NVLAP Lab Code 500089-0

Report Number:	PL10023-002B
Model:	ARE-EDG-4MB-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-4MB-xx-06-E-UL-xx-525-xxxx-40K
Serial Number	PL10023-002
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	8032.0	7984.9	lm
Efficacy	78.48	77.73	lm/W
Correlated Color Temperature (CCT)	3991	K	
Color Rendering Index (CRI)	75		
R_9	-16		
Duv	0.002918		
S/P Ratio*	1.54		

	Sphere		Goniophotometer		
Electrical Measurements	**120V**	**277V**	**120V**	**277V**	
Input Wattage	102.35	101.48	102.72	101.61	W
Input Current	0.86	0.39	0.86	0.39	A
Input Voltage	120.01	277.07	120.17	277.18	V
Power Factor	0.997	0.947	0.996	0.946	
Off-State Power	0	0	0	0	W
Total Harmonic Distortion (Voltage)	0.04	0.05	0.05	0.07	%
Total Harmonic Distortion (Amperage)	6.35	11.13	7.11	11.94	%

Note: All photometric measurements taken at 120VAC.

Luminous Intensity Distribution	Goniophotometer	
Max Candela	6409.8	Cd
Angle of Max Candela (Horizontal)	45	°
Angle of Max Candela (Vertical)	60	°

Key Test Parameters	Sphere Output	Goniophotometer	
Stabilization Time	115	76	min
Total Operating Time (Stabilization + Test)	115	96	min
Ambient Temperature	25.3	25.0	°C

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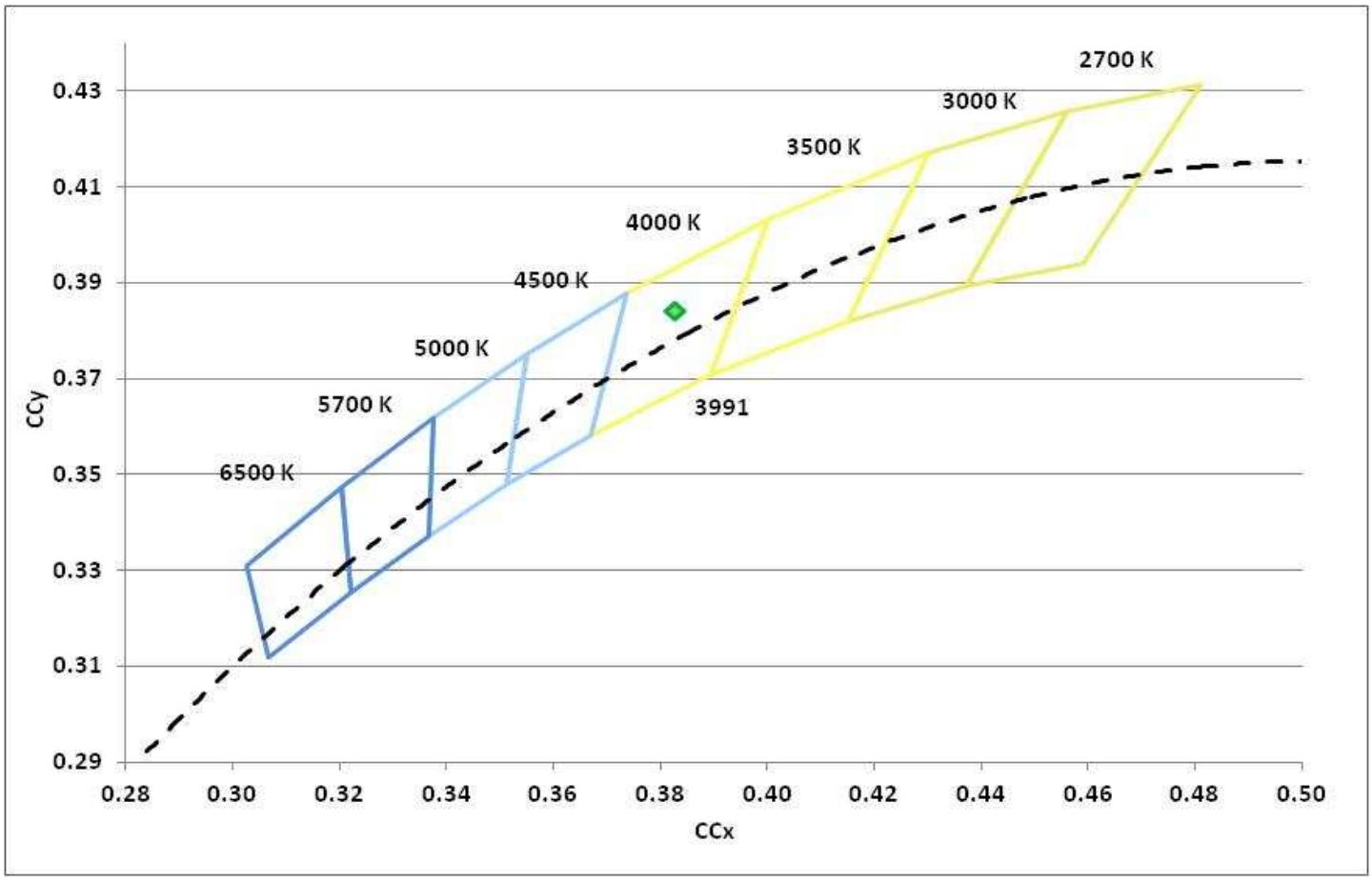
Chromaticity Coordinates

