



Report of Test LLI-19244-8

LED Roadway Lighting - Roadway luminaire. Product ID: QB 00 616S X 5 60 X 3G2S 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 Delta LED driver. Model: USCI-075140GA set to 1200ma.
Operating at 120v AC and 60 Hz.



Performance Summary

Total Light Output	7759 lm	Min Power Factor	0.94 @ 277 V
Luminaire Power	65.8 W	Max THD(i)*	10.0 % @ 277 V
Luminous Efficacy	117.9 lm/W	0-90° Zonal Flux %	100.0 %
CCT	3010 K	80-90° Zonal Flux %	0.6 %
CIE(x,y) 1931	(0.436, 0.405)	BUG Rating*	B2-U0-G2
CRI	71	Street Classification*	Type II Short

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



Test Report No. LLI-19244-8

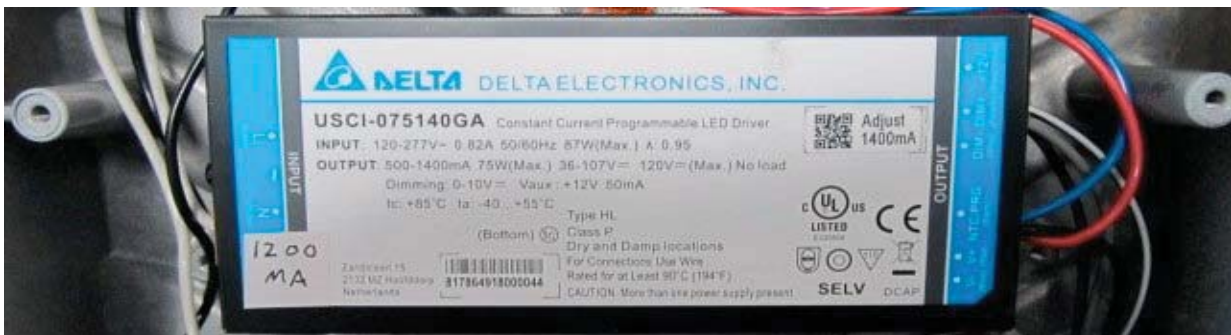
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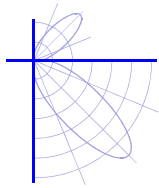
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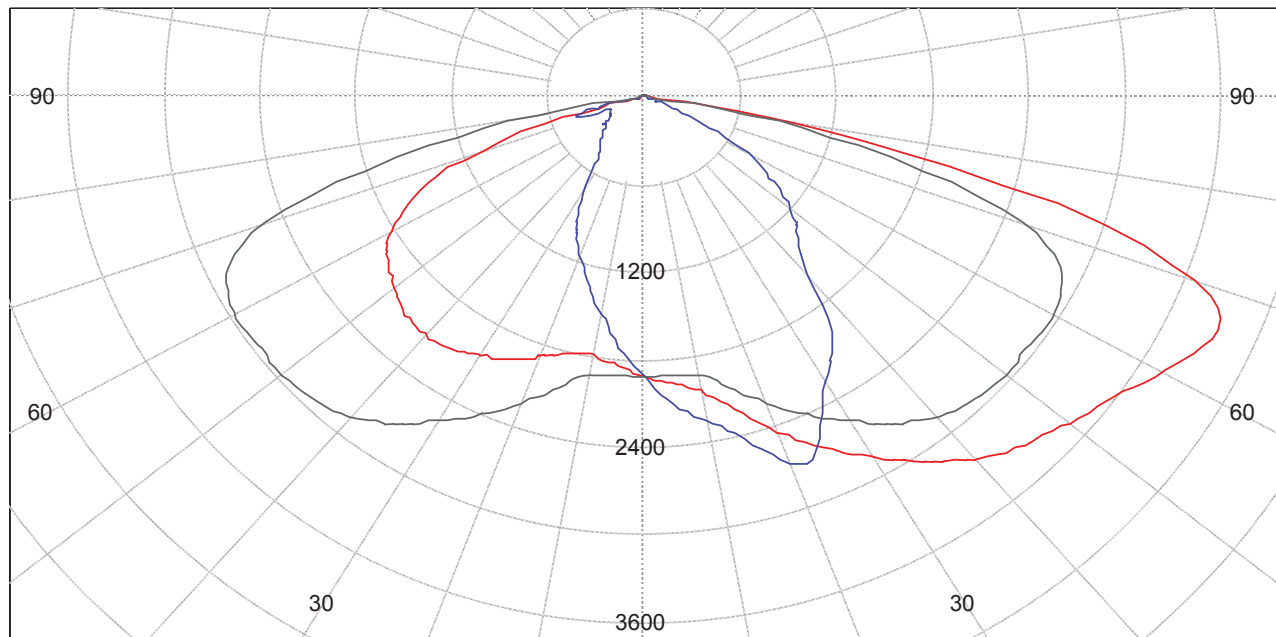
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Polar Light Distribution Curves



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 %	67.6 %	67.6 %
House Side	0.0 %	32.4 %	32.4 %
	0.0 %	100.0 %	100.0 %

Report data based on absolute values as measured.

