NVLAP Lab Code 500089-0

Report Number: PL05642-001B

Model: CPY250AxxDB-UL40Kxxxx / BXCCAxD13-Ux7xxxx

Date: 06/26/2015

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

Prepared For:

Christopher Strom

Cree, Inc.

9201 Washington Avenue

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Prepared By:

Cedric Duviols, Photometric Test Technician

Approved By:

Christopher McLaurin, Photometric Specialist

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Product Information	
Manufacturer	Cree, Inc.
Model Number (SKU)	CPY250AxxDB-UL40Kxxxx / BXCCAxD13-Ux7xxxx
Serial Number	PL05642-001
LED Type	XTE DA1150

Product Description
Cast white painted finned metal housing, molded white plastic reflector, 1 white circuit board with multiple LEDs, clear prismatic dome glass lens in cast white painted metal frame.

Driver Information (Where Applicable)
CREE LE098X02 R1

Length	Width	Height
15.0”	15.0”	3.25”

Sample
The following sample was submitted for evaluation

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Key Photometric Data	Sphere Output	Goniophotometer	
Luminous Flux	12723.1	12721.4	lm
Efficacy	107.59	108.22	lm/W
Correlated Color Temperature (CCT)	3959	K	
Color Rendering Index (CRI)	72		
R_9	-17		
Duv	0.00090969		
S/P Ratio*	1.47		

	Sphere		Goniophotometer		
Electrical Measurements	**120V**	**277V**	**120V**	**277V**	
Input Wattage	118.26	115.56	117.55	115.47	W
Input Current	0.99	0.44	0.98	0.44	A
Input Voltage	119.96	277.16	120.04	276.96	V
Power Factor	0.995	0.938	0.996	0.941	
Off-State Power	0	0	0	0	W
Total Harmonic Distortion (Voltage)	0.05	0.04	0.09	0.09	%
Total Harmonic Distortion (Amperage)	4.64	6.71	4.76	6.84	%

Note: All photometric measurements taken at 120VAC.

Luminous Intensity Distribution	Goniophotometer	
Max Candela	5359.0	Cd
Angle of Max Candela (Horizontal)	50	°
Angle of Max Candela (Vertical)	5	°

Key Test Parameters	Sphere Output	Goniophotometer	
Stabilization Time	86	58	min
Total Operating Time (Stabilization + Test)	91	78	min
Ambient Temperature	25.8	24.7	˚C

