

PHOTOMETRIC TESTING & EVALUATION TO IES LM-79-19

Sample Tested

JR4-50-GWC--**-AC**

Prepared for:

Nemalux Inc.1018 72 Ave NE
Calgary, Alberta, Canada T2E 8V9**Technical Report Number**

80213137-1

June 17, 2024

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Program Description

Photometric and electrical testing of a JR4-50-GWC-**-**-AC Type C LED Luminaire to IES LM-79-19.

Executive Summary

Sample Tested = JR4-50-GWC-**-**-AC

Sample Number = 44003157

Driver = Sosen SS-35VA-L50BHL

LED Module = Samsung 301B

Luminous Efficacy (Lumens/Watt)	Luminous Flux (Lumens)	Input Power (Watts)	Power Factor	ATHD (%)
148.25	5387.57	36.34	0.9933	8.57

CCT(K)	CRI	R9	Rcs,h1	Rf / Rg
5315	74.9	-17	-17	75 / 93

* The above results are recorded / derived from measurements made using an Integrating Sphere

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Test Sample Pictures

The following sample was submitted for evaluation:



Nimalux Inc. : JR4-50-GWC--**-AC**

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Test Result

The following results were measured after stabilization of the sample in the Integrating Sphere (unless otherwise stated). Stability shall be achieved when the variation (Maximum to minimum) of at least three readings of the light output and electrical power consumption, taken at a maximum of 10 minute intervals over a period of 20 minutes and divided by the last of these measurements chronologically, is less than 0.5%.

Key Photometric Results	Sample Reference	
	JR4-50-GWC-**-**-AC	
	Integrating Sphere	Goniophotometer
Luminous Efficacy (Lumens/Watt)	148.25	144.00
Total Luminous Flux (Lumens)	5387.57	5227
Total Radiant Flux (Watts)	16.33	
Correlated Color Temperature (CCT)	5315	
Color Rendering Index (CRI)(Ra)	74.9	
R9 Value	-17	
IES R _f / IES R _g	75 / 93	
Local Chroma Shift R _{cs,h1}	-17	
Chromaticity (Chroma x/Chroma y)	0.337 / 0.3487	
Chromaticity (Chroma u/Chroma v)	0.207 / 0.3214	
Chromaticity (Chroma u'/Chroma v')	0.207 / 0.482	
Duv Value	0.0019	
Stabilization Time (Light and Power)	40 minutes	
Total Run Time (Integrating Sphere)	45 minutes	
Spacing Criteria (0°-180°)/(90°-270°)	1.3 / 1.3	
Scotopic/Photopic ratio $\Phi(v')/\Phi(v)$	1.87	

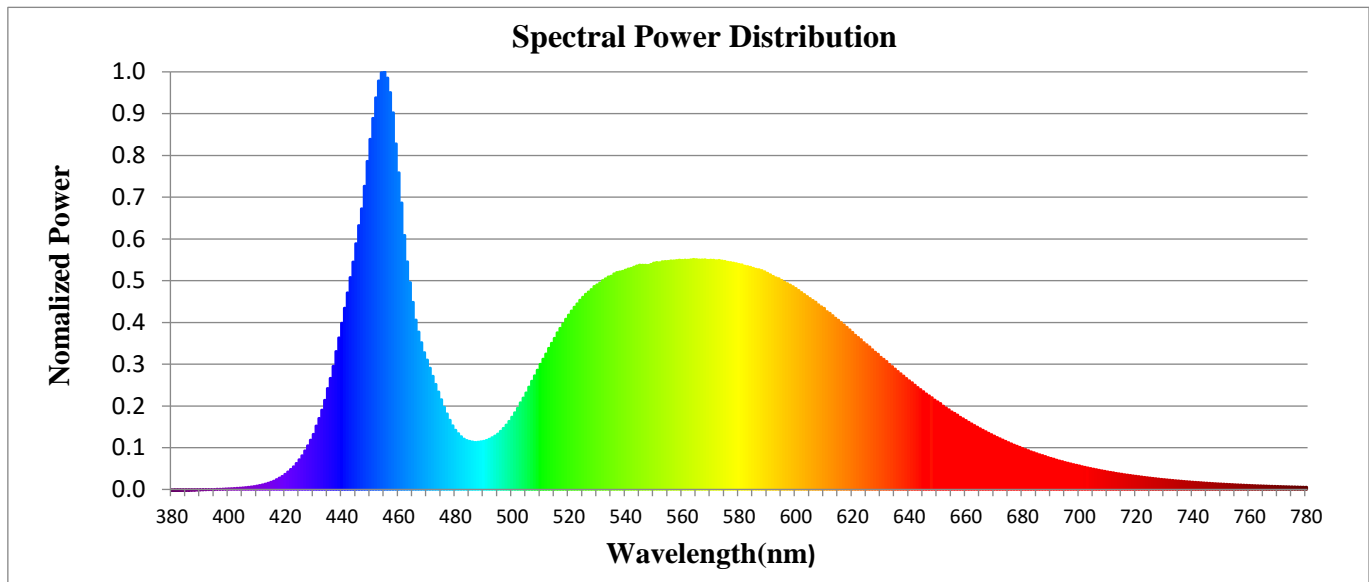
Electrical Input Results:	Sample Reference
	JR4-50-GWC-**-**-AC
Input Power (Watts)	36.34/ 35.47
Input Voltage (Volts AC)	120.05/ 277.0
Input Current (Amps)	0.3048/ 0.1369
Input Frequency (Hertz)	60.0/ 60.0
Power Factor	0.9933/ 0.9355
Total Harmonic Distortion (THD A)%	8.57/ 11.38%