x	y	u	v	u'	v'	Duv
0.3828	0.3845	0.2236	0.3369	0.2236	0.5053	0.002918

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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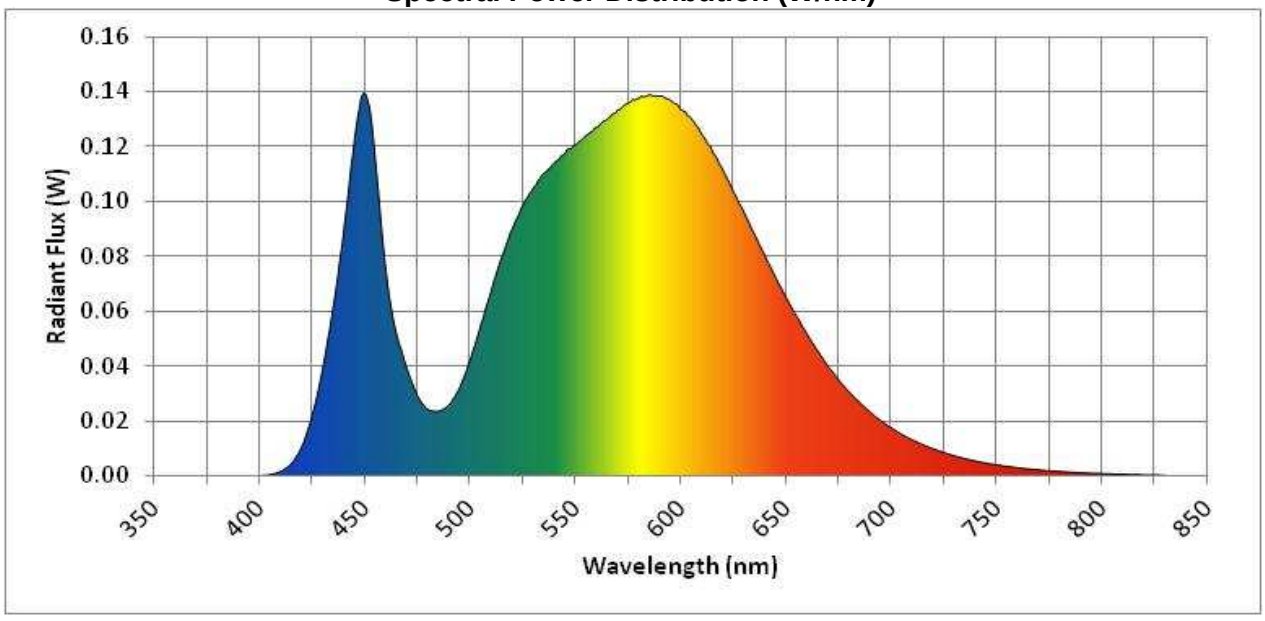
Spectral Distribution

λ(nm)	W/nm	λ(nm)	W/nm	λ(nm)	W/nm
360	0.000017	530	0.105242	700	0.017516
370	0.000012	540	0.114332	710	0.013115
380	0.000011	550	0.120617	720	0.009836
390	0.000009	560	0.127022	730	0.007321
400	0.000106	570	0.133489	740	0.005423
410	0.001797	580	0.137498	750	0.004035
420	0.011138	590	0.138471	760	0.002947
430	0.040457	600	0.133317	770	0.002207
440	0.091285	610	0.124266	780	0.001602
450	0.139173	620	0.111217	790	0.001193
460	0.072872	630	0.095803	800	0.000844
470	0.038453	640	0.080008	810	0.000621
480	0.024087	650	0.064919	820	0.000419
490	0.026137	660	0.051568	830	0.000282
500	0.042746	670	0.039747		
510	0.067955	680	0.030530		
520	0.090323	690	0.023197		