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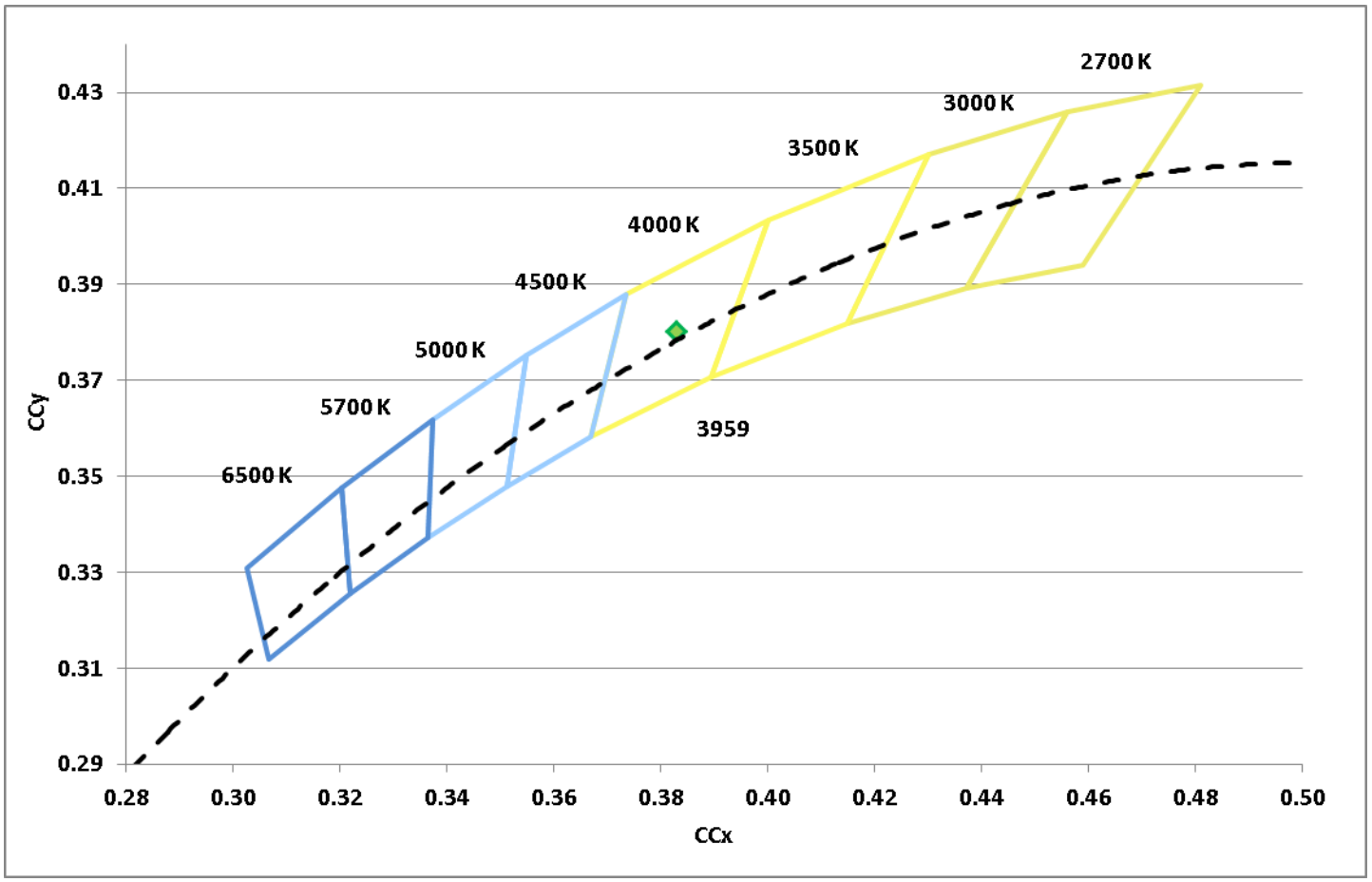
Chromaticity Coordinates

x	y	u	v	u'	v'	Duv
0.3830	0.3803	0.2254	0.3357	0.2254	0.5035	0.00090969

Color Rendering Index Details

Ra	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14
72	71	77	81	73	70	67	81	58	-17	44	69	42	71	89