Additional Information	Sample Reference
	JR4-50-GWC-**-**-AC
Ambient Temperature	25°C
Integrating Sphere Detector	CDS 2600 Spectroradiometer
Absortion Correction Used?	Yes
Date Tested	6/13/2024

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Spectral Flux

The following graph shows the spectral response curve of the radiant flux for the sample:



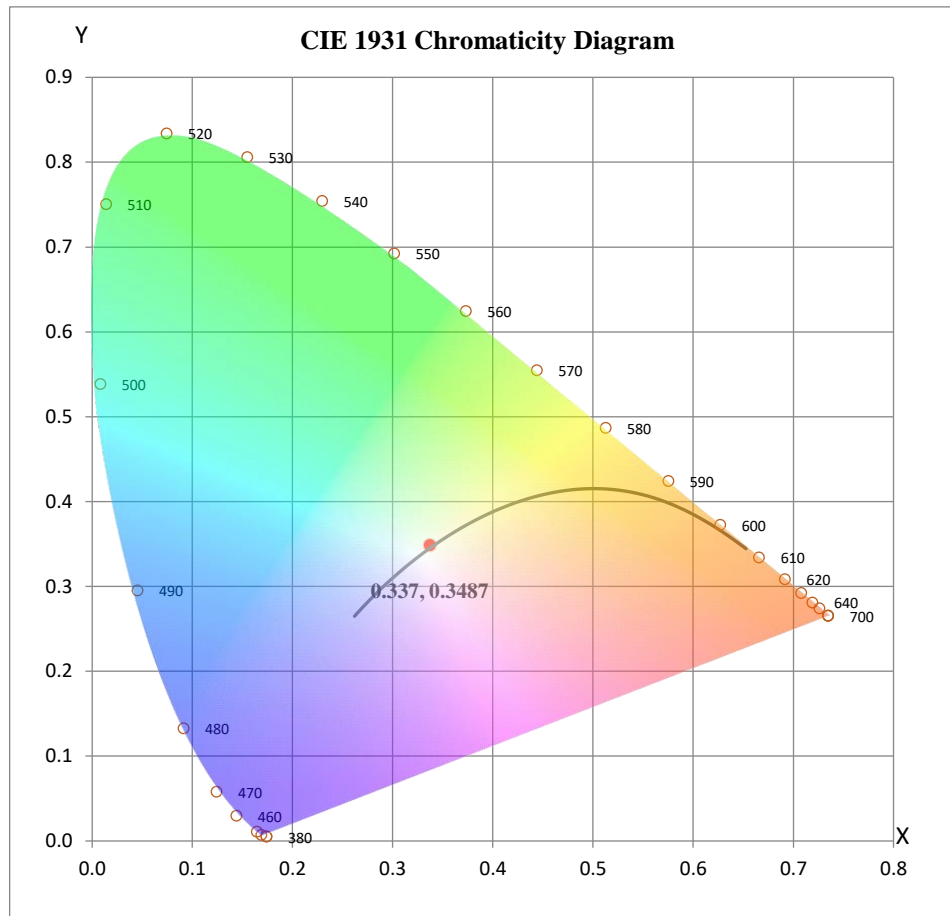
Spectral response of the Radiant Flux

(380nm to 780nm - calibrated range of the Spectroradiometer)

