NVLAP Lab Code 500089-0

Report Number:	PL10097-001B
Model:	ARE-EDG-2MP-xx-06-E-UL-xx-525-xxxx-40K
Date:	02/28/2017

Cree Racine Engineering Services Testing Laboratory (RESTL) Photometric Testing and Evaluation Report

Prepared For:

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This report contains data that are not covered by the NVLAP accreditation.

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Product Information	
Manufacturer	Cree, Inc.
Model Number (SKU)	ARE-EDG-2MP-xx-06-E-UL-xx-525-xxxx-40K
Serial Number	PL10097-001
LED Type	XP-G2

Product Description

Brown metal housing with two end caps and one mounting arm. Mesh metal plate on top. Three heat sinks each with one LED board and brown metal trim plate. One clear plastic optical lens below each LED.

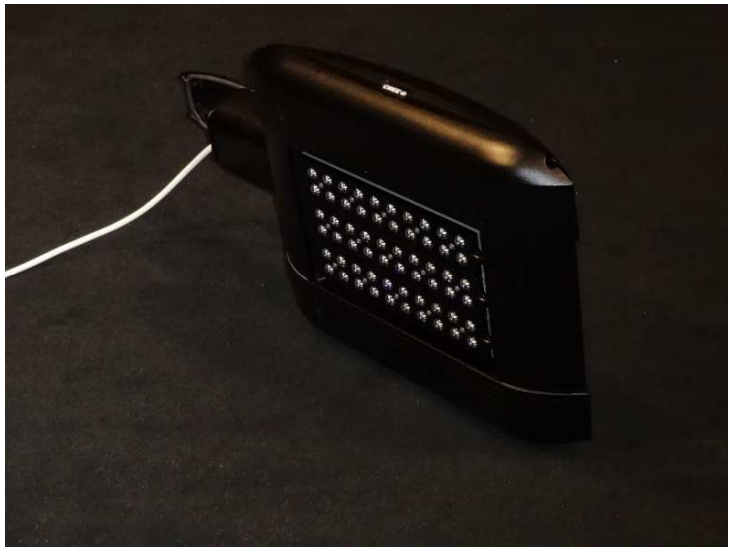
Driver Information (Where Applicable)

Philips LED-INTA-0530C-280DO

Length	Width	Height
28.0”	14.5”	4.8”

Sample

The following sample was submitted for evaluation



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Key Photometric Data	Sphere Output	Goniophotometer	
Luminous Flux	9259.0	9149.4	lm
Efficacy	90.26	89.27	lm/W
Correlated Color Temperature (CCT)	4003	K	
Color Rendering Index (CRI)	75		
R_9	-15		
Duv	0.002491		
S/P Ratio*	1.55		

	Sphere		Goniophotometer		
Electrical Measurements	**120V**	**277V**	**120V**	**277V**	
Input Wattage	102.58	101.67	102.55	101.57	W
Input Current	0.86	0.86	0.86	0.39	A
Input Voltage	120.08	277.06	120.08	277.22	V
Power Factor	0.997	0.947	0.996	0.946	
Off-State Power	0	0	0	0	W
Total Harmonic Distortion (Voltage)	0.05	0.05	0.11	0.13	%
Total Harmonic Distortion (Amperage)	6.35	11.06	7.06	12.01	%

Note: All photometric measurements taken at 120VAC.

Luminous Intensity Distribution	Goniophotometer	
Max Candela	6438.3	Cd
Angle of Max Candela (Horizontal)	75	°
Angle of Max Candela (Vertical)	67.5	°

Key Test Parameters	Sphere Output	Goniophotometer	
Stabilization Time	85	86	min
Total Operating Time (Stabilization + Test)	90	103	min
Ambient Temperature	24.9	25.0	°C

