



IESNA LM79-2008 Test Report

TÜV SÜD America

Photometric Testing and Evaluation in Accordance with LM79-2008

Report Prepared for:

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Sample Tested: LSU2406SU3050 / LSU2406SU30DV50
Sample Description: 2x1 Luminaire for Ambient Lighting of Interior Commercial Spaces
Manufacturer: Maxlite, Inc.

Technical Report Number: JI1403373-03-LM79
Report Issue Date: March 28th, 2014
Total Number of Pages: 10 (including this page)

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March 28, 2014

Summary of Key Test Results

Model# **LSU2406SU3050/30DV50**

Manufacturer **Maxlite, Inc.**

TÜV Sample# 1269-3

Date of Test March 28th, 2014

Notes: Tested in intended orientation
(Aperture Downward)



Parameter	Measured Result
Luminous Flux	3,017 Lumens
Input Power	32.94 Watts
Efficacy	91.59 Lumens/Watt
C.C.T.	5235 K
C.R.I. (R _a)	83.4
Beam Angle	88.0° (V) / 68.4° (H)
Stabilization Time	45 minutes
In-Situ Temp Test (ISTMT)**	NA°C (LED)

The above results are recorded / derived from measurements in accordance with LM79-08

**ISTMT in accordance with “Energy Star Program Requirements for Luminaires – Version 1.2”.



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Test Results –

The following results were obtained after stabilization of the sample in accordance with the requirements set forth in section 5.0 of IES LM79-2008. Stability is achieved when the variation of 3 readings of light output and electrical power over a period of 30 minutes, taken 15 minutes apart, is less than 0.5%.

Photometric Results	Maxlite - LSU2406SU3050
	Integrating Sphere
Total Luminous Flux (Lumens)	3017.0
Luminous Efficacy (Lumens/Watt)	91.59
Total Radiant Flux (Watts)	9.7
Correlated Color Temperature (CCT)	5235
Color Rendering Index (CRI – R _a)	83.4
R ₉ Value	15.9
Chromaticity (Chroma x / Chroma y)	0.3390 / 0.3545
Chromaticity (Chroma u / Chroma v)	0.2074 / 0.3224
Chromaticity (Chroma u' / Chroma v')	0.2074 / 0.4836
D _{uv} Value	0.00200

Electrical Results (120V unless stated otherwise)	Maxlite - LSU2406SU3050
	Integrating Sphere
Input Power (Watts)	32.94
Input Voltage (Volts AC)	120.04
Input Current (Amps)	0.277
Power Factor @120VAC	0.990
Power Factor @277VAC	0.891
Input Frequency (Hertz)	60.0
A-THD @120VAC (Current %)	7.73%
A-THD @277VAC (Current %)	11.33%

Additional Parameters	Maxlite - LSU2406SU3050
	Integrating Sphere
Stabilization Time (Light and Power)	45 minutes
Test Geometry Configuration	4π
Ambient Temperature	24.6°C
ISTMT (In-Situ Temperature Measurement)	NA°C (LED)
Spacing Criteria	1.18 (0° – 180°) / 0.98 (90° – 270°)



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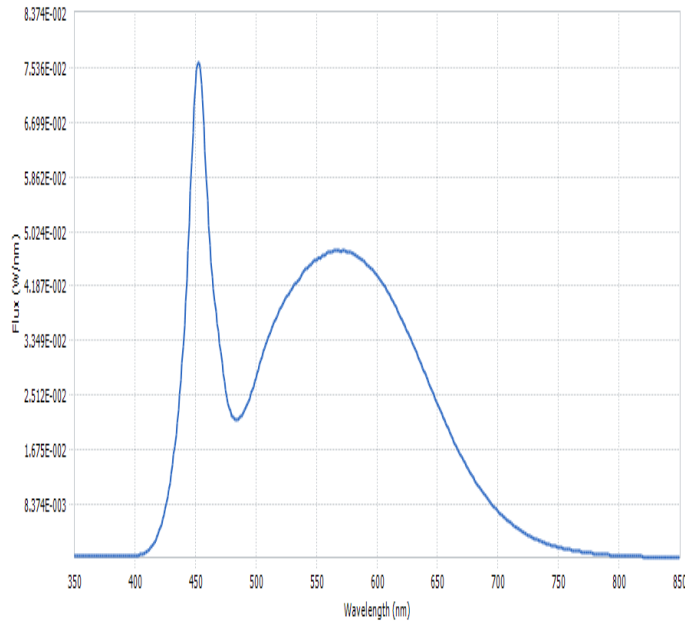
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Spectral Flux and Chromaticity Diagram