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Chromaticity Diagram

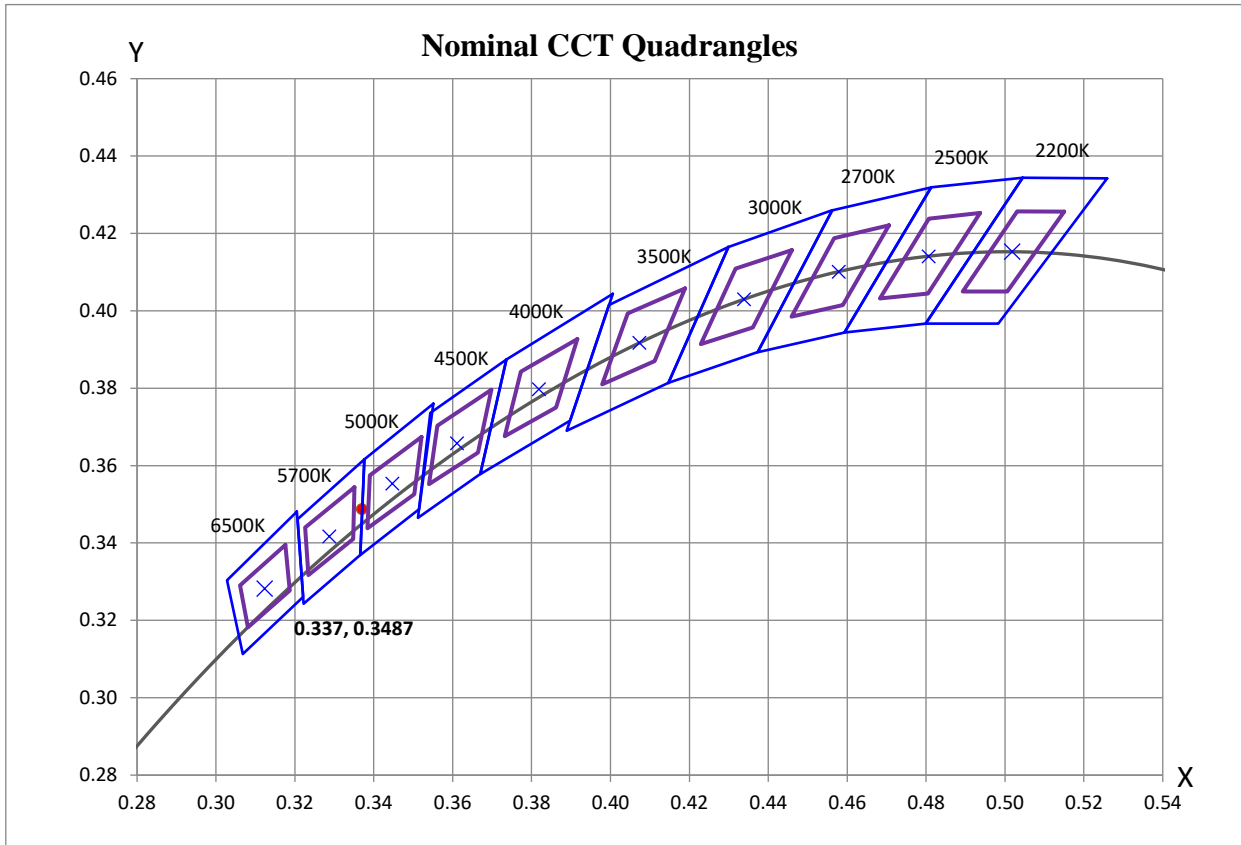
The following image shows the chromaticity diagram for the sample:



$x = 0.337$ $y = 0.3487$

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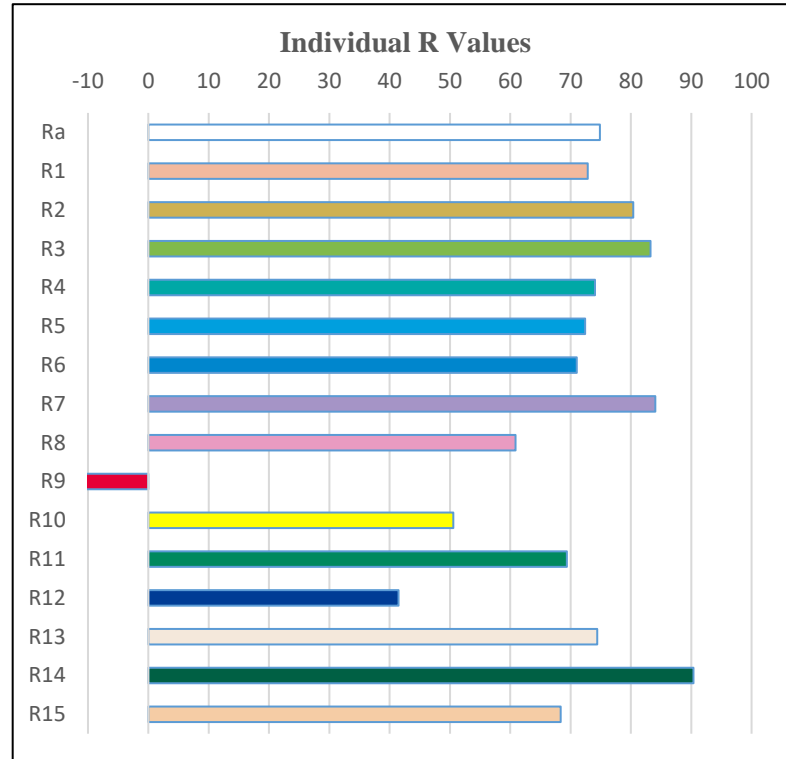
Nominal CCT Quadrangles