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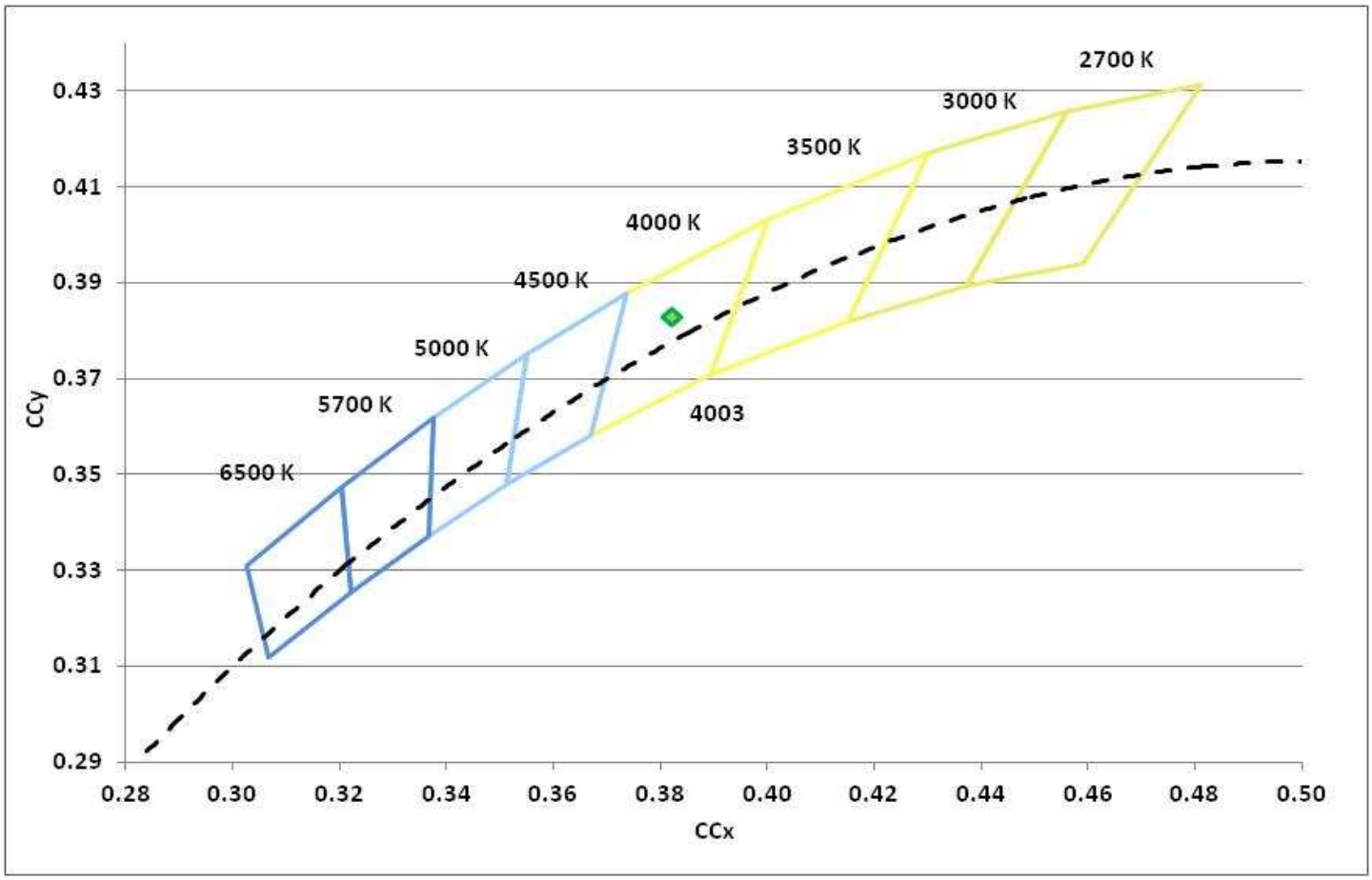
Chromaticity Coordinates

x	y	u	v	u'	v'	Duv
0.3820	0.3831	0.2236	0.3364	0.2236	0.5046	0.002491

Color Rendering Index Details

Ra	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14
75	73	80	86	75	72	72	83	58	-15	53	71	46	74	92

