NVLAP Lab Code 500089-0

Report Number:	PL10023-003B
Model:	ARE-EDG-2MB-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-2MB-xx-06-E-UL-xx-525-xxxx-40K
Serial Number	PL10023-003
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	7860.0	7783.9	lm
Efficacy	76.77	75.98	lm/W
Correlated Color Temperature (CCT)	3991		K
Color Rendering Index (CRI)	75		
R_9	-16		
Duv	0.002790		
S/P Ratio*	1.54		

	Sphere		Goniophotometer		
Electrical Measurements	**120V**	**277V**	**120V**	**277V**	
Input Wattage	102.39	101.50	102.45	101.45	W
Input Current	0.86	0.39	0.86	0.39	A
Input Voltage	120.03	277.06	120.15	277.17	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	0.09	0.07	%
Total Harmonic Distortion (Amperage)	6.35	11.11	7.10	12.04	%

Note: All photometric measurements taken at 120VAC.

Luminous Intensity Distribution	Goniophotometer	
Max Candela	6470.4	Cd
Angle of Max Candela (Horizontal)	75	°
Angle of Max Candela (Vertical)	67.5	°

Key Test Parameters	Sphere Output	Goniophotometer	
Stabilization Time	110	91	min
Total Operating Time (Stabilization + Test)	110	111	min
Ambient Temperature	24.9	25.0	˚C

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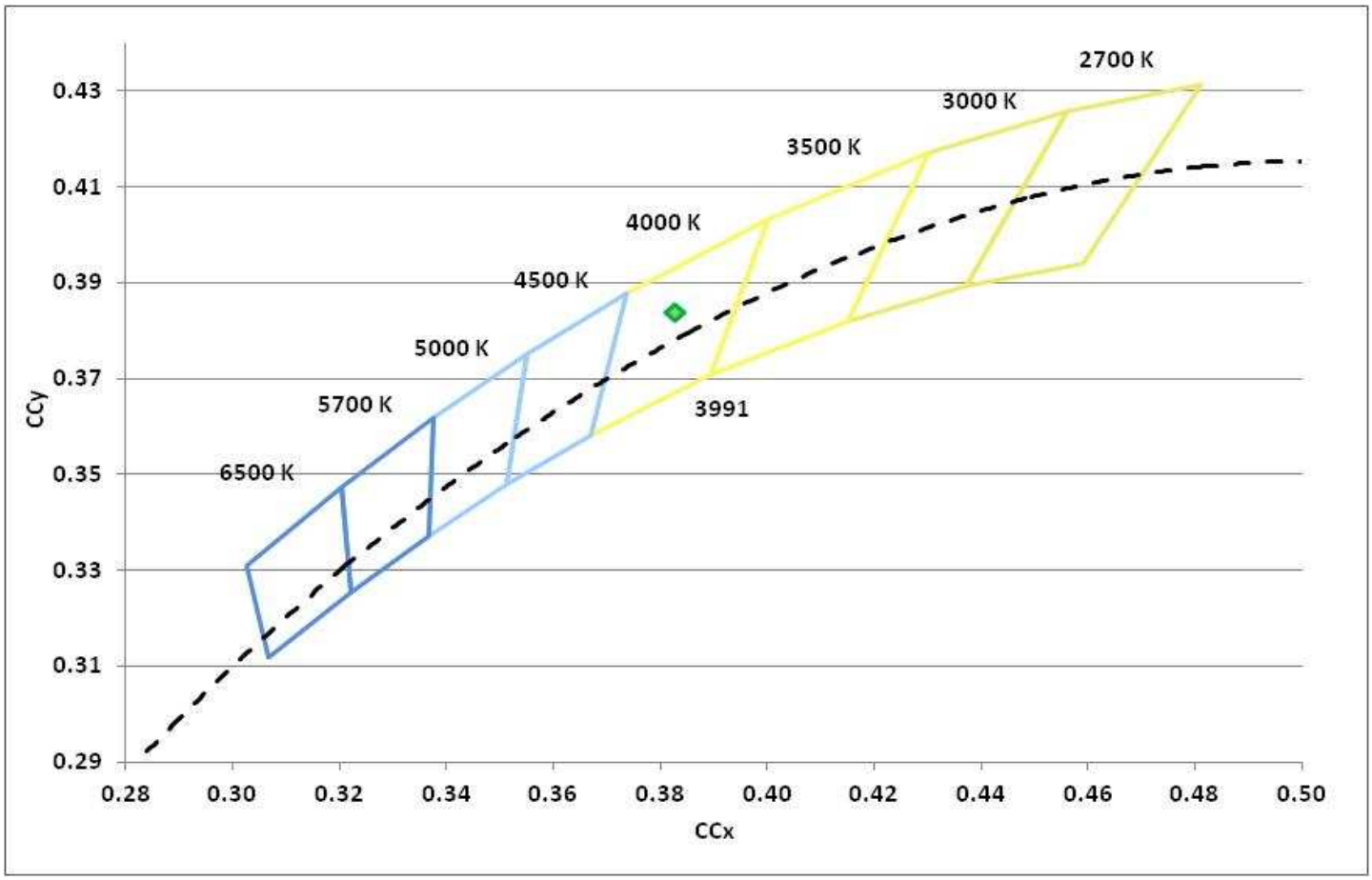
Chromaticity Coordinates