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Color Rendering Index

Ra	74.9
R1	73
R2	80
R3	83
R4	74
R5	72
R6	71
R7	84
R8	61
R9	-17
R10	51
R11	69
R12	41
R13	74
R14	90
R15	68



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Photometric Test Results

Characteristics		Luminance Data (cd/sq.m)			
Total Lumens:	5227.00	Angle In Degrees	Average		
Input Wattage (W):	36.38		0°	45°	90°
Efficacy(lm/W):	143.68	45	85282	85546	85810
Spacing Criterion (0-180°):	1.3	55	81537	82026	82107
Spacing Criterion (90-270°):	1.3	65	71456	72339	72450
Spacing Criterion (Diagonal):	1.42	75	43281	46166	40756
Luminous Length (0-180°):	0.48 ft	85	2678	2142	2142
Luminous Width (90-270°):	0.48 ft				
Luminous Height:	0.00 ft				

Zonal Lumen Summary												
Zone	Lumens	%Fixt		Zone	Lumens	%Fixt		Zone	Lumens		Zone	Lumens
0-20°	684.96	13.1		60-80°	899.46	17.2		0-10°	176.45		90-100°	0.00
0-30°	1463.96	28.0		70-80°	256.85	4.9		10-20°	508.51		100-110°	0.00
0-40°	2416.16	46.2		80-90°	13.49	0.3		20-30°	779.00		110-120°	0.00
0-60°	4314.05	82.5		90-110°	0.00	0.0		30-40°	952.21		120-130°	0.00
0-80°	5213.51	99.7		90-120°	0.00	0.0		40-50°	999.47		130-140°	0.00
0-90°	5227.00	100.0		90-130°	0.00	0.0		50-60°	898.42		140-150°	0.00
10-90°	5050.55	96.6		90-150°	0.00	0.0		60-70°	642.61		150-160°	0.00
20-40°	1731.20	33.1		90-180°	0.00	0.0		70-80°	256.85		160-170°	0.00
20-50°	2730.68	52.2		110-180°	0.00	0.0		80-90°	13.49		170-180°	0.00
40-70°	2540.50	48.6		0-180°	5227.00	100.0		0-90°	5227.00		90-180°	0.00

Coefficients of Utilization																		
Effective Floor Cavity Reflectance 0.20																		
RC	80				70				50			30			10			0
RW	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10	0
0	119	119	119	119	116	116	116	116	111	111	111	106	106	106	102	102	102	100
1	110	105	101	98	107	103	99	96	99	96	93	95	93	90	91	89	88	86
2	100	92	86	80	97	90	84	79	87	82	77	83	79	76	80	77	74	72
3	91	81	73	67	89	79	72	66	76	70	65	74	68	64	71	67	63	61
4	84	72	63	57	81	70	62	56	68	61	55	66	60	55	63	58	54	52
5	77	64	55	49	75	63	55	48	61	54	48	59	52	47	57	51	47	45
6	71	58	49	42	69	57	48	42	55	47	42	53	47	42	52	46	41	39
7	66	52	44	37	64	51	43	37	50	42	37	48	42	37	47	41	36	34
8	61	48	39	33	59	47	39	33	46	38	33	44	38	33	43	37	33	31
9	57	44	35	30	56	43	35	30	42	35	30	41	34	30	40	34	29	28
10	53	40	32	27	52	40	32	27	39	32	27	38	31	27	37	31	27	25