Chromaticity Diagram



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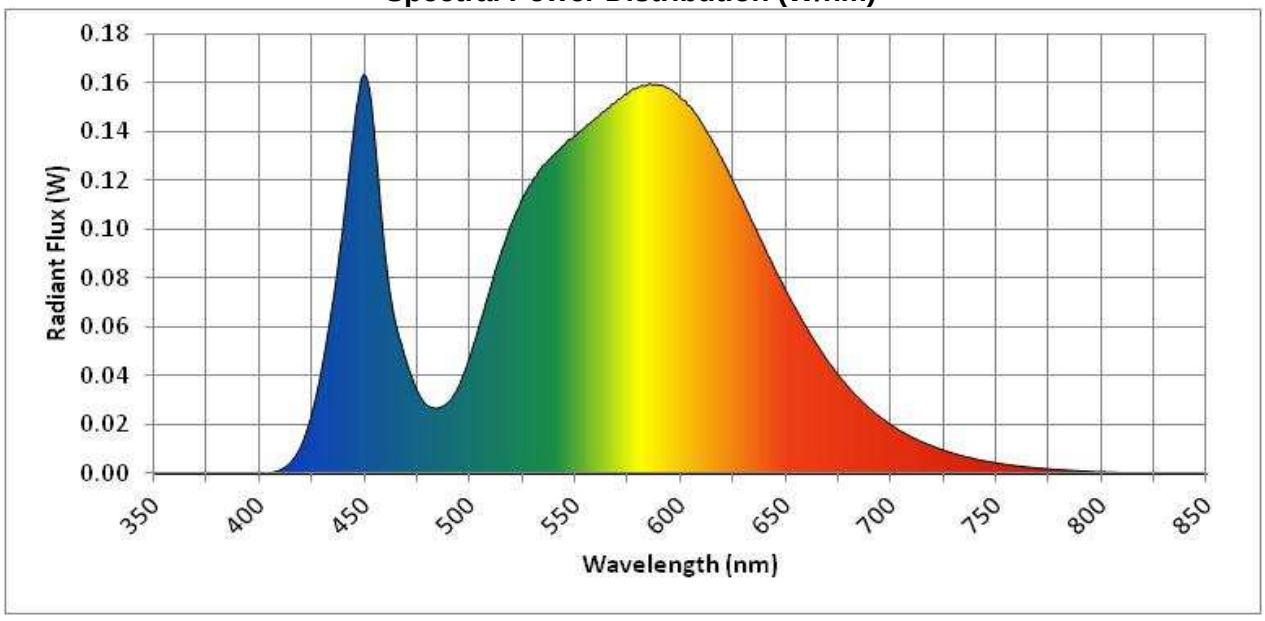
Spectral Distribution

λ(nm)	W/nm	λ(nm)	W/nm	λ(nm)	W/nm
360	0.000016	530	0.121523	700	0.020133
370	0.000016	540	0.131628	710	0.015079
380	0.000013	550	0.138973	720	0.011343
390	0.000030	560	0.146270	730	0.008423
400	0.000094	570	0.153846	740	0.006209
410	0.002053	580	0.158607	750	0.004583
420	0.012894	590	0.159603	760	0.003415
430	0.047145	600	0.153835	770	0.002543
440	0.107057	610	0.143477	780	0.001857
450	0.163554	620	0.128101	790	0.001362
460	0.084966	630	0.110530	800	0.000984
470	0.044660	640	0.092218	810	0.000683
480	0.027851	650	0.074741	820	0.000448
490	0.030143	660	0.059451	830	0.000297
500	0.049347	670	0.045924		
510	0.078393	680	0.035166		
520	0.104091	690	0.026781		

Dominant Wavelength	577	nm
Peak Wavelength	449	nm

Spectral Power Distribution (W/nm)



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Zonal Lumen Summary

Zone	Lumens	% of Total	Zone	Lumens	% of Total
0-5	24.5	0.3%	90-95	0	0%
5-10	74.8	0.8%	95-100	0	0%
10-15	133.7	1.5%	100-105	0	0%
15-20	203.1	2.2%	105-110	0	0%
20-25	283.7	3.1%	110-115	0	0%
25-30	381.6	4.2%	115-120	0	0%
30-35	496.8	5.4%	120-125	0	0%
35-40	635.7	6.9%	125-130	0	0%
40-45	799.7	8.7%	130-135	0	0%
45-50	993.5	10.9%	135-140	0	0%
50-55	1,153.7	12.6%	140-145	0	0%
55-60	1,176.4	12.9%	145-150	0	0%
60-65	1,038.3	11.3%	150-155	0	0%
65-70	796.0	8.7%	155-160	0	0%
70-75	534.0	5.8%	160-165	0	0%
75-80	301.1	3.3%	165-170	0	0%
80-85	110.6	1.2%	170-175	0	0%
85-90	12.0	0.1%	175-180	0	0%
			Total	**9149.4 lm**	**100%**

