NVLAP Lab Code 500089-0

Report Number:	PL10097-003B
Model:	ARE-EDG-4MP-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-4MP-xx-06-E-UL-xx-525-xxxx-40K
Serial Number	PL10097-003
LED Type	XP-G2

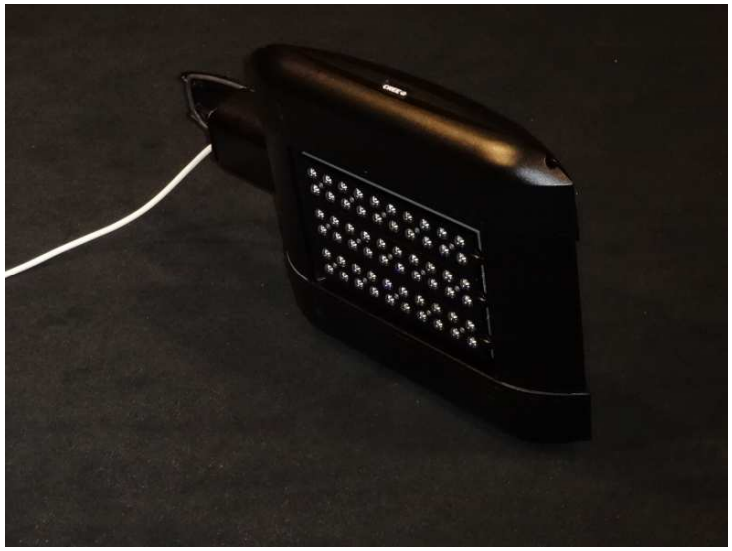
Product Description
Brown metal housing with two end caps and one mounting arm. Mesh metal plate on top. Three heat sinks each with one LED board and brown metal trim plate. One clear plastic optical lens below each LED.

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	9561.0	9410.1	lm
Efficacy	93.27	91.95	lm/W
Correlated Color Temperature (CCT)	3999		K
Color Rendering Index (CRI)	75		
R_9	-16		
Duv	0.002711		
S/P Ratio*	1.55		

	Sphere		Goniophotometer		
Electrical Measurements	**120V**	**277V**	**120V**	**277V**	
Input Wattage	102.51	101.65	102.34	101.64	W
Input Current	0.86	0.39	0.86	0.39	A
Input Voltage	120.03	277.06	119.93	277.28	V
Power Factor	0.997	0.947	0.997	0.946	
Off-State Power	0	0	0	0	W
Total Harmonic Distortion (Voltage)	0.04	0.05	0.14	0.06	%
Total Harmonic Distortion (Amperage)	6.34	11.07	7.06	12.07	%

Note: All photometric measurements taken at 120VAC.

Luminous Intensity Distribution	Goniophotometer	
Max Candela	6218.3	Cd
Angle of Max Candela (Horizontal)	45	°
Angle of Max Candela (Vertical)	60	°

Key Test Parameters	Sphere Output	Goniophotometer	
Stabilization Time	98	126	min
Total Operating Time (Stabilization + Test)	103	146	min
Ambient Temperature	25.2	24.2	˚C

