1000	936	913
20.0	1178	1023	856	701	596	542	503	487	483
30.0	922	692	543	473	454	449	452	455	458
35.0	803	622	497	439	431	435	442	475	507
40.0	721	563	457	426	432	437	475	639	751
45.0	643	491	424	428	438	451	611	935	1021
47.5	597	458	418	430	444	474	737	1023	1092
50.0	546	424	415	438	458	527	849	1052	1101
52.5	491	394	410	445	490	597	920	1059	1112
55.0	430	369	400	449	537	661	937	1039	1125
57.5	373	345	381	452	573	711	915	1010	1097
60.0	324	318	358	460	590	727	873	958	1025
62.5	286	292	335	458	581	709	807	900	972
65.0	249	265	312	439	544	665	726	835	856
67.5	213	232	283	400	489	595	653	733	709
70.0	178	193	247	342	419	505	591	587	546
72.5	142	154	209	276	341	420	495	432	408
75.0	108	118	163	209	268	341	371	306	294
77.5	75	83	115	146	203	252	250	180	164
80.0	44	49	68	89	128	130	112	92	99
82.5	21	23	27	34	45	51	25	24	39
85.0	8	8	8	8	8	5	4	3	4
87.5	3	3	2	2	2	1	1	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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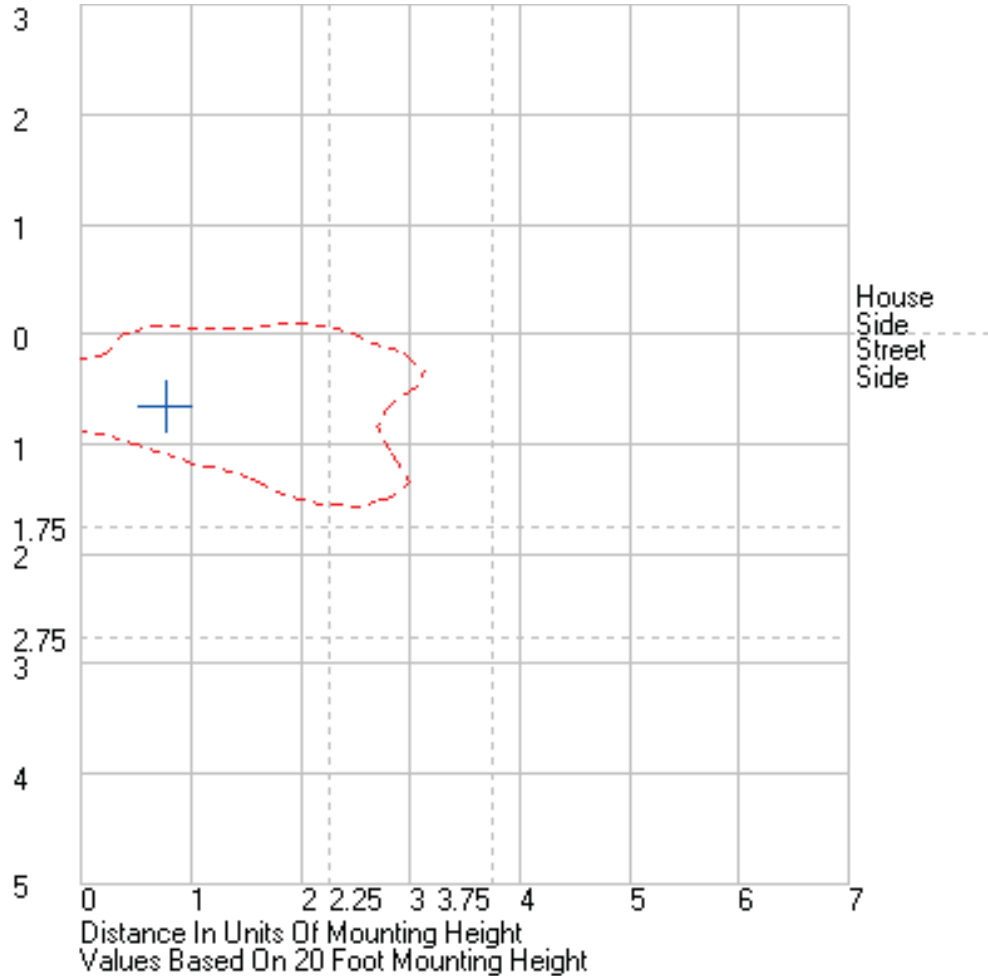
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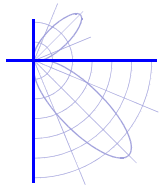
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LM-79 Performance Data