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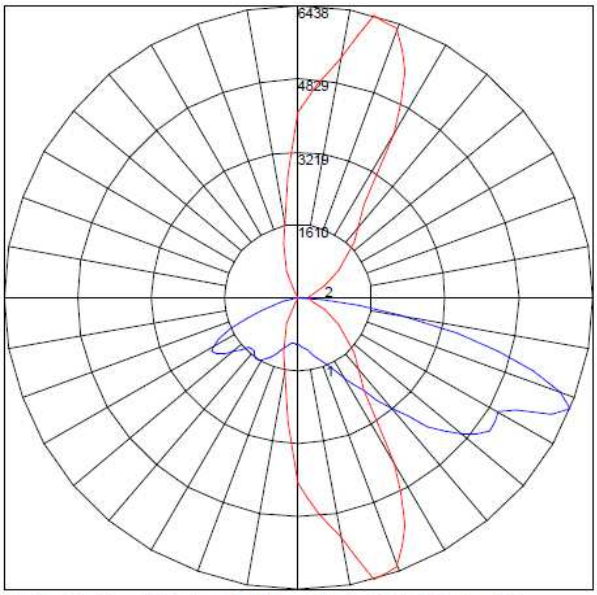
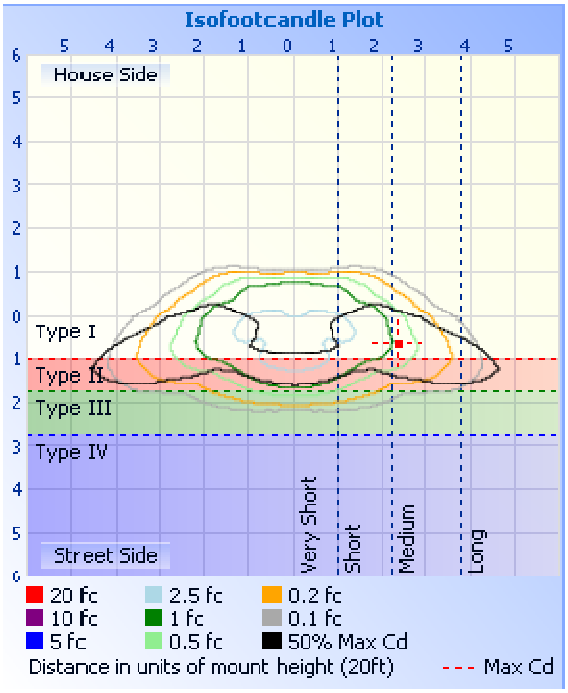
Candela Plot