Signed:

Ryder Tunney
Ryder Tunney
Authorized Signatory

Date of test
Date of report

20-Sep-2019
24-Sep-2019



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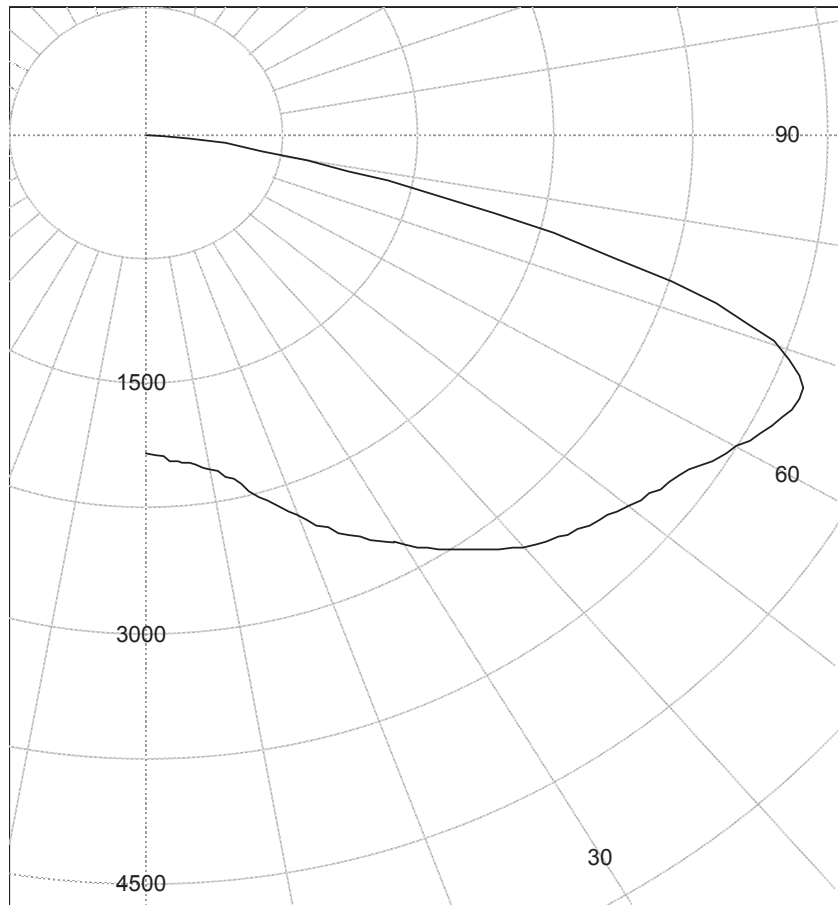
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Operating at 120v AC and 60 Hz.

Intensity in principal plane
(based on overall max intensity)

Vertical Angle (°)	Intensity (cd)
0.0	1917.4
10.0	2042.2
20.0	2442.0
30.0	2848.0
35.0	3047.3
40.0	3230.4
45.0	3363.8
47.5	3413.0
50.0	3467.2
52.5	3526.8
55.0	3576.4
57.5	3663.5
60.0	3753.8
62.5	3838.8
65.0	3913.3
67.5	3899.4
70.0	3662.6
72.5	3155.8
75.0	2322.9
77.5	1492.7
80.0	902.3
82.5	349.9
85.0	14.9
87.5	6.4
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



House side max intensity
2968.6 cd @ (90.0°, 58.0°)

Street side max intensity
3927.9 cd @ (72.5°, 66.0°)