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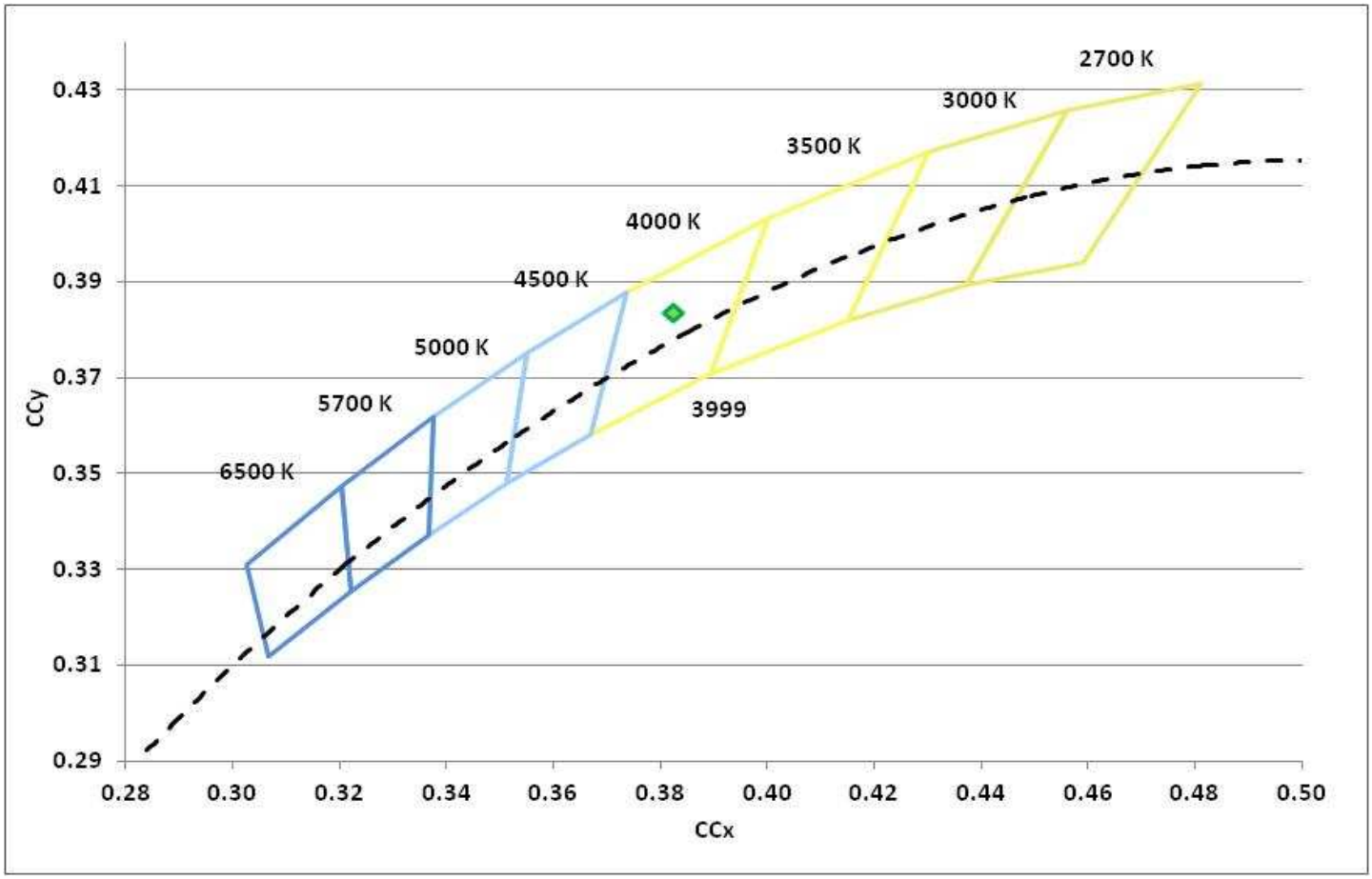
Chromaticity Coordinates

x	y	u	v	u'	v'	Duv
0.3823	0.3837	0.2236	0.3366	0.2236	0.5049	0.002711

Color Rendering Index Details

Ra	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14
75	72	80	86	75	72	72	83	58	-16	53	71	46	74	92