Chromaticity Diagram



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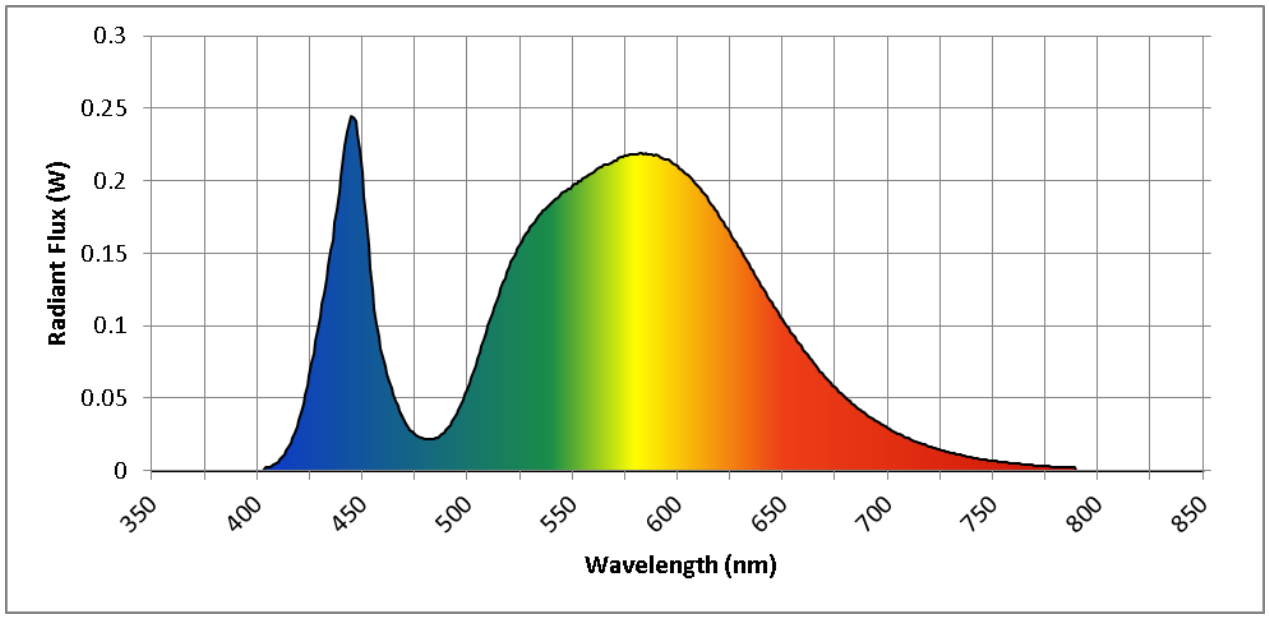
Spectral Distribution

λ(nm)	W/nm	λ(nm)	W/nm	λ(nm)	W/nm
360	0.000374	530	0.168727	700	0.029837
370	0.000534	540	0.185438	710	0.022634
380	0.000297	550	0.196351	720	0.017111
390	0.000121	560	0.206319	730	0.012832
400	0.000879	570	0.214553	740	0.009557
410	0.006614	580	0.218870	750	0.007089
420	0.035468	590	0.218561	760	0.005316
430	0.106316	600	0.210465	770	0.003975
440	0.203903	610	0.196344	780	0.002920
450	0.206549	620	0.176294	790	0.002169
460	0.078305	630	0.152944	800	0.001589
470	0.034780	640	0.127830	810	0.001252
480	0.022509	650	0.104758	820	0.000868
490	0.028127	660	0.084002	830	0.000582
500	0.056271	670	0.065691		
510	0.100300	680	0.050760		
520	0.141084	690	0.039136		

Dominant Wavelength	578	nm
Peak Wavelength	445	nm

Spectral Power Distribution (W/nm)



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Zonal Lumen Summary

Zone	Lumens	% of Total	Zone	Lumens	% of Total
0-5	124.5	1.0%	90-95	31.9	0.3%
5-10	372.2	2.9%	95-100	14.4	0.1%
10-15	599.7	4.7%	100-105	7.5	0.1%
15-20	812.2	6.4%	105-110	3.2	0.0%
20-25	974.6	7.7%	110-115	0.7	0.0%
25-30	1,103.5	8.7%	115-120	0.1	0.0%
30-35	1,175.9	9.2%	120-125	0.0	0.0%
35-40	1,209.7	9.5%	125-130	0.0	0.0%
40-45	1,178.4	9.3%	130-135	0.0	0.0%
45-50	1,114.0	8.8%	135-140	0.0	0.0%
50-55	1,011.1	7.9%	140-145	0.0	0.0%
55-60	888.9	7.0%	145-150	0.0	0.0%
60-65	726.8	5.7%	150-155	0.0	0.0%
65-70	554.5	4.4%	155-160	0.0	0.0%
70-75	386.8	3.0%	160-165	0.0	0.0%
75-80	232.5	1.8%	165-170	0.0	0.0%
80-85	130.3	1.0%	170-175	0.0	0.0%
85-90	68.1	0.5%	175-180	0.0	0.0%
			Total	**12721.4 lm**	**100%**