Coordinates expressed in the C Type coordinate system

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



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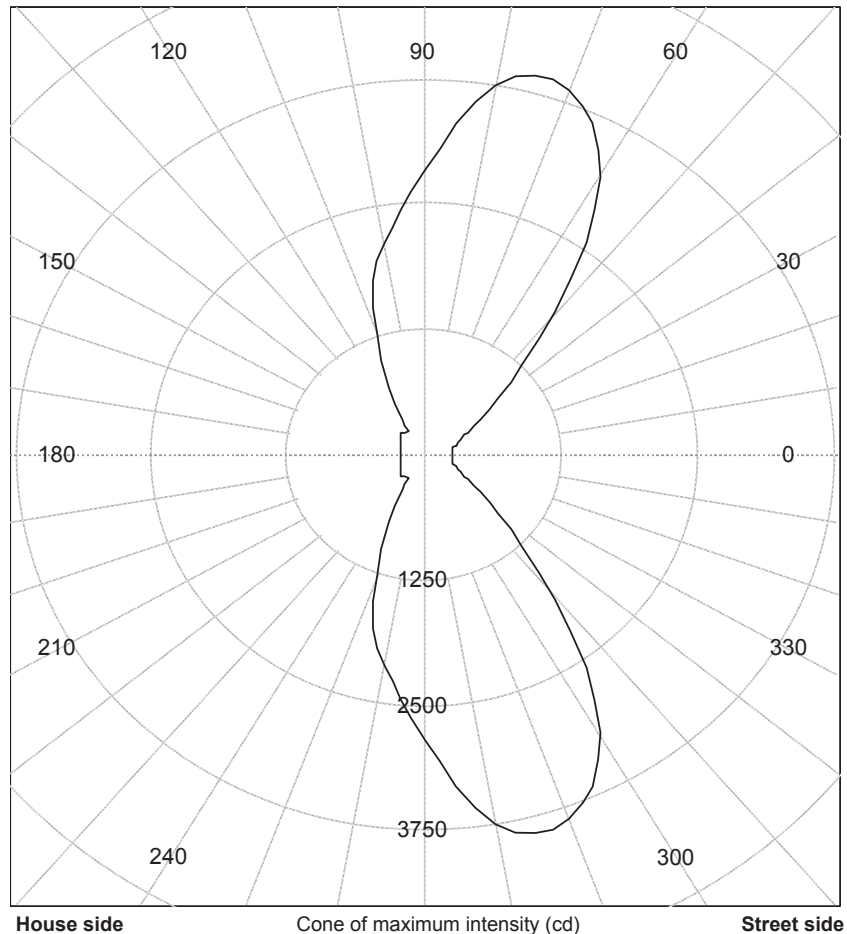
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Intensity in principal cone
(based on overall max intensity)

Lateral Plane (°)	(V66.0) (cd)
0	260.2
15	277.4
30	454.0
40	877.7
45	1262.2
50	1858.3
55	2600.0
60	3198.0
65	3658.4
70	3878.1
75	3924.6
80	3759.3
85	3322.2
90	2841.5
95	2455.4
100	2148.9
105	1790.4
110	1282.9
115	735.8
120	388.0
125	282.5
130	289.5
135	303.1
140	293.6
150	258.0
165	241.4
180	229.4

Principal Conical Surface



House side max intensity
2968.6 cd @ (90.0°, 58.0°)

Street side max intensity
3927.9 cd @ (72.5°, 66.0°)

Coordinates expressed in the C Type coordinate system

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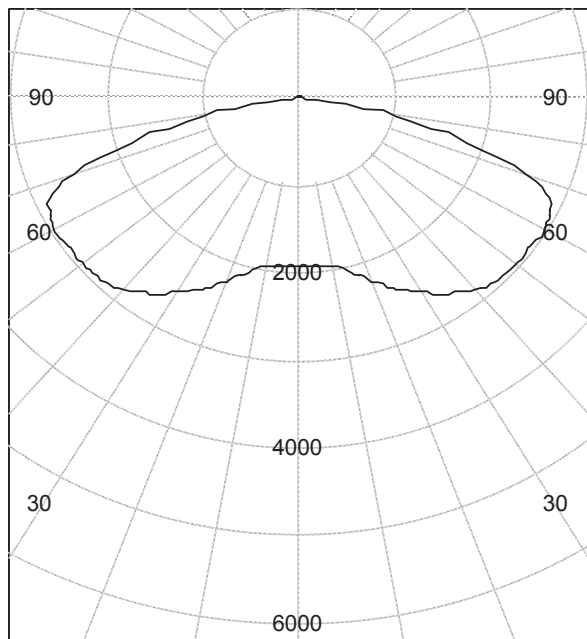
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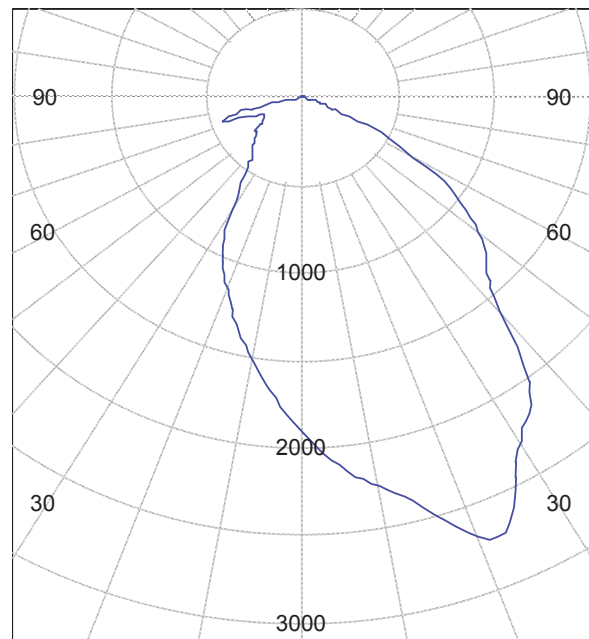
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Polar curve through L90 / L270