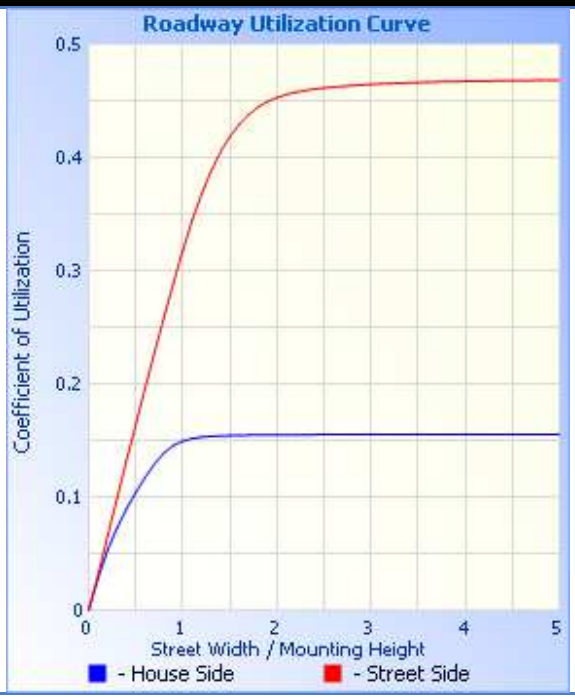


Maximum Candela = 6438.3 Located At Horizontal Angle = 75, Vertical Angle = 67.5
1 - Vertical Plane Through Horizontal Angles (75 - 255) (Through Max. Cd.)
2 - Horizontal Cone Through Vertical Angle (67.5) (Through Max. Cd.)