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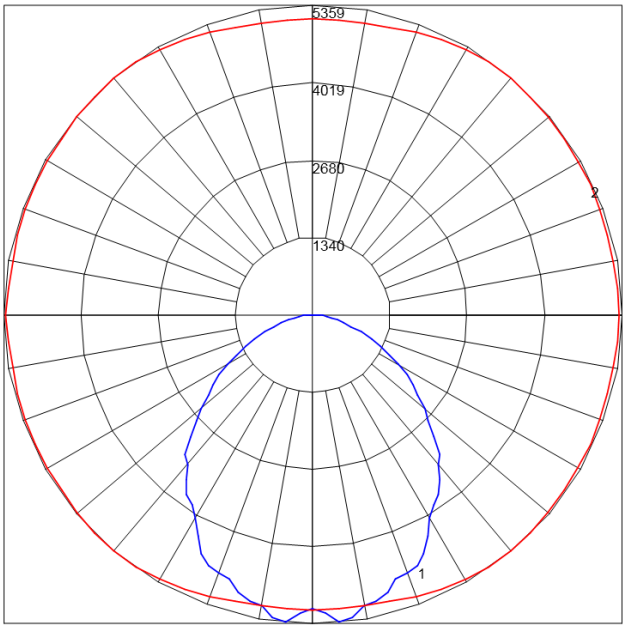
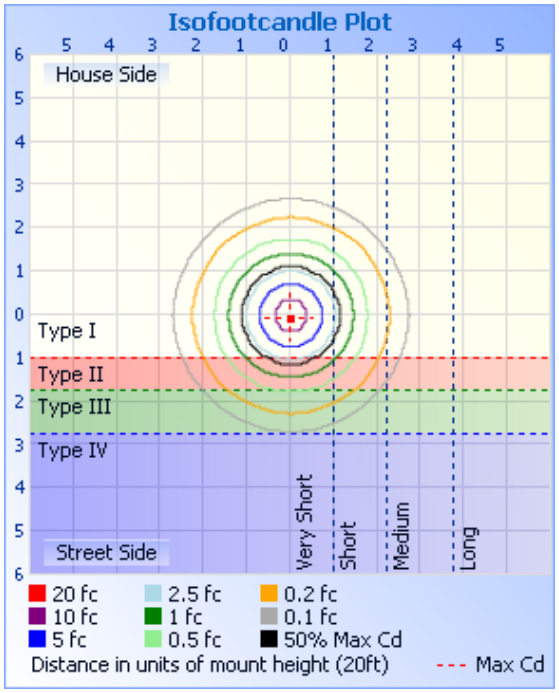
Candela Plot

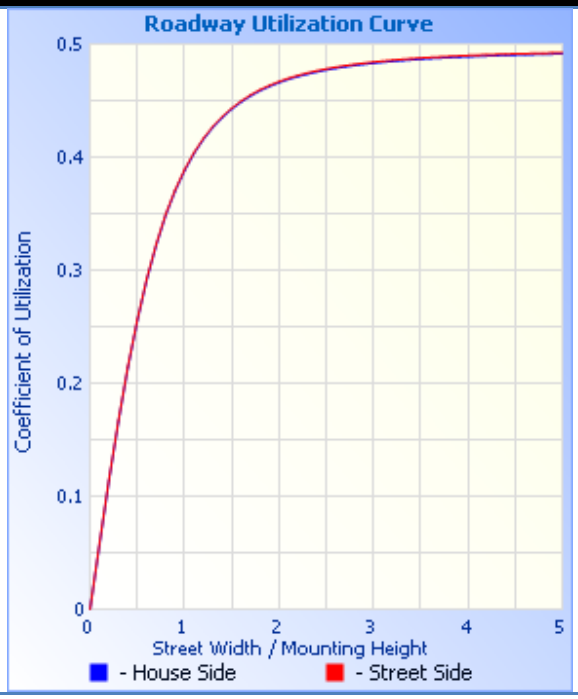


Maximum Candela = 5359.03 Located At Horizontal Angle = 50, Vertical Angle = 5
1 - Vertical Plane Through Horizontal Angles (50 - 230) (Through Max. Cd.)
2 - Horizontal Cone Through Vertical Angle (5) (Through Max. Cd.)