(L90) (cd) (L270)

Polar curve through L0 / L180



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



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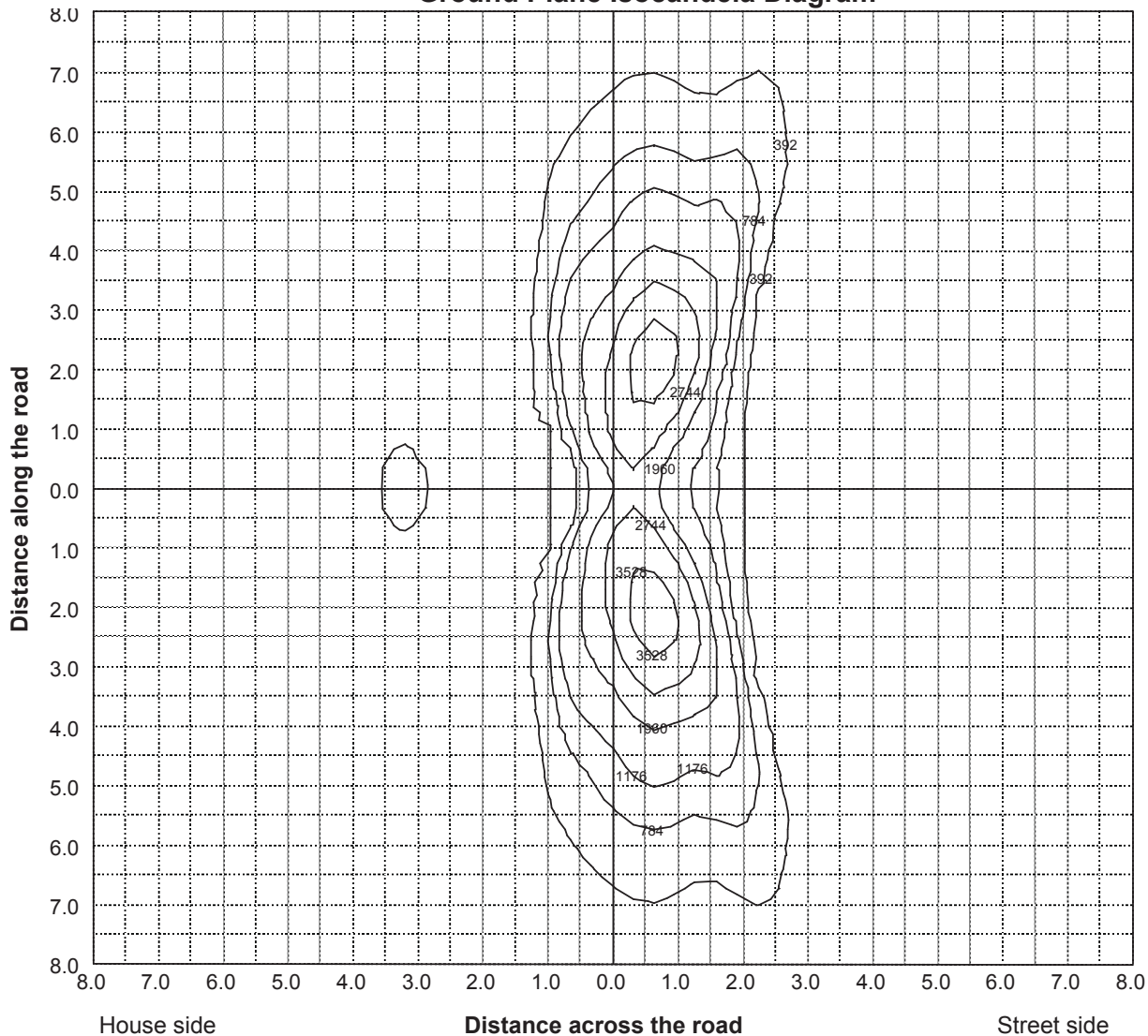
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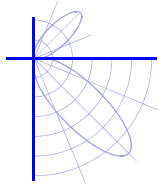
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Ground Plane Isocandela Diagram