x	y	u	v	u'	v'	Duv
0.3827	0.3842	0.2237	0.3368	0.2237	0.5052	0.002790

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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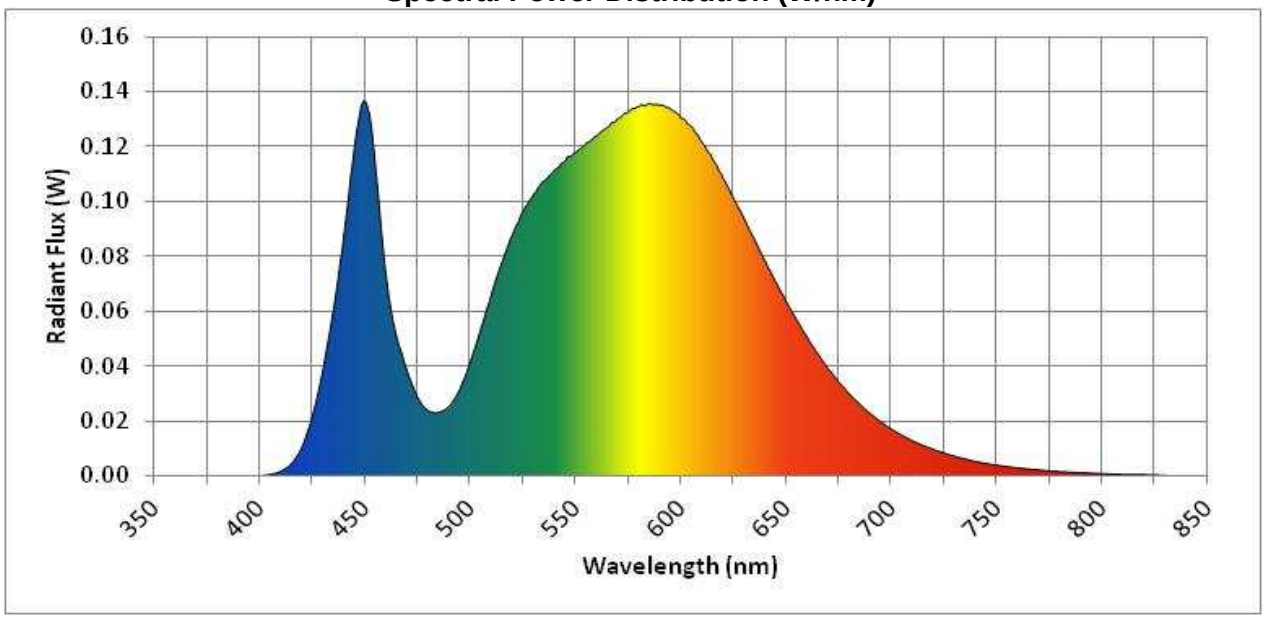
Spectral Distribution

λ(nm)	W/nm	λ(nm)	W/nm	λ(nm)	W/nm
360	0.000005	530	0.102961	700	0.017124
370	0.000004	540	0.111808	710	0.012802
380	0.000003	550	0.118078	720	0.009668
390	0.000003	560	0.124253	730	0.007229
400	0.000084	570	0.130529	740	0.005286
410	0.001806	580	0.134606	750	0.003942
420	0.010868	590	0.135512	760	0.002910
430	0.039563	600	0.130616	770	0.002156
440	0.089345	610	0.121752	780	0.001578
450	0.136698	620	0.108643	790	0.001172
460	0.071732	630	0.093859	800	0.000822
470	0.037798	640	0.078455	810	0.000543
480	0.023674	650	0.063639	820	0.000476
490	0.025574	660	0.050587	830	0.000249
500	0.041897	670	0.039032		
510	0.066626	680	0.029897		
520	0.088231	690	0.022723		