Spectral Flux

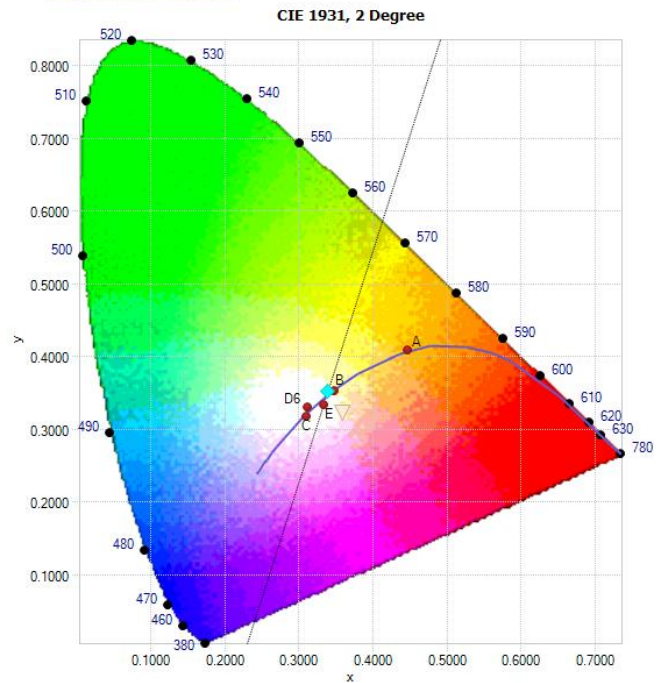
▼ SPECTRAL FLUX GRAPH:



**Spectral response of the Radiant Flux
(350nm to 850nm)**

Chromaticity Diagram

▼ CHROMATICITY DIAGRAM:



Tristimulus values (from page 4):

$$x / y = 0.3390 / 0.3514$$

The locations on the diagram of the tristimulus coordinates are indicated by the blue diamond.

Zonal Lumen Summary

Zone	Lumens	% Lamp / Luminaire
0 - 60	2193.5	72.9 %
60 - 90	607.2	20.2 %
0 - 90	2800.7	93.1 %
90 - 180	209.1	6.9 %
0 - 180	3009.7	100.0 %

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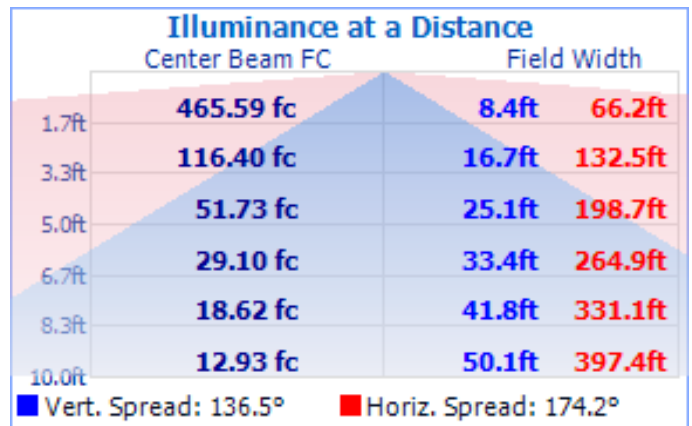
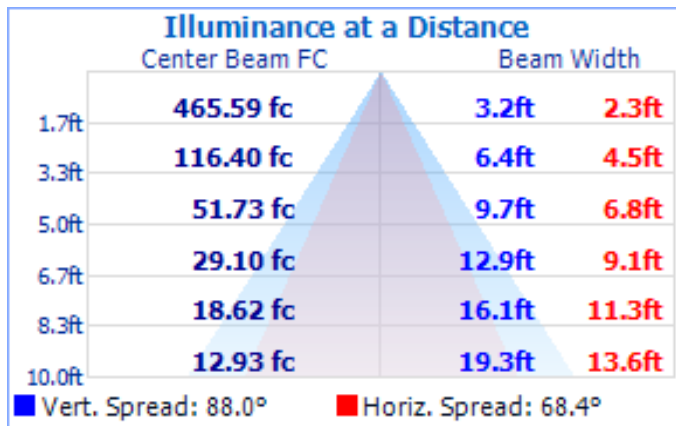


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Test Results – Illuminance Plots

The following images depict the illuminance characteristics of the luminaire.