Spectral	CIE 1931 (x, y) ⁽¹⁾	(0.439, 0.408)
	CIE 1976 (u', v') ⁽¹⁾	(0.250, 0.523)
	Correlated Color Temperature (CCT) ⁽¹⁾	2990 K
	Spatial Δ (u', v') Uniformity ⁽²⁾	5.93E-03
	Color Rendering Index (Ra) ⁽¹⁾	71.0
	Special CRI 9 (R ₉) ^{(1),(3)}	-41.4
	Distance from Planckian Locus (Duv) ^{(1),(3)}	1.12E-03
	Scotopic/Photopic Ratio ^{(1),(3)}	1.21

Electrical	Voltage	120.0 V	(Setpoint 1)
	Frequency	60.0 Hz	
	Current	0.492 A	
	Power	57.0 W	
	Power Factor	0.96	
	Current THD	3.0 %	
	Voltage	277.0 V	(Setpoint 2)
	Frequency	60.0 Hz	
	Current	0.210 A	
	Power	55.8 W	
	Power Factor	0.96	
	Current THD	8.5 %	

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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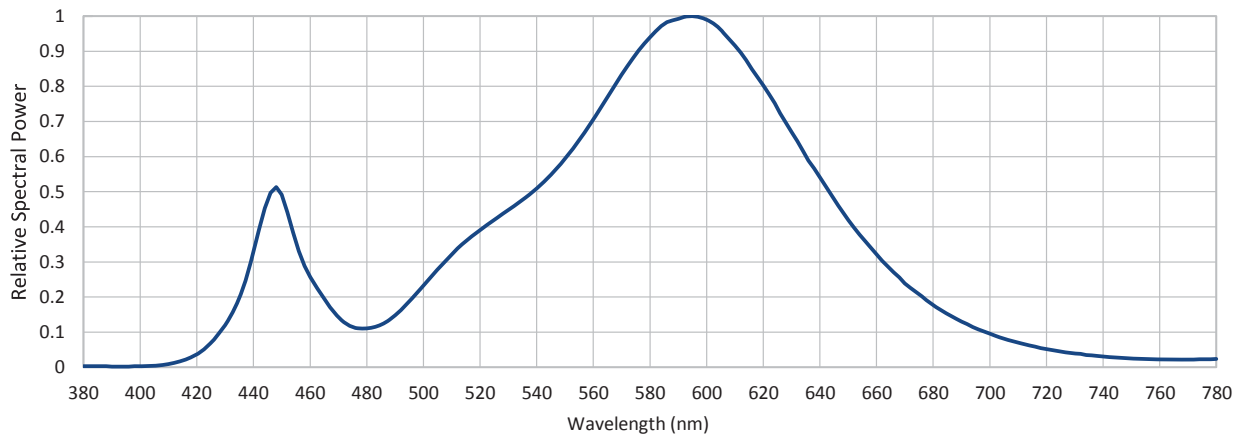
Operating at 120v AC and 60 Hz.