The isocandela contour units are expressed as cd

Upstream and downstream sides have been averaged.



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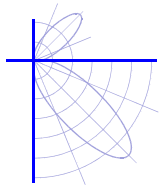
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Intensity data (cd)

Vertical	L-Plane								
	L0	L15	L30	L40	L45	L50	L55	L60	L65
0.0	1917	1917	1917	1917	1917	1917	1917	1917	1917
10.0	2259	2237	2213	2191	2176	2159	2138	2113	2081
20.0	2676	2638	2577	2545	2521	2512	2510	2505	2488
30.0	2256	2320	2617	2899	2972	2987	2954	2916	2885
35.0	2059	2121	2364	2723	2924	3071	3135	3131	3103
40.0	1583	1778	2163	2523	2752	2994	3195	3292	3295
45.0	1357	1463	1905	2354	2606	2879	3141	3326	3403
47.5	1285	1389	1786	2264	2542	2832	3098	3312	3429
50.0	1195	1299	1686	2170	2478	2785	3054	3294	3444
52.5	1082	1177	1590	2063	2419	2748	3035	3289	3474
55.0	960	1039	1455	1940	2351	2706	3018	3289	3489
57.5	850	898	1281	1794	2241	2662	3029	3330	3543
60.0	663	731	1092	1610	2063	2588	3036	3374	3608
62.5	482	530	843	1372	1789	2385	2944	3366	3664
65.0	313	340	557	1038	1429	2038	2718	3261	3679
67.5	198	215	305	639	993	1554	2364	3076	3558
70.0	139	164	187	299	555	996	1820	2699	3273
72.5	105	130	147	155	235	475	1106	2072	2721
75.0	84	103	115	114	117	173	430	1271	2079
77.5	67	84	80	87	82	87	114	538	1292
80.0	55	67	50	57	56	54	60	165	642
82.5	24	34	25	27	29	30	31	45	176
85.0	9	10	10	11	11	12	12	13	16
87.5	4	4	5	5	6	6	6	6	6
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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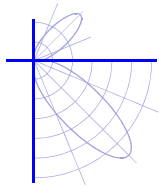
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Operating at 120v AC and 60 Hz.

Intensity data (cd)

Vertical	L-Plane								
	L70	L75	L80	L85	L90	L95	L100	L105	L110
0.0	1917	1917	1917	1917	1917	1917	1917	1917	1917
10.0	2056	2027	2000	1967	1932	1899	1860	1823	1784
20.0	2462	2416	2359	2301	2233	2156	2067	1964	1853
30.0	2865	2829	2762	2665	2563	2444	2297	2142	1981
35.0	3065	3027	2962	2844	2725	2577	2402	2216	2022
40.0	3258	3202	3126	2997	2858	2681	2470	2259	2038
45.0	3388	3327	3235	3091	2927	2715	2473	2242	2009
47.5	3436	3377	3273	3117	2940	2713	2453	2213	1979
50.0	3488	3431	3318	3146	2952	2707	2430	2175	1932
52.5	3540	3491	3368	3171	2949	2682	2394	2144	1890
55.0	3577	3546	3419	3202	2945	2655	2354	2100	1832
57.5	3656	3640	3504	3255	2966	2649	2334	2071	1770
60.0	3742	3731	3582	3295	2955	2607	2286	2015	1673
62.5	3819	3819	3660	3319	2927	2555	2241	1938	1531
65.0	3874	3906	3743	3334	2881	2497	2189	1845	1361
67.5	3830	3908	3740	3268	2755	2360	2057	1677	1144
70.0	3571	3704	3582	3067	2509	2128	1835	1413	857
72.5	3057	3205	3168	2666	2103	1780	1514	1038	540
75.0	2284	2394	2483	2101	1594	1341	1107	631	279
77.5	1565	1463	1559	1435	1108	885	674	303	128
80.0	967	792	809	834	686	512	321	111	63
82.5	334	284	224	273	246	163	75	30	28
85.0	16	14	14	14	14	14	14	13	12
87.5	6	6	7	7	7	7	6	6	6
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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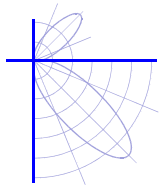
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Operating at 120v AC and 60 Hz.