Illuminance Plot

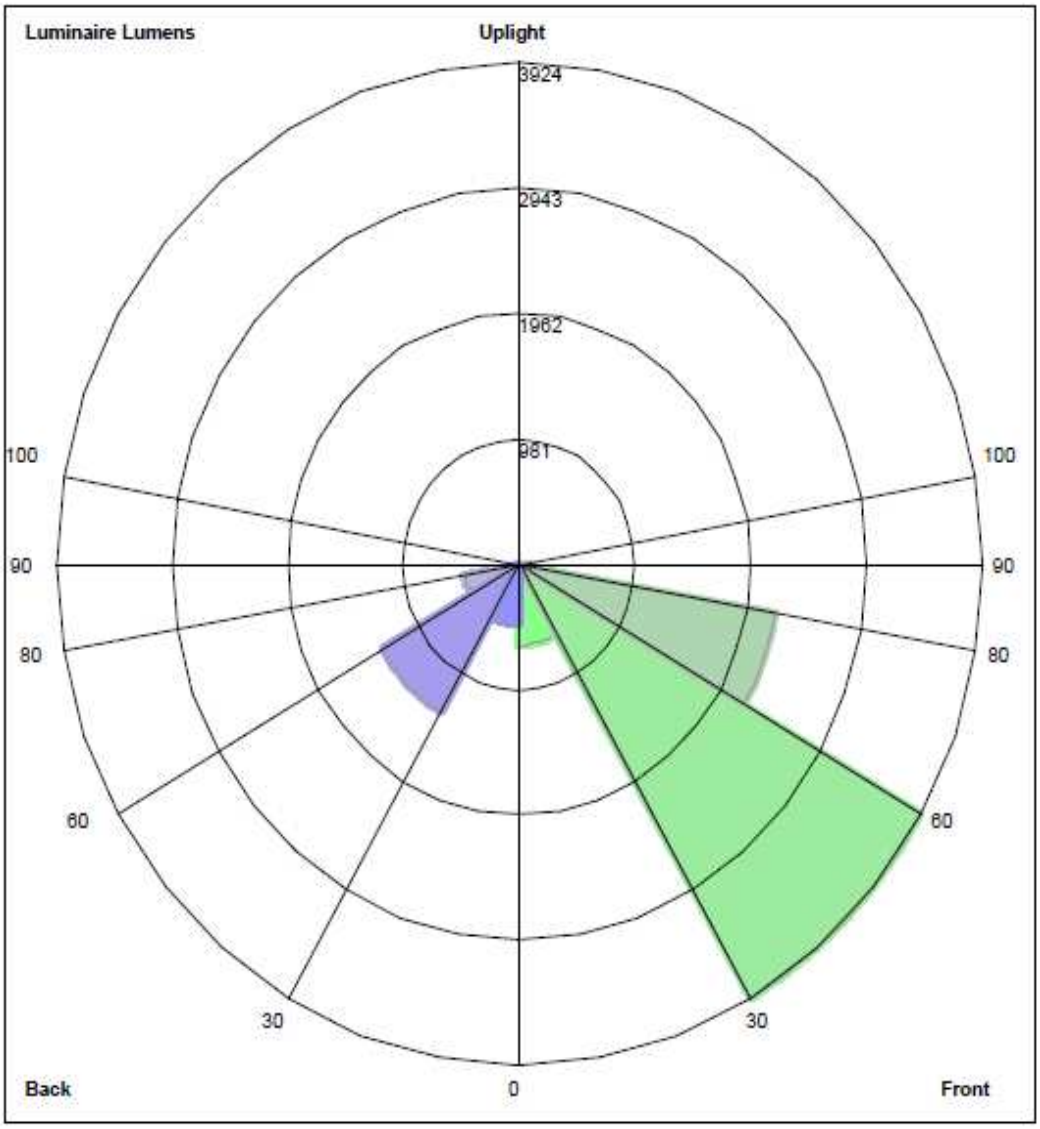


Roadway Utilization



Roadway Summary	Lumens	% Lamp
Distribution	TYPE II, MEDIUM	
Downward Street Side	6871.0	75.1%
Downward House Side	2277.8	24.9%
Downward Total	9148.8	100.0%
Upward Street Side	0.0	0.0%
Upward House Side	0.0	0.0%
Upward Total	0.0	0.0%
Total Lumens	**9148.8**	**100.0%**

Luminaire Classification System



Luminaire Lumens:
Front: Low=632.5, Medium=3923.6, High=2200.3, Very High=114.0
Back: Low=468.2, Medium=1330.9, High=470.1, Very High=8.7
Uplight: Low=0.0, High=0.0