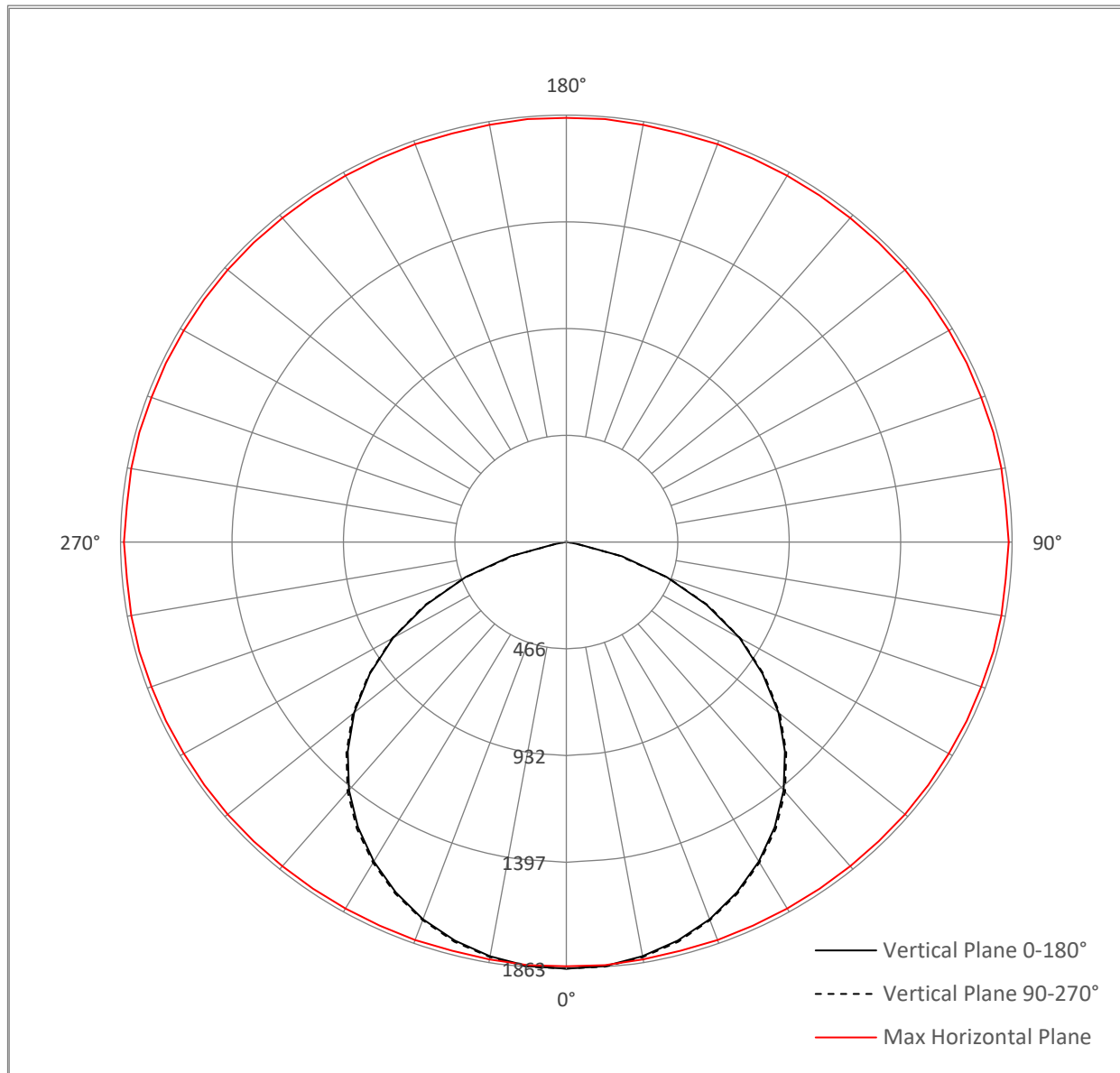
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UGR Table												
		Reflectances						Reflectances				
Ceiling Cavity		70	70	50	50	30		70	70	50	50	30
Walls		50	30	50	30	30		50	30	50	30	30
Floor Cavity		20	20	20	20	20		20	20	20	20	20
Room Size		UGR Viewed Crosswise						UGR Viewed Endwise				
X=2H	Y=2H	27.6	29.2	29.9	29.2	29.9	27.6	29.2	28.0	29.5	29.9	
	3H	29.1	30.5	31.2	30.6	31.3	29.1	30.6	29.5	30.9	31.3	
	4H	29.5	30.8	31.5	30.8	31.5	29.4	30.8	29.8	31.2	31.5	
	6H	29.5	30.8	31.5	30.7	31.5	29.5	30.7	29.9	31.1	31.5	
	8H	29.5	30.7	31.5	30.6	31.4	29.4	30.6	29.9	31.0	31.4	
	12H	29.5	30.6	31.4	30.6	31.4	29.4	30.6	29.8	30.9	31.4	
4H	2H	28.2	29.6	30.3	29.6	30.3	28.2	29.6	28.6	29.9	30.3	
	3H	29.8	31.0	31.8	31.0	31.8	29.9	31.0	30.3	0.0	31.8	
	4H	30.3	31.3	32.1	31.2	32.1	30.2	31.2	30.7	31.7	32.1	
	6H	30.4	31.3	32.2	31.2	32.0	30.3	31.2	30.7	31.6	32.0	
	8H	30.3	31.2	32.1	31.1	32.0	30.2	31.1	30.7	31.5	32.0	
	12H	30.3	31.1	32.0	30.9	31.9	30.2	30.9	30.7	31.4	31.9	
8H	4H	30.4	31.2	32.1	31.2	32.1	30.3	31.2	30.8	31.6	32.1	
	6H	30.5	31.2	32.2	31.1	32.0	30.4	31.1	30.9	31.6	32.0	
	8H	30.5	31.1	32.1	31.0	32.0	30.4	31.0	30.9	31.5	32.0	
	12H	30.5	31.0	32.1	30.9	31.9	30.3	30.9	30.8	31.4	31.9	
12H	4H	30.4	31.1	32.1	31.1	32.0	30.4	31.1	30.8	31.6	32.0	
	6H	30.5	31.1	32.1	31.0	32.0	30.4	31.0	30.9	31.4	32.0	
	8H	30.5	31.0	32.1	30.9	31.9	30.3	30.9	30.8	31.4	31.9	