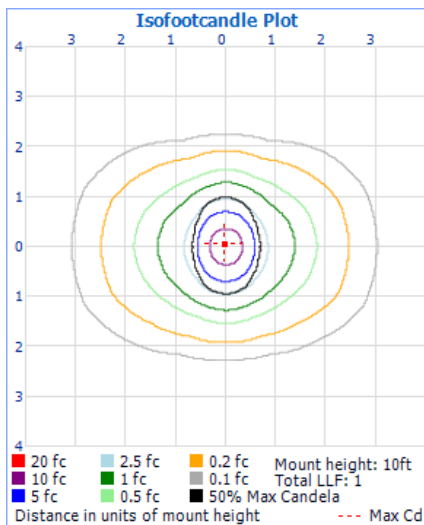


Beam Angle = 88.0° (V) / 68.4° (H)

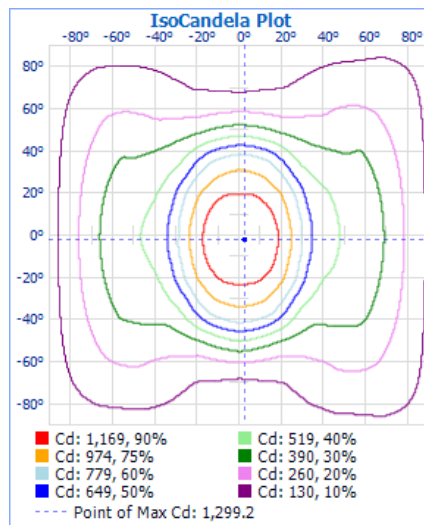
Field Angle = 136.5° (V) / 174.2° (H)

Test Results – Candela Plots

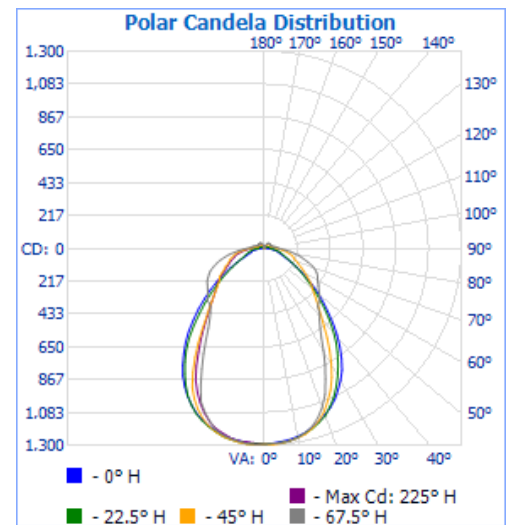
The following images depict the luminous intensity distribution characteristics of the luminaire:



Isofootcandle Plot



Isocandela Plot



Polar Candela



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Test Results – Candela Tabulation

The table below displays the tabulated Candela measurements from the IES file:

Horizontal (lateral) angles are shown in **red** across the top of the table, in increments of 22.5°.

Vertical (longitudinal) angles are shown in **blue** down the side of the table, in increments of 2.5°.