Chromaticity Diagram



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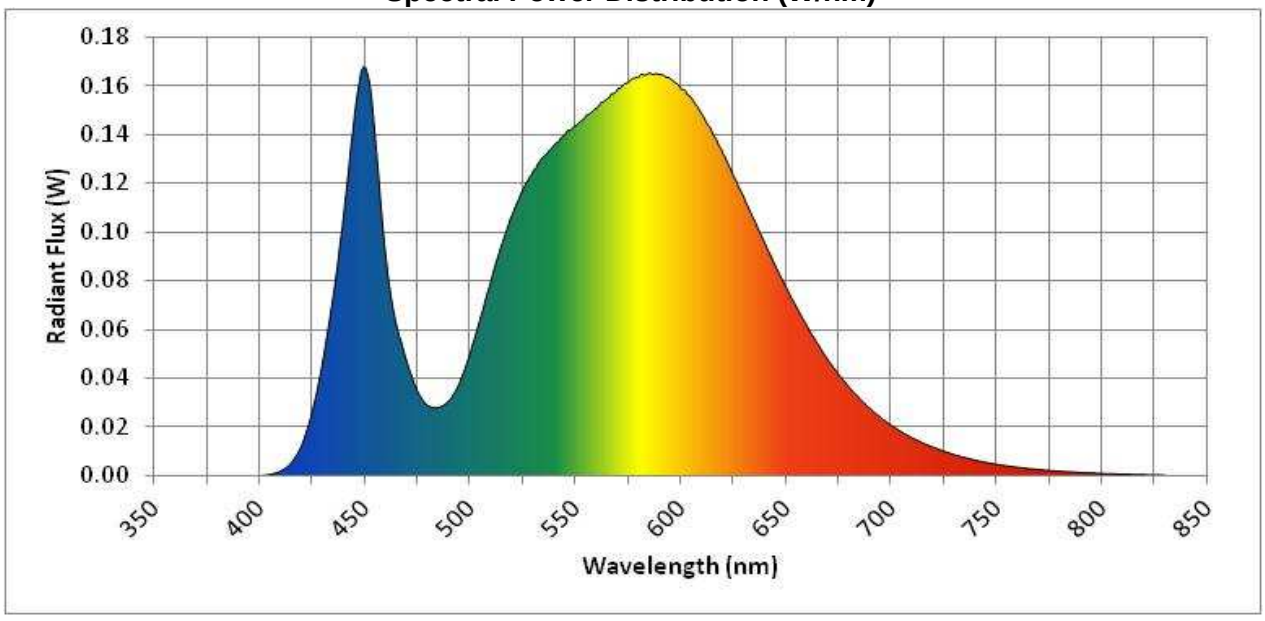
Spectral Distribution

λ(nm)	W/nm	λ(nm)	W/nm	λ(nm)	W/nm
360	0.000008	530	0.125565	700	0.020762
370	0.000011	540	0.136002	710	0.015507
380	0.000016	550	0.143567	720	0.011686
390	0.000006	560	0.150918	730	0.008688
400	0.000112	570	0.158929	740	0.006416
410	0.002152	580	0.163674	750	0.004756
420	0.013281	590	0.164798	760	0.003499
430	0.048547	600	0.158840	770	0.002596
440	0.109993	610	0.148245	780	0.001910
450	0.167529	620	0.132121	790	0.001424
460	0.087163	630	0.113941	800	0.001021
470	0.045765	640	0.095127	810	0.000729
480	0.028724	650	0.077170	820	0.000496
490	0.031133	660	0.061308	830	0.000277
500	0.050967	670	0.047370		
510	0.080975	680	0.036229		
520	0.107560	690	0.027595		

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	23.6	0.3%	90-95	0	0%
5-10	74.2	0.8%	95-100	0	0%
10-15	134.0	1.4%	100-105	0	0%
15-20	206.3	2.2%	105-110	0	0%
20-25	293.3	3.1%	110-115	0	0%
25-30	398.2	4.2%	115-120	0	0%
30-35	516.6	5.5%	120-125	0	0%
35-40	620.7	6.6%	125-130	0	0%
40-45	730.5	7.8%	130-135	0	0%
45-50	925.8	9.8%	135-140	0	0%
50-55	1,198.8	12.7%	140-145	0	0%
55-60	1,252.7	13.3%	145-150	0	0%
60-65	1,176.5	12.5%	150-155	0	0%
65-70	905.8	9.6%	155-160	0	0%
70-75	562.3	6.0%	160-165	0	0%
75-80	275.4	2.9%	165-170	0	0%
80-85	100.8	1.1%	170-175	0	0%
85-90	14.6	0.2%	175-180	0	0%
			Total	**9410.1 lm**	**100%**