Intensity data (cd)

Vertical	L-Plane								
	L115	L120	L125	L130	L135	L140	L150	L165	L180
0.0	1917	1917	1917	1917	1917	1917	1917	1917	1917
10.0	1749	1712	1677	1646	1620	1595	1559	1526	1518
20.0	1747	1649	1551	1460	1381	1318	1240	1176	1157
30.0	1825	1670	1517	1358	1211	1083	918	791	739
35.0	1835	1652	1469	1278	1087	909	684	546	509
40.0	1831	1617	1379	1134	879	664	479	432	423
45.0	1781	1524	1230	883	591	445	405	381	365
47.5	1730	1457	1112	726	480	401	390	358	337
50.0	1670	1363	962	587	410	384	372	345	321
52.5	1601	1228	802	480	384	377	359	334	312
55.0	1500	1056	636	405	369	369	344	323	283
57.5	1365	879	506	361	358	360	327	287	252
60.0	1199	717	414	336	349	346	306	264	237
62.5	1009	565	346	317	334	325	285	252	225
65.0	816	437	298	297	315	304	264	246	223
67.5	610	322	261	278	283	277	248	245	255
70.0	420	240	227	256	251	251	229	288	357
72.5	255	180	193	218	211	214	195	376	443
75.0	153	138	158	166	168	171	205	322	360
77.5	97	101	116	116	120	130	158	245	289
80.0	58	63	69	68	75	81	91	118	157
82.5	28	28	30	28	29	28	17	30	51
85.0	12	11	9	7	5	4	4	3	2
87.5	5	4	3	2	2	1	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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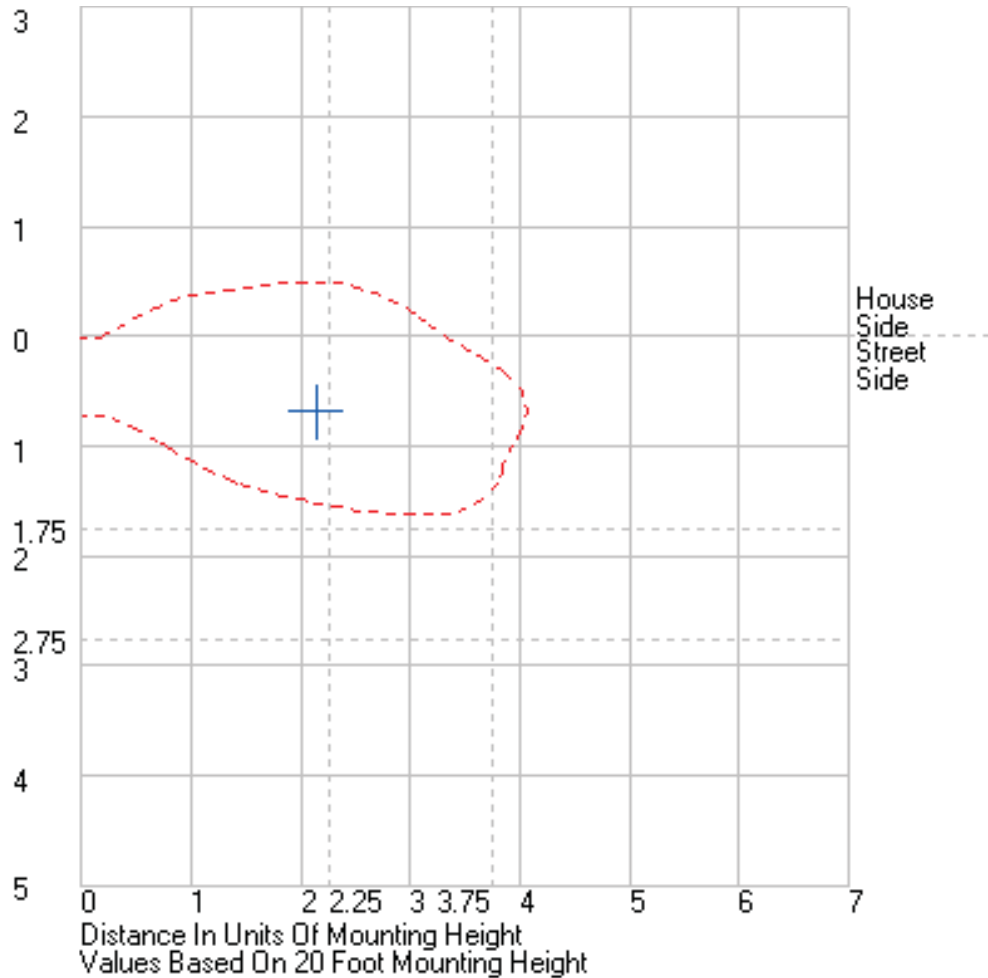
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LM-79 Performance Data