Illuminance Plot

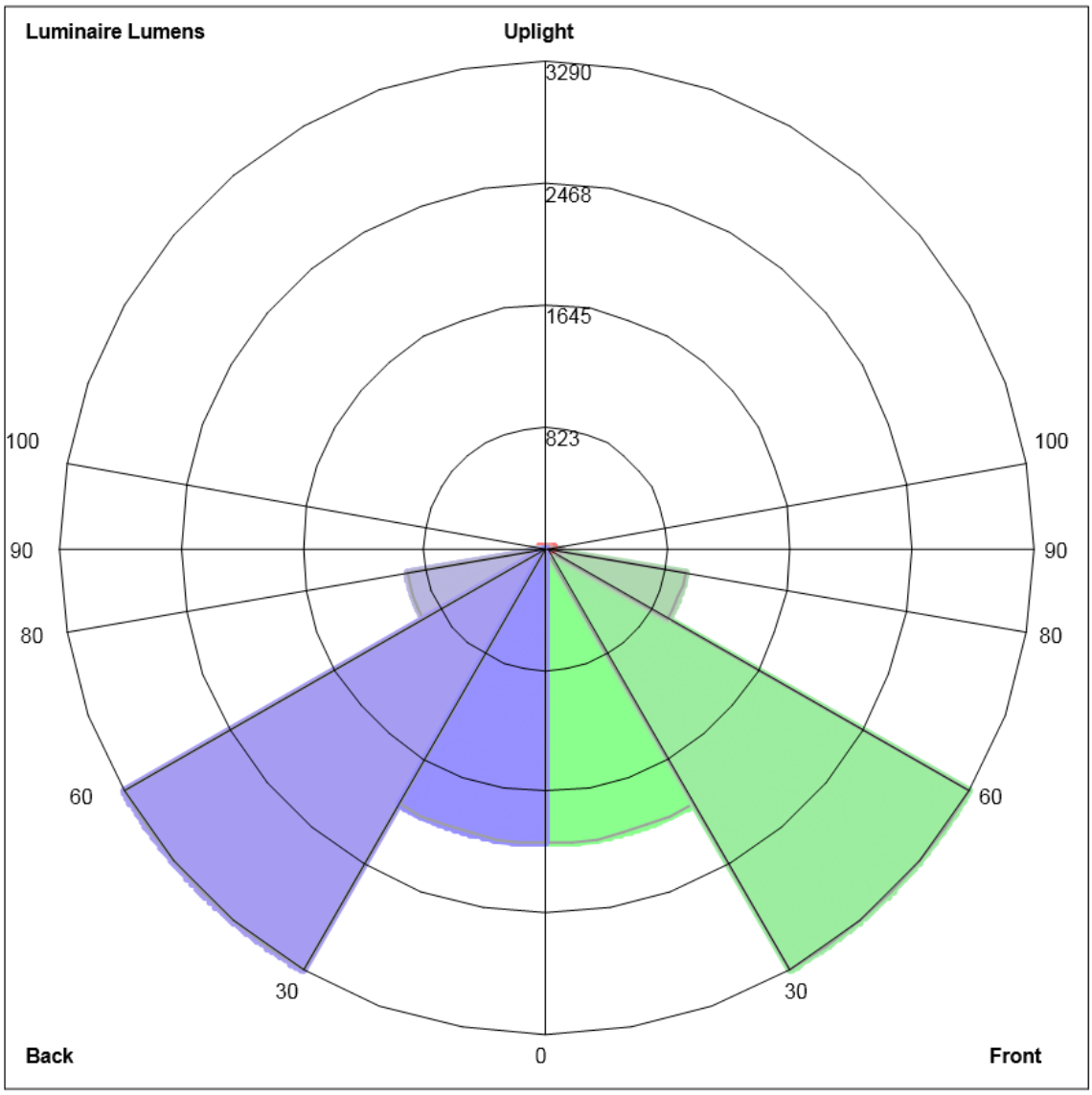


Roadway Utilization



Roadway Summary	Lumens	% Lamp
Cutoff Classification	CUTOFF	
Distribution	Type VS	
Downward Street Side	6,332.4	49.8%
Downward House Side	6,332.4	49.8%
Downward Total	12,664.9	99.6%
Upward Street Side	28.8	0.2%
Upward House Side	28.8	0.2%
Upward Total	57.7	0.5%
Total Lumens	**12,722.6**	**100%**

Luminaire Classification System



Luminaire Lumens:
Front: Low= 1994.0, Medium=3290.1, High=950.6, Very High=99.2
Back: Low= 1994.0, Medium=3290.1, High=950.6, Very High=99.2
Uplight: Low=46.3, High=11.5

BUG Rating : B3-U2-G1

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Candela Tabulations

	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90
0	5110	5110	5110	5110	5110	5110	5110	5110	5110	5110	5110	5110	5110	5110	5110	5110	5110	5110	5110
2.5	5172	5171	5170	5167	5169	5172	5177	5176	5185	5178	5175	5169	5158	5148	5138	5128	5120	5115	5113
5	5322	5308	5295	5300	5310	5323	5320	5322	5338	5352	5359	5344	5308	5258	5206	5161	5141	5125	5126
7.5	5257	5238	5241	5238	5238	5242	5254	5279	5297	5293	5291	5295	5295	5275	5240	5194	5158	5126	5125
10	5089	5081	5066	5054	5058	5040	5040	5070	5128	5145	5137	5116	5130	5144	5132	5093	5047	5054	5055
12.5	4901	4946	5013	5042	5040	5013	4999	5007	5073	5122	5089	5054	5116	5156	5159	5133	5029	4944	4934
15	4925	4963	5080	5157	5196	5119	5029	4916	4900	4990	4994	4982	5029	5124	5141	5175	5123	4930	4871
17.5	4952	4989	4967	4970	5003	4982	4968	4947	4879	4830	4803	4835	4908	4987	4952	4926	5011	4998	4968
20	4833	4789	4726	4710	4796	4871	4913	4896	4843	4840	4776	4767	4832	4868	4793	4770	4824	4806	4804
22.5	4619	4648	4653	4646	4609	4620	4653	4643	4749	4831	4722	4613	4645	4636	4613	4637	4678	4588	4461
25	4542	4506	4538	4542	4510	4405	4441	4451	4530	4680	4568	4441	4443	4406	4465	4447	4523	4519	4439
27.5	4486	4436	4471	4469	4423	4311	4323	4360	4362	4359	4333	4338	4318	4275	4335	4417	4446	4425	4364
30	4273	4178	4126	4230	4270	4242	4215	4224	4199	4146	4068	4240	4248	4193	4222	4254	4220	4204	4156
32.5	4025	3970	3928	3991	3974	3968	4061	4007	3976	3906	3911	3978	4065	3968	3996	3979	3927	3998	4056