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	18.9	0.2%	90-95	0	0%
5-10	55.5	0.7%	95-100	0	0%
10-15	94.6	1.2%	100-105	0	0%
15-20	140.9	1.8%	105-110	0	0%
20-25	198.6	2.6%	110-115	0	0%
25-30	273.5	3.5%	115-120	0	0%
30-35	366.7	4.7%	120-125	0	0%
35-40	484.8	6.2%	125-130	0	0%
40-45	644.8	8.3%	130-135	0	0%
45-50	845.6	10.9%	135-140	0	0%
50-55	1,011.2	13.0%	140-145	0	0%
55-60	1,047.0	13.5%	145-150	0	0%
60-65	939.8	12.1%	150-155	0	0%
65-70	733.6	9.4%	155-160	0	0%
70-75	506.9	6.5%	160-165	0	0%
75-80	296.1	3.8%	165-170	0	0%
80-85	112.3	1.4%	170-175	0	0%
85-90	13.1	0.2%	175-180	0	0%
			Total	**7783.9 lm**	**100%**

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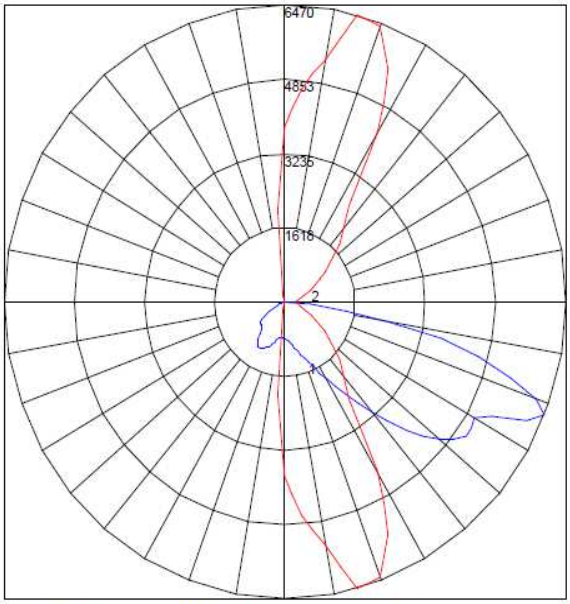
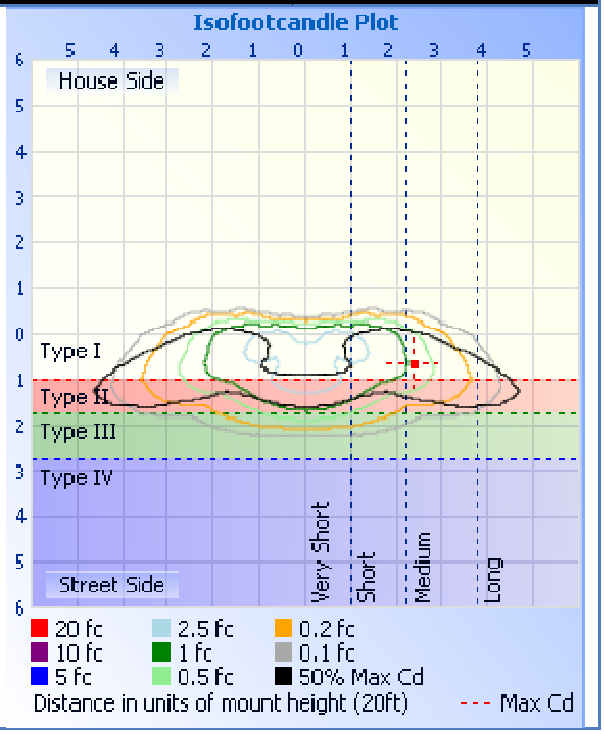
Candela Plot