	0.0	22.5	45.0	67.5	90.0	112.5	135.0	157.5	180.0	202.5	225.0	247.5	270.0	292.5	315.0	337.5	360.0
0.0	1293	1293	1293	1293	1293	1293	1293	1293	1293	1293	1293	1293	1293	1293	1293	1293	1293
2.5	1288	1289	1297	1289	1295	1293	1296	1299	1293	1295	1299	1296	1296	1290	1289	1292	1286
5.0	1281	1290	1292	1288	1292	1293	1294	1298	1288	1296	1298	1295	1294	1288	1285	1286	1283
7.5	1274	1282	1283	1283	1285	1290	1287	1292	1282	1289	1292	1286	1286	1288	1284	1282	1273
10.0	1262	1268	1271	1270	1267	1278	1278	1283	1274	1282	1282	1277	1277	1274	1273	1273	1258
12.5	1246	1250	1256	1246	1249	1255	1266	1272	1261	1272	1272	1263	1257	1256	1253	1254	1243
15.0	1223	1231	1229	1216	1217	1230	1245	1255	1244	1253	1253	1241	1229	1228	1233	1234	1224
17.5	1197	1204	1193	1173	1166	1186	1217	1239	1228	1234	1227	1199	1183	1183	1202	1207	1201
20.0	1169	1175	1149	1114	1106	1132	1180	1208	1204	1209	1194	1151	1135	1133	1159	1177	1170
22.5	1138	1131	1092	1044	1021	1059	1126	1176	1177	1181	1150	1096	1046	1072	1107	1140	1135
25.0	1100	1084	1033	952	925	965	1069	1135	1140	1142	1097	996	944	974	1049	1091	1097
27.5	1052	1027	962	867	828	875	997	1090	1101	1098	1033	897	850	881	984	1038	1055
30.0	1005	967	882	778	744	786	913	1031	1053	1041	944	806	762	791	900	981	1008
32.5	953	904	801	699	676	706	825	964	1003	979	854	721	684	713	810	916	950
35.0	887	839	721	640	635	646	741	896	941	915	762	647	631	644	732	853	888
37.5	818	774	645	596	597	601	660	827	876	850	675	595	593	598	657	790	818
40.0	744	703	582	568	548	559	592	755	810	775	600	556	565	564	589	719	745
42.5	669	629	530	521	540	518	541	673	740	690	541	527	562	534	534	642	665
45.0	592	557	485	506	533	503	493	597	662	606	489	513	545	526	488	564	593
47.5	525	491	445	493	518	494	447	519	590	533	449	512	520	511	449	498	524
50.0	462	430	412	474	507	487	407	451	517	461	411	488	506	486	417	432	462
52.5	399	369	391	451	500	475	385	388	449	393	385	473	499	462	395	374	397
55.0	339	319	357	435	493	459	363	334	385	335	361	459	494	445	368	320	340
57.5	288	276	327	418	484	443	346	282	321	285	352	447	490	431	343	277	288
60.0	241	236	298	404	460	429	321	239	261	243	324	438	484	413	312	239	242
62.5	197	202	273	396	439	408	295	201	211	204	299	420	459	405	289	205	197
65.0	160	174	248	380	409	390	276	169	164	173	283	404	436	396	265	181	160
67.5	135	154	234	360	377	363	253	151	132	150	261	386	405	379	246	157	133
70.0	116	133	210	334	346	340	242	133	111	134	247	358	372	355	235	138	117
72.5	105	120	201	300	312	308	230	121	94	123	236	331	340	325	213	125	104
75.0	93	106	189	267	280	279	209	110	90	111	218	301	303	288	201	112	93
77.5	87	91	169	237	244	243	197	96	86	97	203	267	268	252	186	97	85
80.0	67	86	153	202	206	210	175	89	69	89	187	236	234	220	162	89	69
82.5	46	70	132	171	171	176	151	81	46	83	159	200	198	193	144	81	46
85.0	43	48	114	142	143	144	124	56	43	61	137	168	164	161	124	57	41
87.5	3	44	91	115	115	116	95	45	5	45	110	139	136	136	99	45	4
90.0	1	42	87	93	95	94	84	42	1	42	90	111	108	109	88	44	1

Maximum Candela = **1299** at Horizontal: 225.0°, Vertical: 2.5°



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Test Results – Candela Tabulation

The table below displays the tabulated Candela measurements from the IES file:

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92.5	1	42	75	88	88	89	73	37	1	41	82	93	91	92	81	42	1
95	1	39	66	83	86	83	57	34	1	37	71	87	89	88	72	41	1
97.5	1	38	52	74	78	70	47	30	0	39	55	83	85	81	61	39	1
100	1	33	47	64	65	63	45	27	1	36	49	73	78	72	51	37	1
102.5	1	30	46	57	59	53	45	29	1	35	46	66	73	65	45	35	1
105	1	31	45	51	52	48	45	26	1	32	45	56	65	58	45	32	1
107.5	1	25	45	48	50	46	45	20	1	29	45	52	56	54	45	27	1
110	1	21	45	45	48	46	45	16	1	27	45	50	54	48	45	21	1
112.5	1	18	45	46	46	45	44	20	1	24	45	46	48	47	45	19	1
115	1	15	44	45	45	45	43	17	1	18	45	47	48	47	45	17	1
117.5	1	11	44	45	45	45	43	12	1	20	45	46	47	46	45	16	1
120	1	9	44	45	45	45	42	11	1	14	44	45	46	45	45	12	1
122.5	1	11	43	45	45	45	42	10	1	13	44	45	45	45	45	11	1
125	1	7	43	45	45	45	43	10	1	11	44	45	45	45	43	11	1
127.5	1	5	41	45	45	45	40	8	1	12	43	45	45	45	43	7	1
130	1	6	40	44	45	44	41	6	1	7	44	45	45	45	42	10	1
132.5	1	5	39	44	45	44	40	9	1	9	42	45	45	45	41	7	1
135	1	5	37	44	45	45	36	5	1	7	38	45	45	45	39	8	1
137.5	1	5	34	44	44	44	32	5	1	7	39	45	45	44	36	6	1
140	1	4	27	42	43	43	27	4	1	5	34	44	45	44	30	7	1
142.5	1	4	26	41	43	39	24	5	1	5	29	43	44	44	32	4	1
145	1	6	21	39	42	39	18	2	1	6	27	42	44	42	23	3	1
147.5	1	6	18	37	39	35	16	2	1	5	26	39	44	40	18	2	1
150	1	3	18	34	38	36	9	3	1	5	21	37	41	38	12	2	1
152.5	1	5	18	30	33	27	10	1	1	5	21	31	38	35	9	3	1
155	1	3	14	25	30	21	7	1	1	6	14	28	32	29	7	1	1
157.5	1	5	13	20	24	16	3	1	1	6	15	22	29	21	6	2	1
160	1	3	8	14	17	14	4	2	1	3	12	19	23	12	4	2	1
162.5	1	3	8	16	17	5	2	1	1	3	10	15	15	7	2	2	1
165	1	2	7	8	12	3	2	2	1	3	5	10	11	4	2	1	1
167.5	1	2	5	8	8	2	2	1	1	1	6	10	9	2	2	1	1
170	1	1	4	4	6	3	2	2	1	1	4	9	4	2	1	2	1
172.5	1	1	2	3	3	2	1	1	1	2	3	6	3	2	2	1	1
175	1	1	1	2	1	1	1	1	1	1	1	1	2	1	1	1	1
177.5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
180	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1