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	15.9	0.2%	90-95	0	0%
5-10	47.9	0.6%	95-100	0	0%
10-15	83.5	1.0%	100-105	0	0%
15-20	129.1	1.6%	105-110	0	0%
20-25	190.8	2.4%	110-115	0	0%
25-30	272.8	3.4%	115-120	0	0%
30-35	369.2	4.6%	120-125	0	0%
35-40	459.3	5.8%	125-130	0	0%
40-45	580.7	7.3%	130-135	0	0%
45-50	796.6	10.0%	135-140	0	0%
50-55	1,049.3	13.1%	140-145	0	0%
55-60	1,119.8	14.0%	145-150	0	0%
60-65	1,099.5	13.8%	150-155	0	0%
65-70	865.5	10.8%	155-160	0	0%
70-75	538.0	6.7%	160-165	0	0%
75-80	260.8	3.3%	165-170	0	0%
80-85	93.3	1.2%	170-175	0	0%
85-90	12.9	0.2%	175-180	0	0%
			Total	**7984.9 lm**	**100%**

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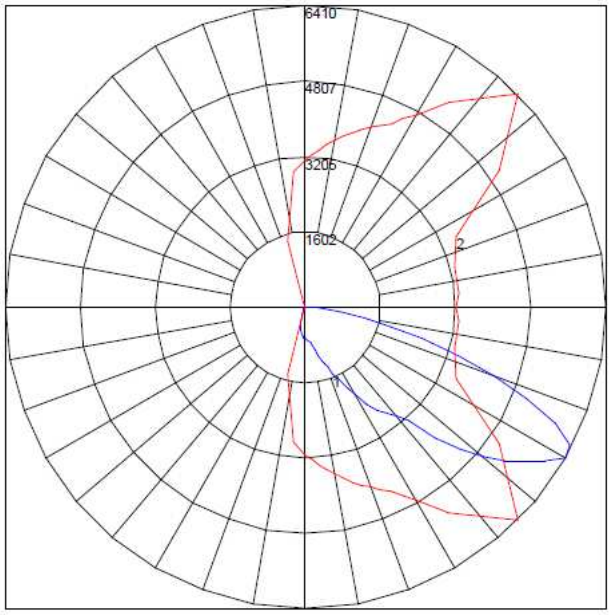
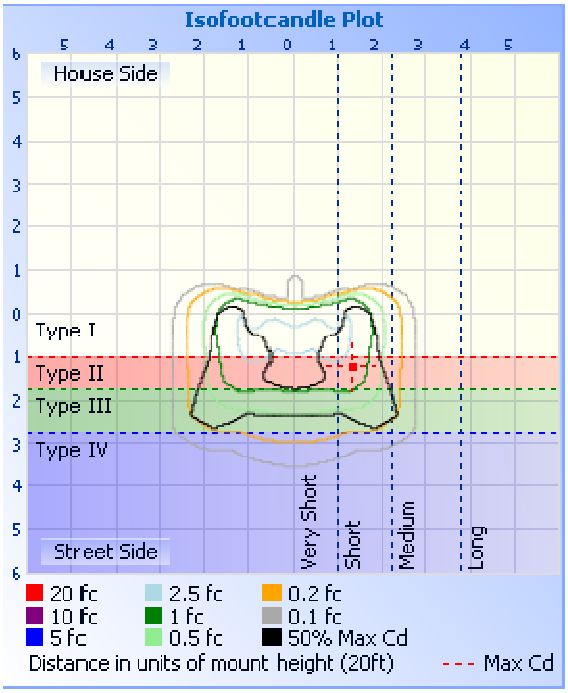
Candela Plot