BUG Rating : B2-U0-G2

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Candela Tabulations

	0	5	15	25	35	45	55	60	62.5	65	67.5	70	72.5	75	77.5	80	82.5	85	87.5	90	95	105	115	125	135	145	155	165	175	180
0	1036	1036	1036	1036	1036	1036	1036	1036	1036	1036	1036	1036	1036	1036	1036	1036	1036	1036	1036	1036	1036	1036	1036	1036	1036	1036	1036	1036	1036	1036
2.5	1076	1077	1076	1078	1077	1073	1071	1068	1065	1062	1061	1060	1059	1058	1054	1051	1047	1044	1040	1036	1031	1022	1005	994	981	974	967	963	962	958
5	1073	1076	1076	1081	1087	1094	1101	1101	1098	1096	1094	1093	1090	1088	1082	1076	1070	1063	1056	1049	1037	1012	982	961	939	927	917	910	908	908
7.5	1117	1124	1118	1114	1114	1117	1132	1137	1138	1138	1137	1136	1133	1130	1122	1114	1104	1094	1083	1071	1052	1017	981	955	933	921	912	906	904	906
10	1211	1218	1210	1191	1167	1159	1169	1179	1182	1186	1188	1190	1186	1183	1173	1162	1148	1134	1119	1103	1078	1040	1001	975	954	940	930	922	919	922
12.5	1227	1234	1245	1268	1264	1221	1220	1230	1235	1240	1246	1253	1251	1250	1237	1225	1206	1188	1169	1150	1123	1084	1044	1016	989	969	955	948	946	950
15	1248	1258	1267	1290	1322	1321	1280	1288	1295	1301	1312	1322	1324	1327	1314	1301	1278	1255	1235	1215	1187	1146	1102	1060	1020	1003	992	984	980	985
17.5	1343	1355	1349	1352	1374	1409	1358	1347	1353	1359	1374	1389	1398	1407	1396	1384	1361	1337	1318	1299	1273	1223	1156	1089	1051	1034	1016	1001	993	997
20	1452	1467	1458	1444	1444	1468	1456	1411	1413	1415	1434	1453	1473	1492	1486	1480	1458	1436	1419	1402	1378	1307	1192	1112	1073	1043	1004	983	974	980
22.5	1586	1602	1582	1557	1523	1528	1553	1498	1489	1480	1502	1525	1558	1591	1594	1598	1578	1559	1545	1532	1503	1378	1219	1125	1068	1013	991	989	990	998
25	1751	1765	1730	1679	1616	1583	1633	1603	1585	1567	1592	1617	1663	1710	1729	1748	1738	1728	1715	1702	1654	1448	1227	1117	1037	1005	1009	1016	1017	1026
27.5	1947	1960	1907	1819	1719	1649	1691	1716	1697	1677	1707	1737	1805	1872	1914	1955	1955	1955	1935	1916	1827	1519	1212	1084	1024	1022	1030	1035	1035	1043
30	2147	2164	2101	1981	1836	1729	1741	1804	1803	1803	1848	1894	1981	2068	2128	2188	2194	2200	2169	2138	2005	1572	1171	1052	1036	1041	1045	1044	1041	1049
32.5	2344	2365	2296	2158	1972	1822	1791	1868	1910	1952	2013	2075	2174	2272	2344	2416	2418	2421	2376	2331	2155	1618	1135	1042	1054	1056	1052	1049	1045	1053
35	2553	2577	2498	2340	2122	1933	1873	1970	2058	2146	2229	2311	2412	2514	2583	2652	2639	2626	2558	2490	2265	1634	1108	1063	1074	1072	1063	1053	1044	1050
37.5	2850	2871	2779	2572	2307	2086	2012	2145	2279	2413	2527	2642	2742	2842	2897	2953	2910	2868	2764	2661	2359	1590	1118	1118	1113	1103	1061	1002	965	960
40	3149	3166	3078	2846	2529	2270	2223	2408	2569	2731	2868	3004	3103	3201	3239	3277	3205	3132	3000	2868	2482	1530	1184	1198	1176	1128	972	830	767	746
42.5	3445	3467	3381	3138	2787	2465	2494	2771	2946	3122	3265	3408	3481	3554	3554	3555	3459	3364	3215	3066	2634	1506	1286	1295	1238	1042	748	564	496	475
45	3828	3861	3784	3537	3116	2703	2751	3207	3423	3639	3802	3964	3995	4026	3956	3886	3746	3606	3431	3255	2797	1564	1410	1400	1236	827	478	327	279	269
47.5	4169	4194	4160	4011	3619	3038	2922	3496	3748	4001	4175	4349	4356	4363	4249	4135	3977	3819	3622	3425	2964	1687	1564	1519	1126	567	276	178	148	141
50	4279	4291	4326	4315	4094	3510	3186	3778	4055	4332	4510	4689	4682	4674	4522	4370	4200	4029	3818	3608	3136	1855	1731	1603	933	346	150	89	74	70
52.5	4090	4102	4182	4290	4267	3905	3576	4132	4395	4658	4831	5004	4973	4942	4752	4563	4387	4212	4010	3809	3332	2032	1872	1570	690	191	77	45	38	37
55	3749	3756	3864	4035	4124	4020	3964	4532	4747	4962	5076	5190	5152	5114	4907	4700	4527	4354	4182	4009	3546	2171	1938	1392	456	95	38	24	22	22
57.5	3238	3221	3337	3548	3747	3848	4165	4818	5027	5235	5234	5234	5170	5106	4926	4746	4627	4508	4380	4253	3788	2230	1871	1100	262	47	22	16	15	15
60	2476	2457	2623	2885	3166	3488	4083	4840	5135	5430	5383	5336	5190	5045	4955	4866	4839	4813	4740	4668	3997	2170	1637	759	137	24	14	12	11	10
62.5	1464	1461	1692	2069	2473	2948	3762	4629	5103	5576	5646	5716	5545	5375	5328	5281	5256	5231	5105	4979	3991	1978	1291	457	68	15	11	9	8	8
65	534	544	758	1208	1714	2319	3218	4493	5133	5773	6066	6359	6244	6128	5837	5547	5378	5208	4972	4735	3463	1649	940	256	38	12	9	7	6	6
67.5	244	246	342	630	1065	1714	2506	4170	4848	5526	5923	6321	6380	6438	5898	5357	5051	4746	4424	4102	2731	1246	624	146	24	10	7	5	5	5
70	150	151	207	372	669	1156	1776	3440	4144	4848	5275	5702	5911	6120	5522	4925	4512	4099	3764	3429	2057	871	378	81	18	8	6	4	4	3
72.5	98	103	165	287	496	725	1180	2452	3242	4032	4444	4857	5133	5408	4892	4377	3909	3441	3104	2767	1454	560	225	44	14	7	4	3	2	2
75	69	73	131	234	407	441	742	1573	2381	3190	3585	3980	4259	4537	4137	3738	3271	2805	2452	2099	933	318	136	24	11	5	3	2	1	1
77.5	49	51	90	172	322	267	466	976	1650	2324	2732	3140	3356	3572	3259	2947	2536	2126	1780	1433	522	170	83	13	8	3	2	1	0	0
80	34	36	63	118	222	155	298	572	1000	1429	1742	2056	2145	2234	2027	1820	1549	1278	1028	778	236	74	37	8	6	2	1	0	0	0
82.5	18	20	40	81	136	76	170	284	521	758	988	1218	1280	1341	1216	1092	924	755	588	420	100	30	16	5	3	1	0	0	0	0
85	5	6	18	45	61	27	76	104	197	290	381	471	495	519	470	422	356	289	218	147	28	10	6	3	1	0	0	0	0	0
87.5	2	2	5	10	6	2	11	11	18	25	27	29	27	26	21	16	12	9	8	6	5	4	3	1	0	0	0	0	0	0
90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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Candela Tabulations (Continued)