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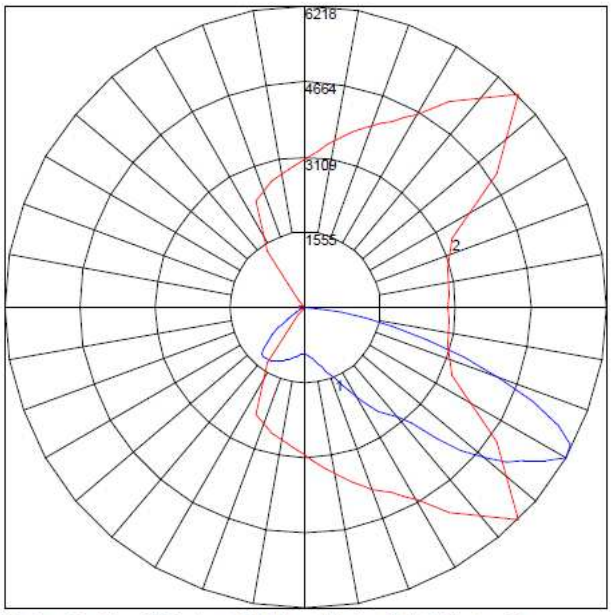
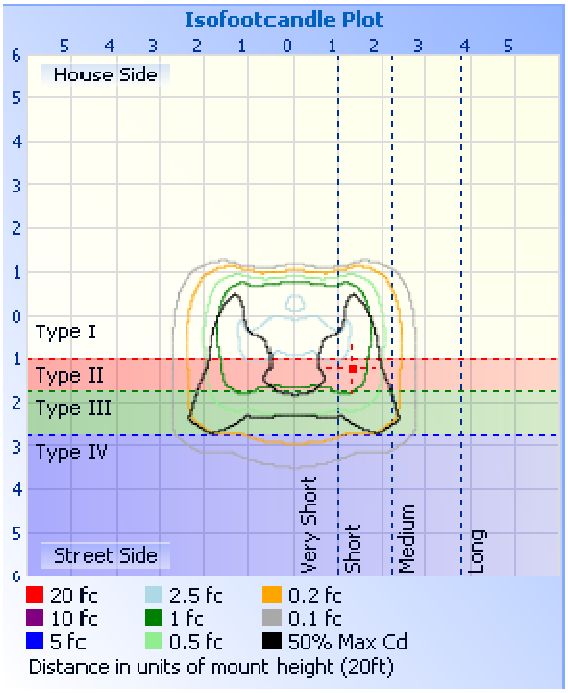
Candela Plot

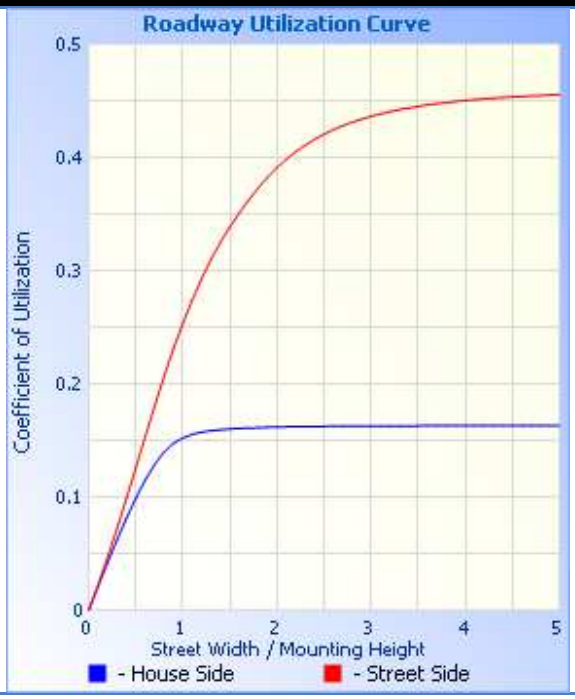


Maximum Candela = 6218.3 Located At Horizontal Angle = 45, Vertical Angle = 60
1 - Vertical Plane Through Horizontal Angles (45 - 225) (Through Max. Cd.)
2 - Horizontal Cone Through Vertical Angle (60) (Through Max. Cd.)