Maximum UGR = 32.2

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Polar Graph



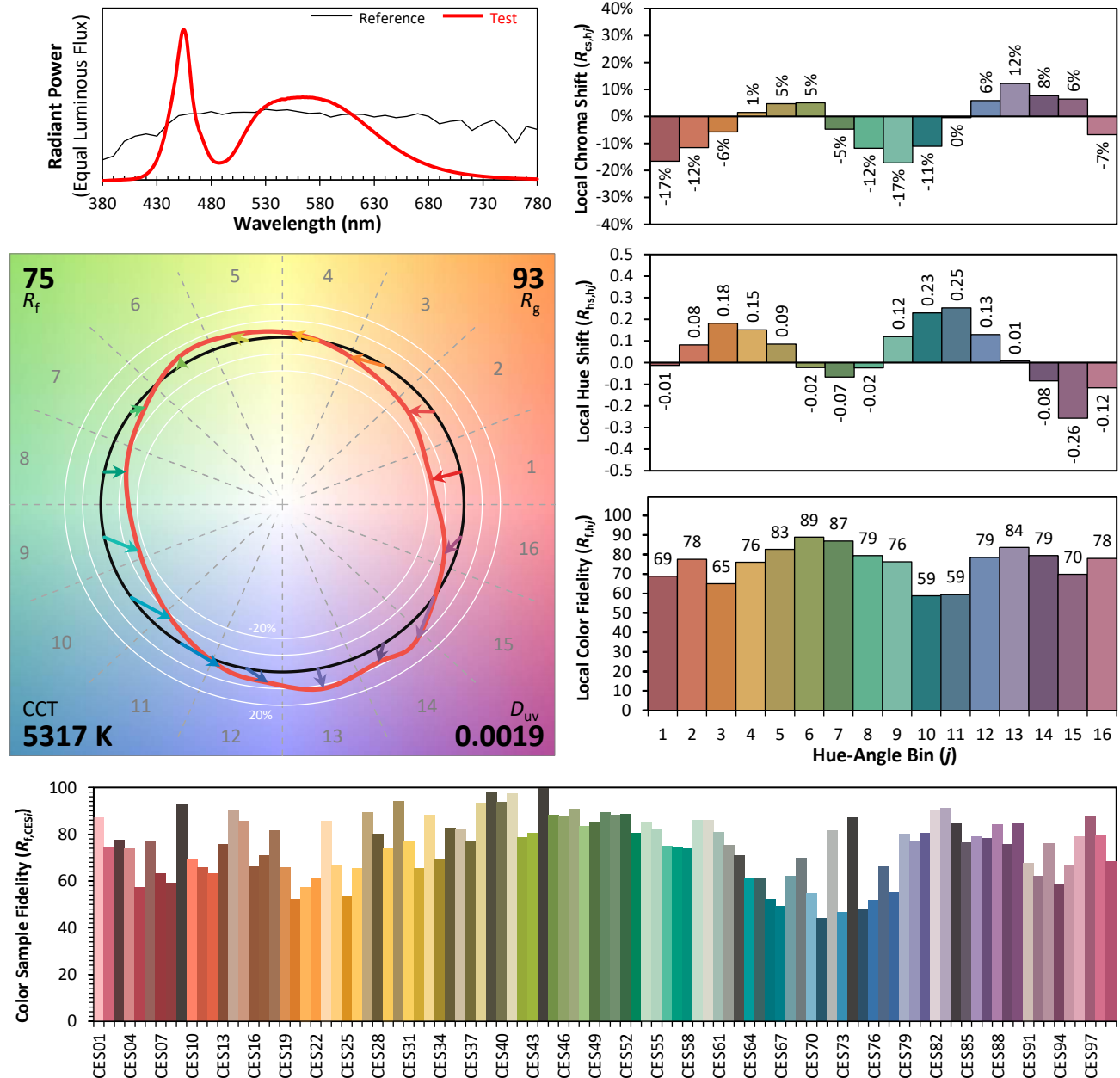
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Candela Tabulation