Spectral	CIE 1931 (x, y) ⁽¹⁾	(0.436, 0.405)
	CIE 1976 (u', v') ⁽¹⁾	(0.250, 0.522)
	Correlated Color Temperature (CCT) ⁽¹⁾	3010 K
	Spatial Δ (u', v') Uniformity ⁽²⁾	2.69E-03
	Color Rendering Index (Ra) ⁽¹⁾	71.0
	Special CRI 9 (R ₉) ^{(1),(3)}	-41.6
	Distance from Planckian Locus (Duv) ^{(1),(3)}	2.92E-04
	Scotopic/Photopic Ratio ^{(1),(3)}	1.22

Electrical	Voltage	120.0 V	(Setpoint 1)
	Frequency	60.0 Hz	
	Current	0.561 A	
	Power	65.8 W	
	Power Factor	0.98	
	Current THD	19 %	
	Voltage	277.0 V	(Setpoint 2)
	Frequency	60.0 Hz	
	Current	0.248 A	
	Power	64.3 W	
	Power Factor	0.94	
	Current THD	10 %	

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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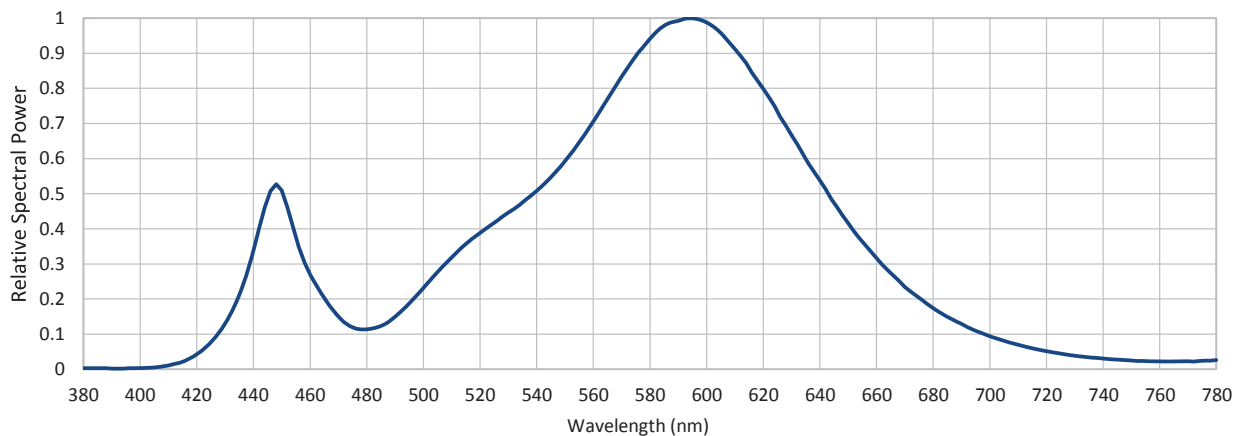
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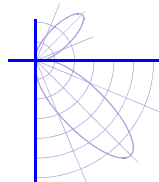
LM-79 Performance Data

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	0.269	540	0.508	620	0.799	700	0.095
385	0.003	465	0.204	545	0.547	625	0.734	705	0.081
390	0.002	470	0.150	550	0.593	630	0.667	710	0.070
395	0.003	475	0.120	555	0.646	635	0.599	715	0.060
400	0.003	480	0.114	560	0.706	640	0.538	720	0.052
405	0.006	485	0.124	565	0.769	645	0.474	725	0.045
410	0.011	490	0.150	570	0.833	650	0.416	730	0.039
415	0.022	495	0.188	575	0.892	655	0.364	735	0.034
420	0.042	500	0.232	580	0.941	660	0.317	740	0.031
425	0.078	505	0.277	585	0.978	665	0.274	745	0.028
430	0.131	510	0.319	590	0.992	670	0.235	750	0.025
435	0.212	515	0.357	595	0.999	675	0.204	755	0.023
440	0.340	520	0.389	600	0.988	680	0.174	760	0.022
445	0.485	525	0.418	605	0.958	685	0.150	765	0.023
450	0.510	530	0.446	610	0.912	690	0.129	770	0.023
455	0.376	535	0.475	615	0.859	695	0.110	775	0.024
								780	0.026