Illuminance Plot

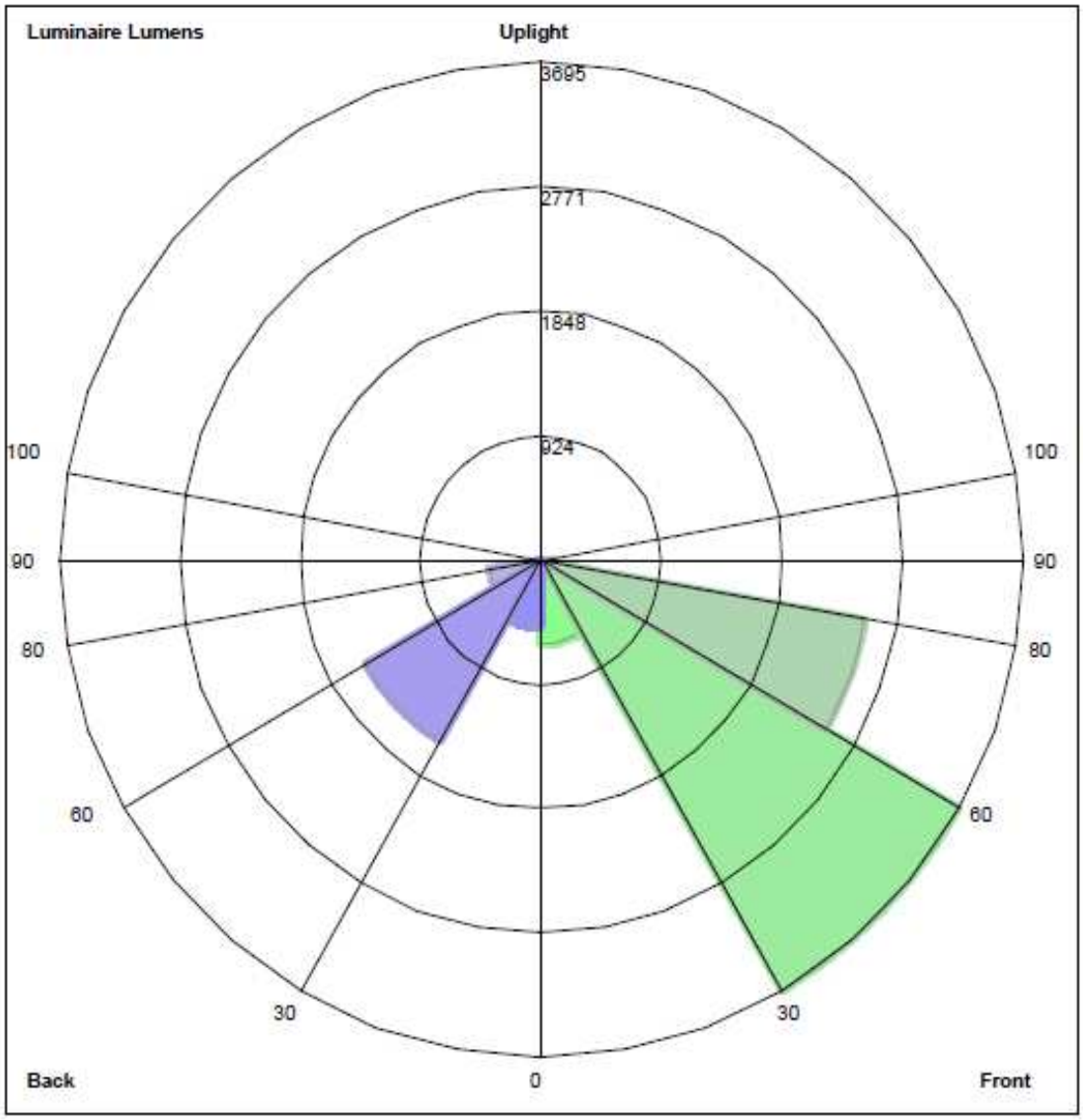


Roadway Utilization



Roadway Summary	Lumens	% Lamp
Distribution	TYPE III, SHORT	
Downward Street Side	6950.5	73.9%
Downward House Side	2548.7	26.1%
Downward Total	9409.2	100.0%
Upward Street Side	0.0	0.0%
Upward House Side	0.0	0.0%
Upward Total	0.0	0.0%
Total Lumens	**9409.2**	**100.0%**