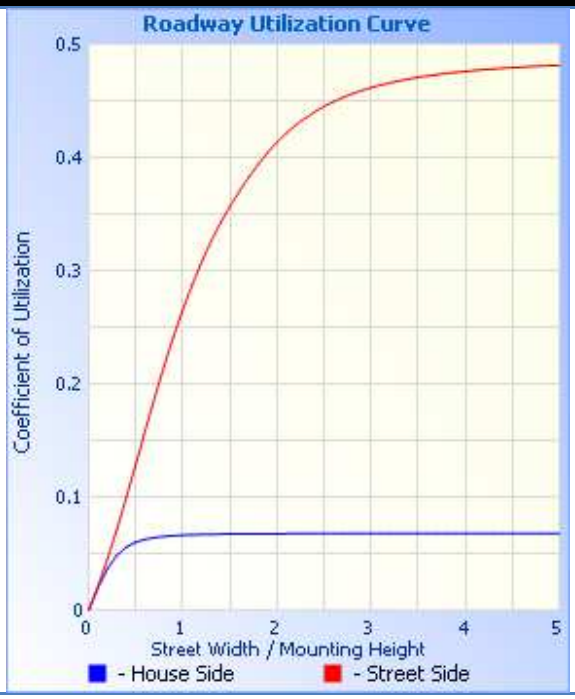


Maximum Candela = 6409.8 Located At Horizontal Angle = 45, Vertical Angle = 60
1 - Vertical Plane Through Horizontal Angles (45 - 225) (Through Max. Cd.)
2 - Horizontal Cone Through Vertical Angle (60) (Through Max. Cd.)