35	3857	3880	3960	3872	3825	3750	3777	3757	3874	3785	3808	3775	3804	3763	3759	3774	3911	3894	3878
37.5	3662	3731	3736	3659	3659	3643	3628	3518	3548	3598	3611	3529	3606	3634	3694	3645	3790	3735	3707
40	3412	3350	3382	3409	3433	3420	3410	3355	3394	3390	3394	3350	3426	3489	3419	3387	3393	3356	3488
42.5	3181	3216	3157	3148	3089	3161	3104	3188	3273	3183	3274	3206	3162	3224	3097	3212	3211	3206	3225
45	3024	3053	3029	2981	2958	2950	2856	2902	2971	3003	2984	2873	2905	2982	2971	3000	3022	3076	3013
47.5	2787	2769	2814	2771	2777	2727	2698	2761	2787	2756	2717	2788	2734	2706	2785	2739	2808	2757	2793
50	2572	2541	2549	2517	2550	2507	2537	2562	2532	2494	2535	2585	2557	2487	2557	2523	2605	2586	2548
52.5	2322	2300	2324	2276	2316	2288	2336	2369	2263	2374	2281	2314	2316	2305	2322	2318	2322	2376	2399
55	2105	2085	2089	2058	2087	2115	2171	2087	2129	2123	2113	2131	2177	2141	2174	2144	2179	2141	2159
57.5	1965	1940	1930	1935	1880	1879	1874	1886	1948	1877	1935	1931	1933	1931	1930	1938	1983	1999	1993
60	1672	1671	1695	1691	1727	1766	1653	1735	1692	1731	1718	1761	1730	1786	1744	1710	1709	1697	1690
62.5	1460	1458	1445	1458	1491	1511	1551	1517	1470	1516	1497	1527	1535	1530	1491	1473	1473	1457	1458
65	1301	1290	1298	1273	1247	1261	1272	1282	1311	1292	1300	1282	1287	1261	1277	1285	1303	1303	1312
67.5	1113	1107	1082	1089	1081	1093	1076	1069	1099	1111	1095	1072	1081	1073	1092	1116	1115	1148	1136
70	921	915	926	910	877	888	895	903	886	865	882	882	924	898	917	941	940	940	973
72.5	777	769	749	752	732	736	724	725	701	699	701	730	734	754	738	757	761	769	778
75	581	578	585	583	586	583	576	575	560	558	556	581	577	579	577	576	584	580	590
77.5	420	419	413	413	418	424	428	432	432	433	429	436	427	427	422	420	422	420	423
80	312	305	302	306	309	313	315	320	324	321	322	323	321	317	316	311	312	313	314
82.5	231	233	232	233	233	236	237	238	242	243	240	240	240	238	236	234	237	234	232
85	166	169	168	168	170	173	174	174	176	178	176	175	174	174	172	170	171	170	169
87.5	115	118	117	118	119	120	121	123	123	124	123	123	122	122	120	120	120	119	118
90	78	79	80	81	82	83	84	85	86	88	87	87	87	86	86	85	85	83	83