Luminaire Classification System



Luminaire Lumens:
Front: Low=625.3, Medium=3695.2, High=2520.2, Very High=109.3
Back: Low=503.3, Medium=1548.6, High=400.8, Very High=6.1
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	968	968	968	968	968	968	968	968	968	968	968	968	968	968	968	968	968	968	968	968	968	968	968	968	968	968	968	968	968	968
2.5	993	994	992	992	989	986	981	980	979	978	978	977	976	976	975	975	974	973	972	970	971	970	968	966	967	966	966	963	965	968
5	1035	1037	1035	1034	1030	1024	1015	1011	1008	1006	1004	1001	999	997	995	993	990	988	986	984	983	981	978	975	976	976	977	975	976	981
7.5	1085	1089	1087	1089	1085	1074	1060	1053	1049	1045	1040	1036	1032	1028	1024	1021	1017	1013	1010	1006	1004	998	995	994	996	997	1000	1000	1003	1010
10	1133	1140	1145	1152	1148	1136	1114	1103	1097	1091	1085	1079	1072	1066	1060	1055	1049	1044	1039	1034	1030	1022	1020	1020	1026	1030	1036	1039	1043	1052
12.5	1188	1199	1208	1222	1223	1209	1180	1163	1155	1146	1138	1131	1122	1112	1106	1098	1092	1085	1078	1072	1066	1055	1052	1054	1064	1072	1084	1093	1100	1110
15	1266	1280	1294	1310	1309	1292	1256	1235	1224	1213	1203	1194	1182	1171	1161	1152	1142	1132	1124	1115	1105	1088	1082	1088	1104	1120	1139	1153	1164	1174
17.5	1342	1361	1383	1410	1410	1383	1346	1324	1312	1300	1287	1275	1260	1245	1232	1218	1204	1190	1177	1163	1146	1117	1105	1113	1139	1165	1191	1212	1228	1240
20	1425	1446	1474	1509	1516	1486	1456	1440	1428	1416	1402	1388	1366	1345	1326	1306	1286	1265	1246	1227	1197	1148	1124	1135	1169	1204	1239	1263	1281	1294
22.5	1517	1547	1579	1615	1624	1603	1610	1598	1583	1569	1547	1526	1495	1465	1437	1410	1382	1354	1329	1304	1264	1192	1155	1163	1199	1236	1272	1304	1326	1341
25	1633	1662	1691	1730	1734	1749	1805	1779	1753	1726	1692	1658	1618	1579	1543	1508	1472	1437	1407	1378	1333	1246	1201	1200	1228	1264	1308	1341	1364	1376
27.5	1803	1831	1835	1861	1852	1930	2023	1961	1915	1868	1821	1773	1723	1673	1631	1589	1549	1508	1476	1443	1393	1303	1257	1245	1259	1294	1333	1370	1396	1409
30	2124	2137	2030	2008	1983	2152	2232	2125	2057	1989	1928	1867	1808	1750	1702	1654	1610	1566	1531	1496	1440	1349	1309	1291	1295	1314	1350	1387	1414	1427
32.5	2467	2466	2229	2147	2119	2393	2418	2262	2176	2091	2020	1948	1882	1816	1762	1708	1660	1612	1575	1537	1480	1398	1365	1339	1320	1321	1355	1395	1421	1434
35	2559	2548	2319	2258	2251	2618	2584	2389	2287	2185	2102	2020	1946	1872	1813	1753	1703	1653	1615	1577	1525	1462	1428	1386	1336	1317	1343	1351	1356	1361
37.5	2534	2533	2358	2340	2373	2810	2738	2519	2403	2288	2198	2108	2029	1949	1887	1824	1774	1725	1690	1656	1617	1574	1527	1438	1343	1297	1241	1173	1149	1144
40	2474	2476	2377	2385	2477	2993	2924	2706	2578	2450	2349	2248	2168	2088	2033	1979	1938	1898	1872	1846	1814	1761	1678	1519	1348	1215	1024	896	853	844