Illuminance Plot

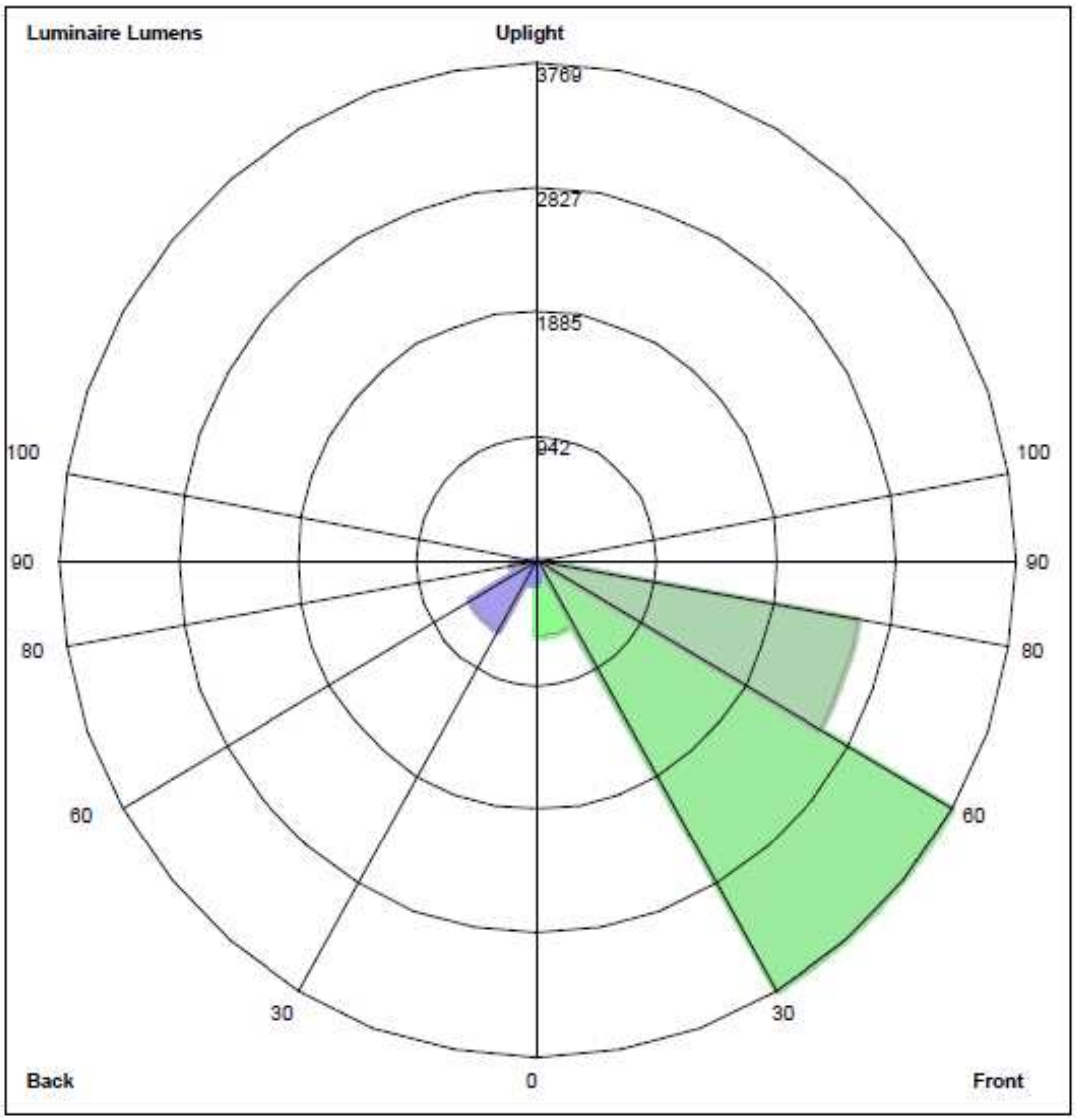


Roadway Utilization



Roadway Summary	Lumens	% Lamp
Distribution	TYPE III, SHORT	
Downward Street Side	7006.9	87.8%
Downward House Side	977.0	12.2%
Downward Total	7983.8	100%
Upward Street Side	0	0%
Upward House Side	0	0%
Upward Total	0	0%
Total Lumens	**7983.8**	**100.0%**

Luminaire Classification System



Luminaire Lumens:
Front: Low=564.3, Medium=3769.4, High=2569.4, Very High=103.3
Back: Low=175.0, Medium=604.0, High=195.3, Very High=2.9
Uplight: Low=0.0, High=0.0