LM-79 Performance Data

Relative spectral power distribution

(Relative to peak = 1, weighted average of spatial measurements)

λ (nm)	Relative Power	λ (nm)	Relative Power	λ (nm)	Relative Power	λ (nm)	Relative Power	λ (nm)	Relative Power
380	0.003	460	0.257	540	0.509	620	0.803	700	0.096
385	0.003	465	0.194	545	0.548	625	0.737	705	0.082
390	0.002	470	0.142	550	0.594	630	0.670	710	0.070
395	0.002	475	0.115	555	0.646	635	0.603	715	0.060
400	0.003	480	0.111	560	0.706	640	0.542	720	0.052
405	0.005	485	0.121	565	0.769	645	0.478	725	0.045
410	0.009	490	0.148	570	0.833	650	0.421	730	0.039
415	0.019	495	0.187	575	0.891	655	0.369	735	0.035
420	0.037	500	0.233	580	0.940	660	0.322	740	0.031
425	0.070	505	0.279	585	0.977	665	0.279	745	0.027
430	0.120	510	0.321	590	0.992	670	0.239	750	0.025
435	0.199	515	0.359	595	1.000	675	0.208	755	0.024
440	0.329	520	0.391	600	0.990	680	0.177	760	0.023
445	0.475	525	0.420	605	0.961	685	0.153	765	0.022
450	0.492	530	0.448	610	0.916	690	0.130	770	0.022
455	0.357	535	0.477	615	0.862	695	0.111	775	0.023
								780	0.024





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LM-79 Performance Data

Spatial measurements

Vert. angle (°)	CIE 1976 (u',v') coordinates	
	Horiz. 0.0° plane	Horiz. ° plane
0.0	(0.248, 0.522)	(0.247, 0.520)
10.0	(0.249, 0.522)	(0.249, 0.521)
20.0	(0.251, 0.525)	(0.253, 0.523)
30.0	(0.250, 0.523)	(0.247, 0.520)
40.0	(0.250, 0.522)	(0.251, 0.524)
50.0	(0.251, 0.524)	(0.246, 0.519)
60.0	(0.250, 0.523)	I <= 10% peak
70.0	(0.255, 0.527)	I <= 10% peak
80.0	I <= 10% peak	I <= 10% peak
-	-	-

Spatial measurements

Vert. angle (°)	CIE 1976 (u',v') coordinates	
	Horiz. 0.0° plane	Horiz. ° 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 5.5 / 7.75 hours

Equipment and uncertainties

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

Luminous Intensity	± 4 %	Temperature	± 1 °C
Luminous Flux	± 4 %	Luminous Efficacy	± 4.5 %
Horiz., Vert. Angles	± 0.25°		

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	CCT	± 100 K
CIE (u', v') coordinates	± 0.002	CRI (Ra)	± 2
Spatial Δ (u', v') uniformity	± 0.001	Scotopic / Photopic Ratio *	± 0.02
Rel. Spectral Irradiance *	± 2 %	R9 *	± 2
Duv *	± 5E-04		

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

Voltage	± 0.5 %	Frequency *	± 0.1 Hz
Current	± 0.5 %	Power	± 0.5 %
Current THD *	± 3 %	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 1.0.10 / 5.9 (14th Dec 2017)

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Test Report No. LLI-19244-11

LED Roadway Lighting - Roadway luminaire. Product ID: QB 00 616S X 5 53 X 3G2G XXXX XXXX