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TÜV SÜD Photometric Testing Information

Testing is performed in accordance with the procedures outlined in IESNA LM79-2008. The sample is evaluated for photometric and electrical characteristics using an integrating sphere and a goniophotometer, located in an accredited, temperature and humidity-controlled, draft free photometric laboratory.

Sphere Geometry

The integrating spheres used for measurement utilize a “ 4π geometry” configuration in accordance with section 9 of IES LM-79-2008 and is applicable for all types of SSL products (directional and non-directional light projections). The spectroradiometer is an array-type detector manufactured and calibrated by Labsphere (Model# CDS1100).

Self-Absorption Correction

The integrating sphere uses self-absorption correction to eliminate errors due to mismatches between the standard reference lamp and the test samples being measured. This auxiliary correction lamp is a halogen type lamp powered by a calibrated Lamp Power Supply manufactured and calibrated by Labsphere (model LPS150). Ambient temperature is measured using a thermocouple located inside the integrating sphere at the same height as the sample under test (UUT) and not more than 1 meter in horizontal distance away from the sample (section 2.2 of LM79-2008). The thermocouple is located behind a baffle in order to eliminate any direct optical radiation from the sample under test.

Sample Stabilization

The sample (UUT) is placed inside the integrating sphere and powered by a regulated and conditioned alternating or direct current supply. The stabilization times shown on the results pages of this report denote the time of the 3rd measurement (of the 3 consecutive readings) since this is the minimum time that the sample is assumed to have taken to reach stabilization in accordance with section 5.0 of LM79-2008.

Sphere Calibration

The integrating sphere is calibrated using a quartzline halogen lamp with the following specifications:

Manufacturer: EYE Lighting International

Model# J94/JD28V75W

Voltage = 28.0 Volts DC

Wattage = 75.0 Watts

Calibration Current = 2.679 Amperes

Luminous Flux = 1685 Lumens

Calibration Date = 2-17-2011 (calibrated by Labsphere – NIST traceable).

Continued.....

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TÜV SÜD Photometric Testing Information (continued)

Goniophotometer

The Goniophotometer is a Mirror based Type C optical measurement system in accordance with section 9.3.1 of IESNA LM79-2008.

Goniophotometer Calibration

The Goniophotometer is calibrated using a frosted tungsten filament FDS/DZE lamp with the following specifications:

- Manufacturer: General Electric
- Part Number: CSB-110
- Lamp Number: 112-A
- Voltage: 16.52 Volts DC
- Wattage: 150.0 Watts
- Calibration Current: 4.816 Amperes
- Luminous Intensity: 151.5 Candelas
- Calibration Date: 02-13-2011 (NIST traceable)

TÜV SÜD Test Equipment List:

TÜV SÜD Sphere System – contains the following:			
Description	Manufacturer / Model#	TÜV SÜD Ref#	Calibration Due Date
Integrating Sphere	Labsphere LM760	SPH003	weekly
Spectroradiometer	Labsphere CDS1100	ATLE0048	9/7/2016
Power Analyzer	Yokogawa WT210	ATLE0058	3/7/2015
Power Source	Chroma 61602	AC003	N/A
Thermometer	Fluke 52-II	ATLE0008	11/17/2014
TÜV SÜD Mirror Goniophotometer System – contains the following:			
Goniophotometer	M.E. GONC02	GON002	Weekly
Spectroradiometer	Gigahertz Optik P9801	GIG002	Weekly
Power Analyzer	Yokogawa WT210	ATLE0031	11/16/2014
Power Source	Chroma 61603	AC007	N/A

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