		Vertical Angle																																					
Horizontal Angle		0.0	2.5	5.0	7.5	10.0	12.5	15.0	17.5	20.0	22.5	25.0	27.5	30.0	32.5	35.0	37.5	40.0	42.5	45.0	47.5	50.0	52.5	55.0	57.5	60.0	62.5	65.0	67.5	70.0	72.5	75.0	77.5	80.0	82.5	85.0	87.5	90.0	
	0	1861	1861	1857	1849	1835	1820	1800	1777	1752	1721	1687	1650	1609	1567	1518	1467	1413	1352	1292	1227	1157	1083	1002	920	835	743	647	549	447	344	240	140	50	20	5	2	0	
	5	1861	1857	1852	1844	1833	1817	1797	1775	1751	1721	1687	1651	1611	1568	1521	1470	1417	1358	1297	1231	1160	1087	1007	924	837	745	650	551	449	345	240	140	50	18	4	2	0	
	10	1861	1859	1855	1847	1834	1818	1798	1776	1750	1720	1688	1650	1610	1566	1519	1469	1415	1357	1296	1230	1160	1085	1006	923	837	746	649	550	448	345	243	139	56	17	5	2	0	
	15	1861	1859	1856	1848	1834	1818	1800	1778	1752	1721	1688	1653	1611	1567	1520	1470	1416	1356	1294	1231	1159	1085	1005	923	837	745	650	551	447	343	244	146	55	21	5	2	0	
	20	1861	1857	1853	1845	1833	1818	1800	1777	1751	1722	1689	1653	1613	1569	1522	1471	1416	1358	1295	1229	1160	1085	1007	924	836	746	650	552	451	350	250	149	67	18	5	2	0	
	25	1861	1858	1855	1847	1834	1819	1801	1778	1751	1721	1689	1652	1612	1568	1521	1471	1415	1357	1295	1229	1161	1085	1005	924	837	747	650	551	451	352	254	154	75	16	6	2	0	
	30	1861	1859	1855	1846	1834	1819	1801	1778	1751	1722	1689	1652	1612	1568	1521	1470	1415	1357	1295	1229	1160	1085	1006	925	838	748	653	553	450	352	256	161	81	18	7	2	0	
	35	1861	1860	1856	1847	1835	1819	1801	1778	1750	1721	1688	1652	1611	1568	1521	1471	1416	1358	1296	1231	1160	1085	1007	925	838	747	654	557	453	351	260	165	77	24	5	1	0	
	40	1861	1859	1855	1848	1835	1819	1800	1778	1752	1722	1689	1653	1612	1569	1521	1469	1415	1357	1296	1230	1160	1087	1008	926	840	749	656	558	455	352	260	166	69	27	4	2	0	
	45	1861	1859	1855	1847	1833	1819	1801	1779	1753	1723	1691	1654	1613	1569	1521	1471	1416	1357	1296	1230	1160	1086	1008	926	839	749	655	558	456	353	256	155	67	17	4	1	0	
	50	1861	1858	1853	1846	1835	1820	1800	1777	1753	1725	1691	1653	1612	1571	1522	1471	1416	1359	1298	1230	1160	1086	1007	926	838	748	654	557	456	353	248	144	56	14	4	1	0	
	55	1861	1858	1854	1846	1834	1819	1800	1778	1752	1723	1690	1653	1613	1569	1522	1472	1417	1360	1297	1231	1161	1086	1008	926	838	747	654	557	455	351	240	127	52	11	4	1	0	
	60	1861	1860	1854	1846	1835	1818	1798	1776	1752	1724	1689	1652	1613	1571	1524	1471	1418	1361	1299	1232	1160	1086	1008	925	838	748	654	557	454	345	231	117	40	11	4	1	0	
	65	1861	1859	1856	1846	1835	1818	1799	1777	1752	1724	1690	1653	1614	1570	1523	1472	1419	1361	1299	1232	1161	1088	1009	925	837	747	653	556	452	338	224	110	40	11	4	1	0	
	70	1861	1861	1856	1848	1836	1820	1799	1777	1753	1724	1691	1653	1613	1570	1523	1473	1419	1362	1299	1232	1161	1087	1009	924	837	747	653	557	452	337	220	106	38	12	4	1	0	
	75	1861	1859	1853	1846	1836	1820	1800	1779	1755	1726	1692	1655	1616	1573	1526	1474	1419	1362	1300	1233	1162	1088	1009	925	838	746	653	556	451	339	221	113	40	10	4	2	0	
	80	1861	1860	1857	1849	1836	1821	1803	1782	1755	1725	1692	1657	1618	1573	1526	1476	1420	1363	1300	1234	1164	1088	1009	926	838	747	653	555	451	340	225	112	46	10	4	2	0	
85	1861	1863	1860	1853	1843	1831	1814	1785	1756	1725	1693	1656	1616	1573	1526	1476	1421	1363	1301	1234	1165	1090	1010	926	839	750	655	556	454	343	229	120	43	13	4	2	0		
90	1861	1863	1860	1851	1839	1824	1805	1782	1755	1725	1692	1655	1615	1572	1526	1475	1422	1362	1300	1235	1165	1091	1009	926	841	749	656	558	452	342	226	125	39	15	4	2	0		