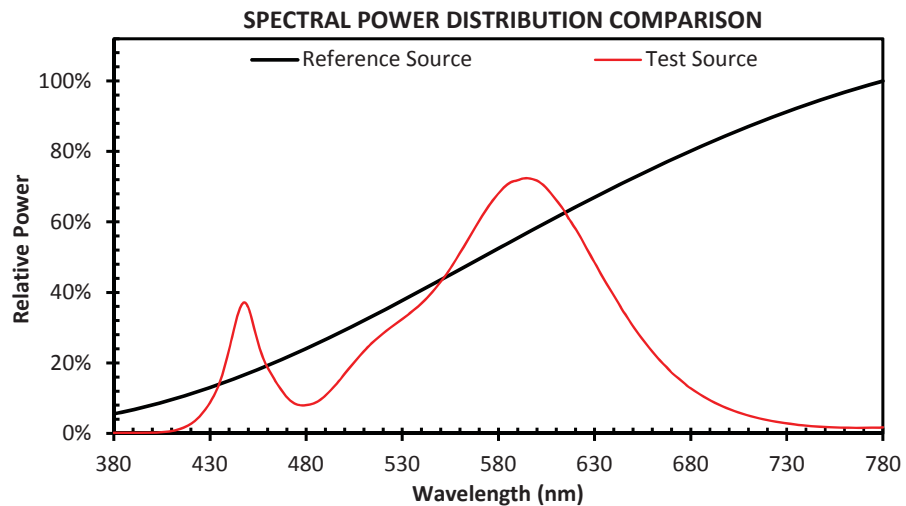
Grey cast aluminum top housing and white plastic bottom housing with clear flat glass lens.

16 LEDs in 4 x 4 array with clear plastic sheet of individual lenses.

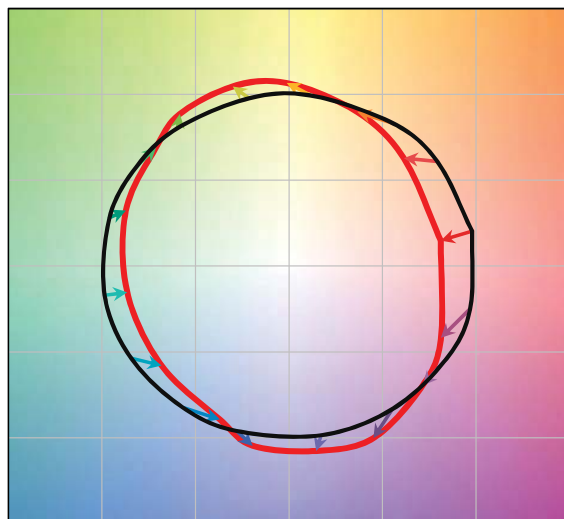
One Osram Optotronic LED driver. Model: QT50W/UNV/1250C/2DIMLT2/P6 set to 1050ma.

Operating at 120v AC and 60 Hz.

R_f	73
R_g	93



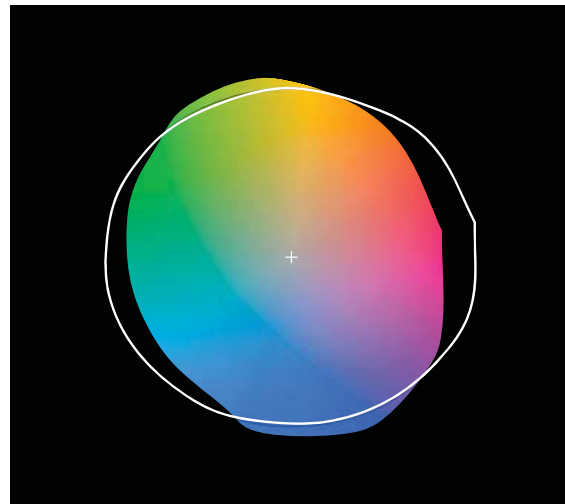
COLOR VECTOR GRAPHIC



— Test Source

→ Series1

COLOR DISTORTION GRAPHIC





Test Report No. LLI-19244-11

LED Roadway Lighting - Roadway luminaire. Product ID: QB 00 616S X 5 53 X 3G2G XXXX XXXX
Grey cast aluminum top housing and white plastic bottom housing with clear flat glass lens.
16 LEDs in 4 x 4 array with clear plastic sheet of individual lenses.
One Osram Optotronic LED driver. Model: QT50W/UNV/1250C/2DIMLT2/P6 set to 1050ma.
Operating at 120v AC and 60 Hz.

Test Distance 8.0 m
Test Temperature 25.3 °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 C78.377:2015, ANSI C82.77-10:2014.

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.

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