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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	(0.249, 0.520)	(0.249, 0.520)
10.0	(0.248, 0.520)	(0.250, 0.521)
20.0	(0.250, 0.521)	(0.249, 0.520)
30.0	(0.250, 0.522)	(0.251, 0.522)
40.0	(0.250, 0.522)	(0.249, 0.521)
50.0	(0.250, 0.521)	(0.250, 0.522)
60.0	(0.251, 0.522)	(0.250, 0.523)
70.0	(0.251, 0.523)	I <= 10% peak
80.0	(0.250, 0.521)	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 6.75 / 8.75 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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RT



Test Report No. LLI-19244-8

LED Roadway Lighting - Roadway luminaire. Product ID: QB 00 616S X 5 60 X 3G2S XXXX XXXX

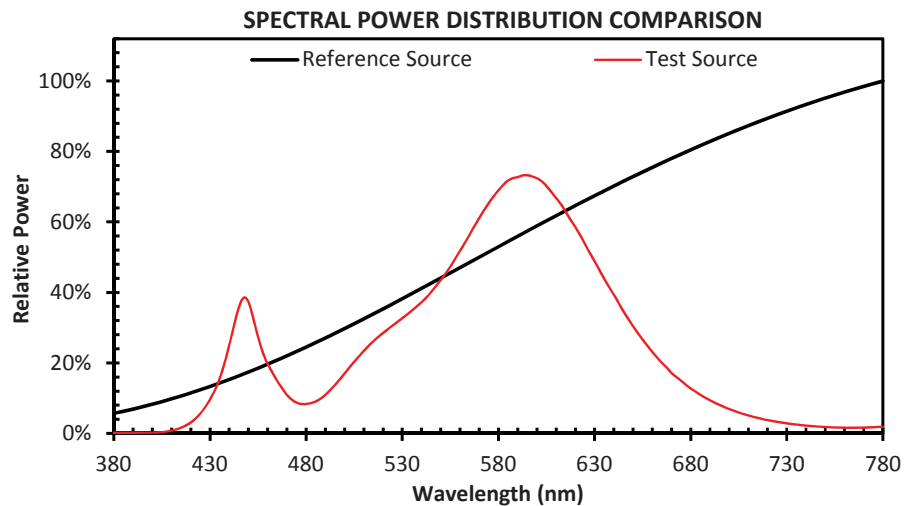
Grey cast aluminum top housing and white plastic bottom housing with clear flat glass lens.

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

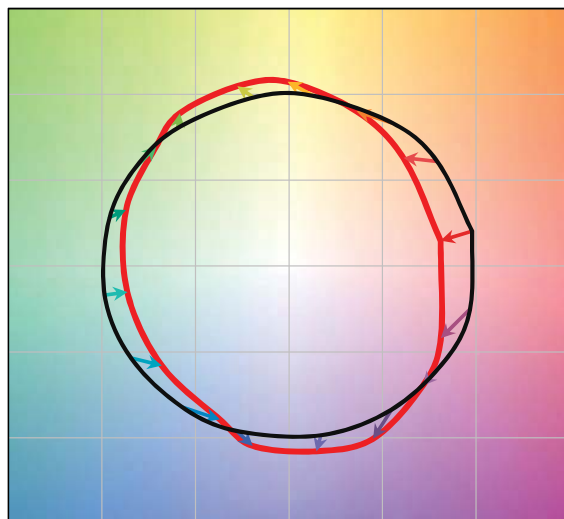
One Delta LED driver. Model: USCI-075140GA set to 1200ma.

Operating at 120v AC and 60 Hz.

R_f	72
R_g	93



COLOR VECTOR GRAPHIC

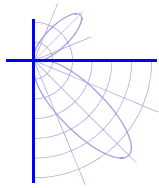


— Test Source

→ Series1

COLOR DISTORTION GRAPHIC





Test Report No. LLI-19244-8

LED Roadway Lighting - Roadway luminaire. Product ID: QB 00 616S X 5 60 X 3G2S 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 Delta LED driver. Model: USCI-075140GA set to 1200ma.

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.