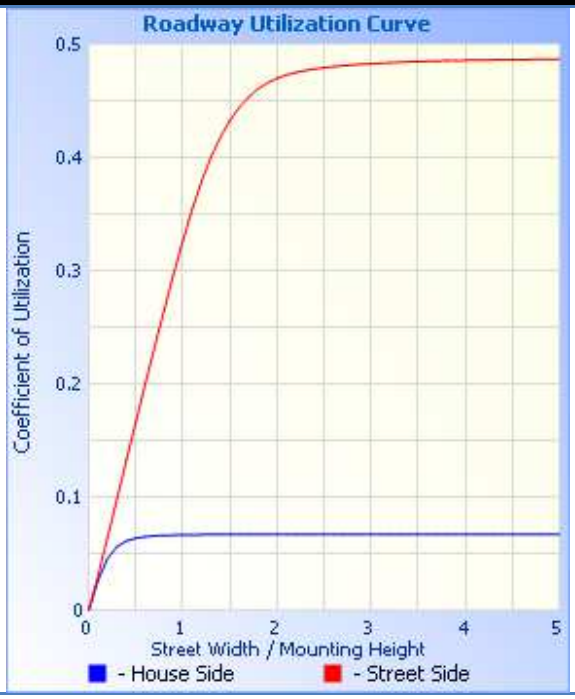


Maximum Candela = 6470.4 Located At Horizontal Angle = 75, Vertical Angle = 67.5
1 - Vertical Plane Through Horizontal Angles (75 - 255) (Through Max. Cd.)
2 - Horizontal Cone Through Vertical Angle (67.5) (Through Max. Cd.)