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ANSI/IES TM-30-18 Color Rendition Report



Notes: This is a recommended method for displaying ANSI/IES TM-30-18 information.

x 0.3369
 y 0.3486
 u' 0.2070
 v' 0.4820

CIE 13.3-1995
 (CRI)
 R_a 75
 R_g -17

Colors are for visual orientation purposes only. Created with the ANSI/IES TM-30-18 Calculator Version 2.00.

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Photometric Testing Information

The sample was evaluated for photometric and electrical characteristics using an integrating sphere and a goniophotometer, each located in purpose-built, temperature and humidity-controlled, draft free environments

The integrating sphere is by Labsphere which exhibits a “ 4π geometry” configuration according to IES LM-79-19 and is applicable for all types of LED products (directional and non-directional light projections). Its spectroradiometer is an array-type detector manufactured and calibrated by Labsphere.

The integrating sphere uses self-absorption correction to eliminate errors due to mismatches between the standard reference lamp and the test samples being measured. The auxiliary lamp used to perform this task is a halogen type lamp powered by a calibrated Lamp Power Supply manufactured and calibrated by Labsphere. Ambient temperature (for photometric analysis) is measured using a “J-Type” thermocouple located inside the integrating sphere at the same height as the sample under test and not more than 1 meter in horizontal distance away from the sample. The thermocouple is located behind the baffle of the photo detector in order to eliminate any direct optical radiation from the sample under test.

Luminaire Stabilization.

The sample was placed inside the integrating sphere and powered by a regulated and conditioned Voltage alternating current supply. The correlated color temperature, color rendering index, chromaticity coordinates and electrical power measurements contained in this report are the numeric averages of the three readings upon which stabilization is verified. The stabilization times shown on the results pages of this report denote the time of the 1st measurement (of the 3 consecutive readings) since this is the minimum time that the sample is assumed to have taken to reach stabilization.

The integrating sphere is calibrated using a quartzline halogen lamp with the following specifications:
(Calibrated by Labsphere – NIST traceable).

Lamp ID	J178		
Manufacture	Donar		
Model Number	SCL-1400-J178		
Part ID	SCL-1400		
Current (A)	2.679		
Wattage (W)	75.0		
Voltage (VDC)	28.0		
Luminous Flux	1306		
Calibration Date	6/21/2021		

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Photometric Testing Information (Continued)

The goniophotometer Mayer Engineering Type C is calibrated using a frosted tungsten filament FDS/DZE lamp with the following specifications:

Manufacturer: GE
Part Number: DZE
Bulb Number: 106-A
Voltage: 16.93 Volts DC reference
Calibration Current: 4.863 Amperes
Luminous Intensity: 168.8 Candelas
Calibration Date: 4/25/12 (NIST traceable)

Manufacturer: GE
Part Number: DZE
Bulb Number: 106-B
Voltage: 16.45 Volts DC reference
Calibration Current: 4.79 Amperes
Luminous Intensity: 145.3 Candelas
Calibration Date: 4/25/12 (NIST traceable)

Manufacturer: GE
Part Number: DZE
Bulb Number: 106-C
Voltage: 16.57 Volts DC reference
Calibration Current: 4.829 Amperes
Luminous Intensity: 157.0 Candelas
Calibration Date: 4/25/12 (NIST traceable)

A Yokogawa WT310 Power Analyzer was used to measure all electrical characteristics of the sample.

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Equipment List: Goniophotometer Type C (Mirror 2)

Description	Manufacturer and Model Number	CSA Instrument Reference Number	Calibration Due Date
Optometer	Gigahertz Optik P9801	OPT400	N/A
Programmable DC Power Supply	Chroma Instruments 62012P-80-60	DCP300	N/A
Regulated Power Supply	Chroma Instruments 61602	AC301	N/A
Power Analyzer	Yokogawa WT310-E	POA400	9/25/2024

Equipment List: Sphere B Equipment

Description	Manufacturer and Model Number	CSA Instrument Reference Number	Calibration Due Date
Integrating Sphere 118"	Labsphere LMS-3M	Z00029788	N/A
Spectroradiometer	Labsphere CDS2600	N/A	N/A
Auxiliary Lamp PSU	Labsphere LPS525	N/A	N/A
Power Analyzer	Yokogawa WT310E	Z00025875	10/18/2024
Programmable AC Power Supply	Chroma Instruments 61605	Z00023974	N/A

* All equipment is calibrated to ISO / IEC 17025-2017 guidelines.

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