BUG Rating : B1-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	661	661	661	661	661	661	661	661	661	661	661	661	661	661	661	661	661	661	661	661	661	661	661	661	661	661	661	661	661	661
2.5	678	678	677	678	676	675	674	672	672	671	671	671	671	671	671	670	669	667	666	666	664	664	659	657	653	648	647	644	644	645
5	710	712	712	712	710	707	704	700	698	697	696	695	694	693	692	690	688	686	684	682	679	675	664	652	635	616	601	589	582	580
7.5	764	769	769	766	761	755	748	741	738	735	732	729	728	726	724	722	718	714	712	709	704	692	669	635	587	540	503	476	465	459
10	859	868	869	864	847	825	802	792	788	784	779	773	770	767	763	759	755	750	746	742	735	717	671	603	521	449	394	358	344	336
12.5	977	987	994	997	974	933	886	862	853	843	836	830	825	820	815	809	803	797	793	788	778	749	673	563	452	361	294	251	232	226
15	1102	1116	1124	1130	1115	1067	997	962	946	930	919	908	901	894	885	876	868	860	852	845	830	782	666	516	381	273	204	164	146	141
17.5	1218	1234	1258	1278	1263	1208	1138	1094	1073	1053	1035	1017	1005	992	980	968	955	942	930	917	893	816	648	460	301	193	130	104	96	94
20	1324	1343	1375	1409	1409	1365	1309	1269	1245	1220	1194	1168	1146	1124	1105	1085	1065	1045	1027	1009	972	855	622	395	225	125	85	70	68	68
22.5	1454	1478	1513	1547	1548	1533	1524	1485	1453	1421	1380	1339	1303	1268	1237	1207	1178	1149	1125	1101	1054	894	600	331	155	82	59	57	61	62
25	1620	1646	1667	1699	1690	1723	1779	1718	1668	1619	1563	1507	1457	1408	1365	1321	1285	1248	1220	1191	1132	929	578	270	106	55	50	56	64	66
27.5	1823	1854	1863	1869	1847	1945	2037	1947	1873	1800	1731	1662	1598	1535	1481	1427	1384	1342	1307	1273	1204	964	552	209	72	46	48	60	70	73
30	2148	2174	2086	2054	2017	2191	2282	2152	2057	1962	1877	1792	1719	1646	1582	1518	1469	1420	1380	1340	1263	985	520	162	53	42	49	64	77	80
32.5	2504	2513	2292	2205	2183	2439	2491	2327	2215	2103	2002	1900	1821	1743	1669	1595	1539	1484	1439	1394	1316	999	485	124	45	43	51	69	85	89
35	2615	2591	2373	2311	2327	2665	2674	2482	2353	2223	2108	1994	1909	1824	1743	1662	1600	1538	1492	1446	1370	1018	452	91	41	42	53	74	95	100
37.5	2569	2558	2394	2378	2448	2859	2836	2623	2482	2342	2221	2100	2010	1920	1836	1753	1690	1627	1586	1544	1470	1061	419	71	40	41	52	75	99	104
40	2496	2490	2397	2411	2548	3042	3021	2806	2657	2508	2379	2250	2159	2069	1997	1924	1873	1821	1790	1759	1678	1159	390	59	40	41	50	71	97	101
42.5	2452	2458	2432	2462	2668	3279	3328	3138	2985	2831	2695	2559	2476	2394	2327	2261	2210	2158	2114	2070	1954	1274	355	52	40	41	49	66	91	95
45	2396	2403	2415	2576	3171	3920	3842	3582	3374	3166	3015	2864	2790	2715	2651	2588	2533	2478	2431	2384	2238	1384	311	47	40	42	47	62	85	88
47.5	2408	2445	2451	2830	3714	4480	4200	3939	3734	3529	3428	3328	3290	3253	3209	3165	3114	3064	3019	2974	2780	1626	280	45	41	40	43	54	73	75
50	2926	2933	2845	3091	4117	4966	4715	4519	4343	4168	4122	4076	4057	4037	3997	3957	3902	3846	3786	3727	3464	1974	257	45	40	37	36	41	52	52
52.5	2932	2925	2838	3128	4381	5366	5292	5114	4950	4787	4730	4674	4632	4589	4527	4465	4394	4323	4238	4152	3848	2169	231	45	38	31	27	28	32	31
55	2853	2842	2772	3036	4448	5688	5704	5410	5196	4982	4885	4788	4724	4659	4572	4485	4382	4278	4169	4059	3726	2066	180	45	35	26	20	15	14	13
57.5	2826	2843	2819	3058	4525	6085	5700	5180	4956	4732	4637	4543	4458	4373	4262	4150	4029	3908	3787	3666	3352	1786	127	44	31	20	14	8	5	5
60	3234	3296	3313	3560	5058	6410	5328	4721	4515	4309	4192	4075	3966	3857	3733	3609	3487	3364	3251	3138	2886	1469	91	40	27	16	10	5	3	3
62.5	3640	3667	3698	3945	5625	6375	4855	4162	3949	3736	3600	3463	3346	3229	3103	2978	2865	2753	2657	2562	2352	1161	68	36	22	13	7	3	2	2
65	3497	3485	3581	3836	5540	5884	4311	3506	3286	3065	2921	2777	2653	2530	2409	2288	2188	2087	2015	1944	1790	880	54	32	18	10	6	2	1	1
67.5	3077	3064	3199	3398	4919	5123	3578	2751	2552	2353	2218	2083	1963	1842	1744	1645	1567	1489	1436	1384	1290	629	48	27	15	8	4	2	0	0
70	2643	2625	2712	2806	4110	4273	2731	2021	1861	1701	1580	1459	1356	1252	1178	1104	1053	1002	964	927	877	424	41	22	12	7	3	1	0	0
72.5	2223	2180	2159	2140	3242	3416	1937	1421	1292	1164	1057	951	868	784	725	666	633	600	583	565	556	272	34	19	10	5	2	0	0	0
75	1719	1647	1546	1490	2309	2579	1310	947	842	736	651	567	504	440	399	358	337	317	311	306	312	165	29	17	8	4	2	0	0	0
77.5	1190	1125	1029	985	1521	1852	858	596	517	439	379	320	276	232	208	184	174	163	158	154	150	97	26	14	6	3	2	0	0	0
80	743	724	668	636	987	1275	517	326	276	226	190	154	130	106	96	85	81	77	72	67	43	51	24	11	4	3	1	0	0	0
82.5	150	214	432	408	610	767	253	155	128	102	83	65	54	44	40	35	33	31	28	24	16	22	20	7	3	2	1	0	0	0
85	34	34	252	235	293	269	85	49	39	28	22	17	14	12	11	11	10	8	7	6	4	7	13	3	2	2	1	1	1	1
87.5	7	7	71	54	39	30	7	5	4	4	3	3	2	2	2	2	2	2	1	1	1	1	2	1	2	2	1	1	1	1
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

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	Chroma	66202	66202 0005018

Goniophotometer Equipment List

Description	Manufacturer	Model	Serial Number
AC Power Source	Elgar	CW1251P	1248A02602
Type C Goniophotometer	LSI / UL	6440T	6440PN2028
Spectroradiometer	Gooch & Housego	770VIS/NIR	12415189
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
01/13/17	A	DMS	Origination	A. Gressel	C. McLaurin
02/28/17	B	DMS	Updated Driver Information	A. Gressel	C. McLaurin