Illuminance Plot

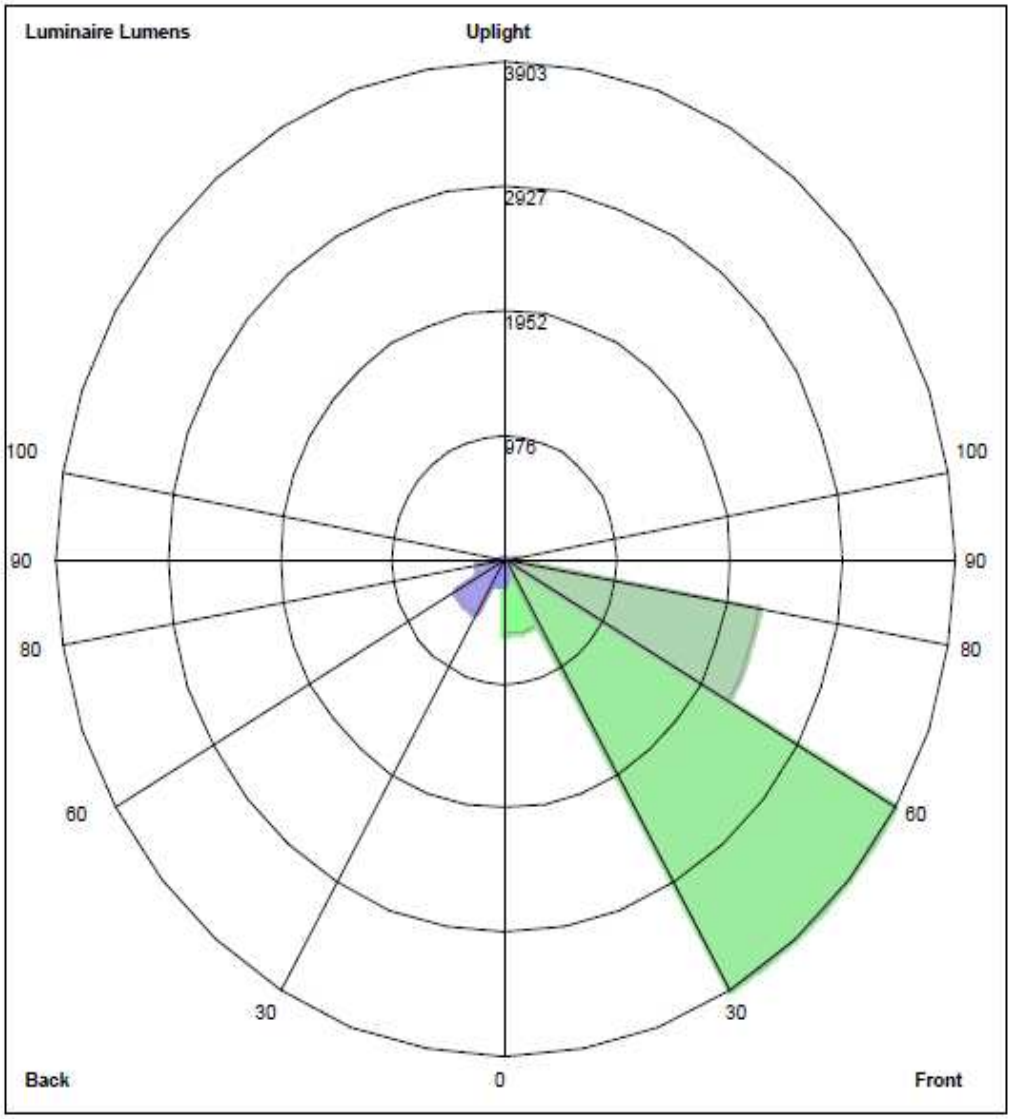


Roadway Utilization



Roadway Summary	Lumens	% Lamp
Distribution	TYPE II, MEDIUM	
Downward Street Side	6838.7	87.9%
Downward House Side	944.6	12.1%
Downward Total	7783.3	100%
Upward Street Side	0	0%
Upward House Side	0	0%
Upward Total	0	0%
Total Lumens	**7783.3**	**100.0%**