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Candela Tabulations (Continued)

	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90
92.5	46	46	46	46	47	48	49	52	54	57	59	60	62	64	65	66	66	66	67
95	24	23	22	21	21	23	26	28	31	35	38	41	45	48	51	53	55	57	58
97.5	6	6	6	5	4	5	9	13	18	23	28	33	37	41	45	48	50	53	53
100	0	0	0	0	0	0	1	6	11	16	20	25	29	34	38	41	44	47	47
102.5	0	0	0	0	0	0	0	1	4	9	14	18	22	26	29	32	35	37	38
105	0	0	0	0	0	0	0	0	0	3	7	12	16	19	22	25	27	28	29
107.5	0	0	0	0	0	0	0	0	0	0	1	5	8	12	15	17	19	20	20
110	0	0	0	0	0	0	0	0	0	0	0	0	1	5	8	10	12	13	13
112.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	5	7	8
115	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	4	5
117.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2
120	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
125	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
130	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
135	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
140	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
145	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
150	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
155	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
160	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
165	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
170	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
175	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
180	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	Labsphere	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-65:2001	Single-Ended Compact Fluorescent Lamps – Life Test Performance
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

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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
03/12/15	A	DMS	Origination	C. Duviols	R. Higley
06/26/15	B	DMS	Changed internal part number from: BXCCAxA13-Ux7xxxx to: BXCCAxD13-Ux7xxxx	L. Li	C. McLaurin