42.5	2430	2444	2419	2441	2610	3248	3244	3037	2893	2750	2640	2531	2451	2372	2318	2264	2221	2178	2141	2104	2043	1924	1787	1566	1326	1036	741	596	563	554
45	2373	2390	2401	2575	3134	3873	3713	3416	3222	3029	2902	2775	2698	2620	2570	2519	2481	2443	2400	2358	2272	2072	1851	1572	1242	800	482	381	366	357
47.5	2413	2451	2459	2815	3643	4373	4028	3719	3532	3345	3268	3191	3158	3124	3094	3064	3032	3001	2954	2906	2793	2452	2033	1590	1086	557	311	249	247	243
50	2866	2877	2806	3064	4067	4854	4486	4245	4111	3977	3960	3943	3939	3936	3914	3893	3850	3806	3748	3690	3531	3044	2416	1691	894	367	204	164	170	171
52.5	2884	2884	2826	3136	4372	5251	5058	4902	4784	4666	4641	4616	4572	4528	4473	4418	4343	4267	4183	4098	3914	3469	2867	1911	714	230	133	124	137	139
55	2795	2796	2759	3053	4456	5516	5549	5244	5068	4893	4814	4736	4655	4574	4484	4393	4282	4172	4063	3954	3760	3375	2950	2015	564	134	98	109	126	129
57.5	2709	2720	2719	2992	4461	5886	5545	5031	4844	4656	4567	4478	4370	4262	4152	4041	3913	3785	3674	3564	3380	3051	2725	1783	395	83	85	106	123	125
60	2930	2980	3049	3342	4834	6218	5184	4607	4420	4234	4118	4002	3874	3746	3624	3501	3382	3263	3164	3066	2919	2698	2432	1395	223	59	81	103	117	119
62.5	3312	3351	3438	3745	5467	6184	4718	4056	3862	3668	3535	3402	3271	3140	3019	2899	2790	2680	2587	2495	2355	2183	2009	988	109	50	76	95	105	107
65	3285	3298	3427	3715	5547	5791	4172	3424	3222	3021	2875	2729	2594	2460	2345	2231	2132	2032	1956	1881	1767	1555	1376	629	60	45	68	79	85	86
67.5	2929	2934	3103	3325	4976	5106	3450	2710	2517	2323	2181	2040	1915	1790	1693	1597	1521	1445	1394	1343	1273	1117	902	369	42	41	52	54	51	48
70	2542	2536	2649	2776	4183	4268	2651	2015	1849	1684	1558	1432	1329	1225	1151	1076	1025	974	940	906	865	783	612	205	36	37	37	31	25	24
72.5	2154	2125	2130	2147	3339	3419	1910	1418	1287	1156	1049	941	858	775	716	658	627	596	578	560	552	533	420	115	33	32	26	18	18	18
75	1687	1637	1551	1510	2444	2584	1301	943	840	736	651	566	502	438	396	354	335	317	309	302	314	345	282	67	30	25	17	12	13	13
77.5	1184	1130	1039	1002	1630	1856	848	596	518	440	378	317	274	231	207	182	172	162	159	155	164	206	181	46	26	18	11	6	4	3
80	773	739	672	646	1045	1264	512	331	276	222	185	149	126	103	93	83	78	73	71	69	76	105	96	35	20	12	5	1	0	0
82.5	405	419	429	406	645	754	249	155	127	100	81	63	53	43	39	35	33	30	28	26	28	43	42	24	13	6	2	0	0	0
85	32	42	249	233	308	322	82	46	36	26	21	16	14	12	11	10	9	9	7	6	6	15	16	13	6	3	1	0	0	0
87.5	5	5	96	71	64	32	9	4	4	3	2	2	2	1	1	1	1	1	1	0	0	2	2	3	2	1	1	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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*Items marked with a single asterisk are not covered by the NVLAP accreditation.

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
01/31/17	A	DMS	Origination	A. Gressel	C. McLaurin
02/28/17	B	DMS	Updated Driver Information	A. Gressel	C. McLaurin