	0	5	15	25	35	45	55	60	62.5	65	67.5	70	72.5	75	77.5	80	82.5	85	87.5	90	95	105	115	125	135	145	155	165	175	180
92.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
97.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
102.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
105	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
107.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
112.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
115	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
117.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
120	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
122.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
125	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
127.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
130	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
132.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
135	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
137.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
140	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
142.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
145	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
147.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
150	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
152.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
155	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
157.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
160	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
162.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
165	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
167.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
170	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
172.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
175	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
177.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
180	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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Integrating Sphere Equipment List

Description	Manufacturer	Model	Serial Number
2M Sphere	Everfine	2M	1004156T
CCD Array Spectrometer	Otsuka	MC-9801	98010360
Programmable AC Source	Adaptive	FC200	2280220
Power Analyzer	Yokogawa	WT310	C2QC04045V

Goniophotometer Equipment List

Description	Manufacturer	Model	Serial Number
AC Power Source	Chroma	61602	616020002300
Type C Goniophotometer	LSI / UL	6440T	6440PN2028
Spectroradiometer	Gooch & Housego	770VIS/NIR	12415212
Power Meter	Yokogawa	WT210	91M945458

Test Methods Used:

Title	Description
ANSI C82.77:2002	Harmonic Emission Limits- Related Power Quality Reqt's for Lighting Equipment
CIE Pub. 13.3:1995	Method of Measuring and Specifying Color Rendering of Light Sources
CIE Pub. 15:2004	Colorimetry
IES LM-58:1994	Spectroradiometric Measurements
IES LM-79:2008	Electrical and Photometric Measurements of Solid-State Lighting Products

Reference Standard Used:

Equipment	Description
2m Sphere	Tungsten Halogen Omni-Directional 75W Calibration Lamp, Serial Number F119
Type C Goniophotometer and Spectrometer	Tungsten Halogen Omni-Directional 500W Calibration Lamp, Serial Numbers 13C069. 13C070, 13C071. For color calibration of spectrometer, 13C074.

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In the event that the recorded temperature is outside of 25 ± 1˚C, this is considered a non-standard condition.

** In the event that testing is subcontracted, test results in this report marked with the symbol **, or noted as “Sphere” or “Integrating Sphere”, were performed by the subcontracted laboratory identified in the footer on the first page of this report. Subcontracted testing is strictly integrating sphere based. All other tests are performed using a Type C goniophotometer.

The integrating sphere information in the equipment list, report items marked with **, or results specifically identified as “Sphere” or “Integrating Sphere”, are the actual equipment used, and test results produced, by the subcontracted laboratory when subcontracting is indicated on the cover page.

Additional Comments:

The photos below are intended to show the orientation and fixturing/set-up of the units under test. These are critical to understanding the results of the test given the sensitivity of many products and measurement systems to orientation and set-up considerations, and also for reproducing the conditions of the test.

Goniophotometer

Integrating Sphere

Document Revision History:

Each subsequent revision of this report replaces the preceding report.

Date	Rev	DCN #	Change at the time of this test	By	Approval
01/27/17	A	DMS	Origination	A. Gressel	C. McLaurin
02/28/17	B	DMS	Updated Driver Information	A. Gressel	C. McLaurin