Luminaire Classification System



Luminaire Lumens:
Front: Low=580.3, Medium= 3903.0, High=2234.9, Very High=119.8
Back: Low=201.3, Medium=495.6, High=242.2, Very High=5.7
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	808	808	808	808	808	808	808	808	808	808	808	808	808	808	808	808	808	808	808	808	808	808	808	808	808	808	808	808	808	808
2.5	840	841	840	841	840	838	836	834	832	831	829	828	827	826	824	822	819	816	814	811	806	797	783	770	759	749	742	737	736	724
5	849	854	854	856	860	863	865	864	862	861	859	857	855	852	849	845	840	834	829	824	812	789	759	732	702	673	648	632	625	608
7.5	906	921	915	907	904	905	910	911	910	910	908	906	901	897	891	885	876	866	857	847	830	794	750	694	631	573	526	492	478	458
10	1032	1051	1038	1008	975	963	963	968	968	969	967	966	960	954	945	936	923	910	897	885	859	814	747	653	553	463	400	358	343	324
12.5	1093	1101	1110	1124	1101	1047	1032	1032	1035	1038	1039	1039	1033	1028	1014	1001	983	966	951	936	911	852	749	611	474	370	300	259	243	231
15	1127	1147	1152	1170	1195	1168	1113	1109	1111	1113	1117	1121	1118	1115	1098	1082	1060	1038	1022	1005	977	905	754	560	402	297	230	190	171	160
17.5	1252	1275	1265	1260	1268	1288	1206	1187	1189	1190	1197	1204	1204	1205	1189	1174	1151	1127	1110	1093	1063	964	744	504	342	238	164	121	103	93
20	1379	1405	1397	1378	1368	1374	1321	1268	1267	1266	1276	1286	1294	1302	1292	1281	1258	1234	1219	1203	1170	1022	715	449	285	169	94	62	53	48
22.5	1510	1544	1529	1505	1469	1461	1447	1371	1361	1351	1364	1377	1398	1419	1415	1412	1391	1370	1357	1343	1302	1065	675	390	212	97	55	40	36	34
25	1673	1705	1673	1632	1572	1537	1556	1497	1476	1456	1471	1486	1523	1560	1568	1577	1566	1555	1541	1527	1461	1108	620	319	135	62	41	33	30	29
27.5	1866	1898	1847	1768	1679	1613	1639	1632	1607	1582	1606	1629	1688	1747	1776	1804	1802	1799	1775	1751	1633	1143	545	238	89	48	35	29	27	26
30	2069	2106	2049	1930	1797	1700	1708	1745	1737	1729	1769	1809	1885	1961	2009	2057	2057	2056	2017	1978	1809	1155	450	161	68	42	32	26	25	25
32.5	2288	2330	2260	2116	1933	1797	1766	1832	1866	1899	1952	2004	2092	2180	2238	2296	2291	2287	2231	2176	1961	1156	361	106	55	37	29	24	24	24
35	2505	2548	2470	2312	2088	1908	1854	1948	2029	2110	2178	2246	2340	2433	2487	2542	2521	2500	2422	2345	2078	1119	274	77	43	32	26	22	22	23
37.5	2790	2835	2743	2541	2275	2060	1998	2134	2262	2390	2489	2588	2681	2775	2812	2849	2800	2750	2641	2532	2175	1020	212	61	34	28	23	20	21	21
40	3093	3134	3049	2814	2500	2248	2212	2400	2559	2719	2845	2971	3057	3144	3165	3187	3110	3032	2893	2754	2304	897	179	51	29	24	20	18	18	19
42.5	3380	3430	3350	3104	2757	2446	2487	2765	2940	3116	3248	3380	3435	3490	3482	3473	3375	3278	3118	2958	2453	799	161	45	26	20	18	16	16	16
45	3751	3818	3740	3492	3076	2680	2754	3212	3431	3649	3793	3936	3950	3965	3889	3812	3672	3533	3342	3152	2606	759	146	41	21	18	14	13	13	12
47.5	4118	4167	4126	3974	3562	3000	2930	3514	3764	4014	4169	4325	4323	4322	4198	4074	3915	3756	3543	3329	2739	746	128	37	17	15	12	11	10	9
50	4284	4298	4328	4307	4061	3468	3190	3795	4069	4343	4510	4676	4659	4642	4483	4324	4152	3980	3750	3519	2859	743	111	34	14	11	10	8	7	6
52.5	4136	4127	4207	4312	4272	3887	3581	4142	4406	4670	4838	5007	4962	4916	4724	4531	4356	4180	3948	3717	2986	713	97	29	12	9	8	6	4	4
55	3818	3792	3906	4077	4145	4029	3972	4547	4763	4980	5091	5203	5152	5100	4890	4680	4507	4334	4114	3893	3102	646	88	25	10	7	6	4	3	3
57.5	3343	3277	3407	3610	3786	3882	4191	4858	5062	5266	5255	5243	5176	5108	4925	4743	4619	4496	4295	4094	3208	528	82	20	8	6	5	3	2	2
60	2629	2546	2711	2966	3233	3550	4136	4905	5190	5474	5412	5349	5205	5060	4969	4877	4842	4806	4636	4467	3266	396	65	16	7	6	4	2	2	2
62.5	1669	1576	1789	2165	2543	3024	3830	4717	5177	5638	5697	5757	5571	5384	5347	5311	5260	5209	4951	4693	3121	282	49	12	6	5	3	2	1	1
65	650	606	829	1293	1766	2385	3289	4582	5218	5854	6134	6414	6282	6150	5860	5571	5363	5155	4781	4408	2632	196	37	10	6	4	2	1	1	1
67.5	270	260	367	669	1106	1764	2574	4260	4932	5605	6002	6399	6435	6470	5914	5359	5019	4680	4245	3811	2031	133	28	9	5	4	2	1	0	0
70	163	157	214	385	701	1198	1837	3525	4229	4933	5360	5788	5977	6166	5542	4918	4483	4048	3617	3186	1495	91	21	7	6	3	2	1	0	0
72.5	104	107	169	294	510	761	1222	2556	3341	4126	4538	4949	5212	5474	4924	4374	3891	3408	2997	2586	1045	63	16	6	6	3	2	0	0	0
75	73	76	136	242	409	470	772	1671	2474	3277	3678	4078	4351	4624	4187	3750	3270	2790	2386	1981	667	44	12	5	6	3	1	0	0	0
77.5	53	54	96	182	324	284	489	1036	1719	2402	2819	3235	3453	3670	3326	2982	2561	2140	1747	1354	364	29	9	4	5	2	1	0	0	0
80	36	37	66	127	230	165	316	608	1062	1516	1843	2169	2256	2344	2092	1841	1567	1294	1002	711	142	14	6	3	4	1	1	0	0	0
82.5	16	17	44	89	144	83	185	306	556	805	1043	1281	1344	1408	1260	1112	938	765	575	385	42	9	4	2	2	1	0	0	0	0
85	8	8	22	53	48	29	90	122	227	332	434	535	557	579	512	444	372	299	218	136	11	6	4	2	1	0	0	0	0	0
87.5	3	3	7	15	9	4	12	16	21	26	28	30	27	24	18	11	10	9	8	7	5	5	3	2	1	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

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

NVLAP Lab Code 500089-0

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