

Classified
Cooper Lighting Solutions Photometric Lab
1121 Highway 74 South
Peachtree City, GA 30269



Scaled data based on original data using
LM-79-08 Approved Method: Electrical and Photometric Measurements of Solid-State
Lighting Products

Test Report Prepared for
Cooper Lighting Solutions
(formerly Eaton)

Brand: io LED

Report Number: P895853

Luminaire Tested: **GRZ-15L-927-30x60-X-UNV-STD-1F**

Issue Date: 11/20/2024

Test Information

Test Method: LM-79-08
Report Number: P895853
Test Lab: INNOVATION CENTER(G3)
Issue Date: 11/20/2024
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)
Product Line: io LED
Catalog Number: GRZ-15L-927-30x60-X-UNV-STD-1F
Description: iO LED 90CRI 2700K GRAZER 1500 lumens per ft WITH 30 deg x 60 deg OPTIC
Light Source: 2700K CCT, 90 CRI LEDS
Ballast/Driver: ELECTRONIC DRIVER

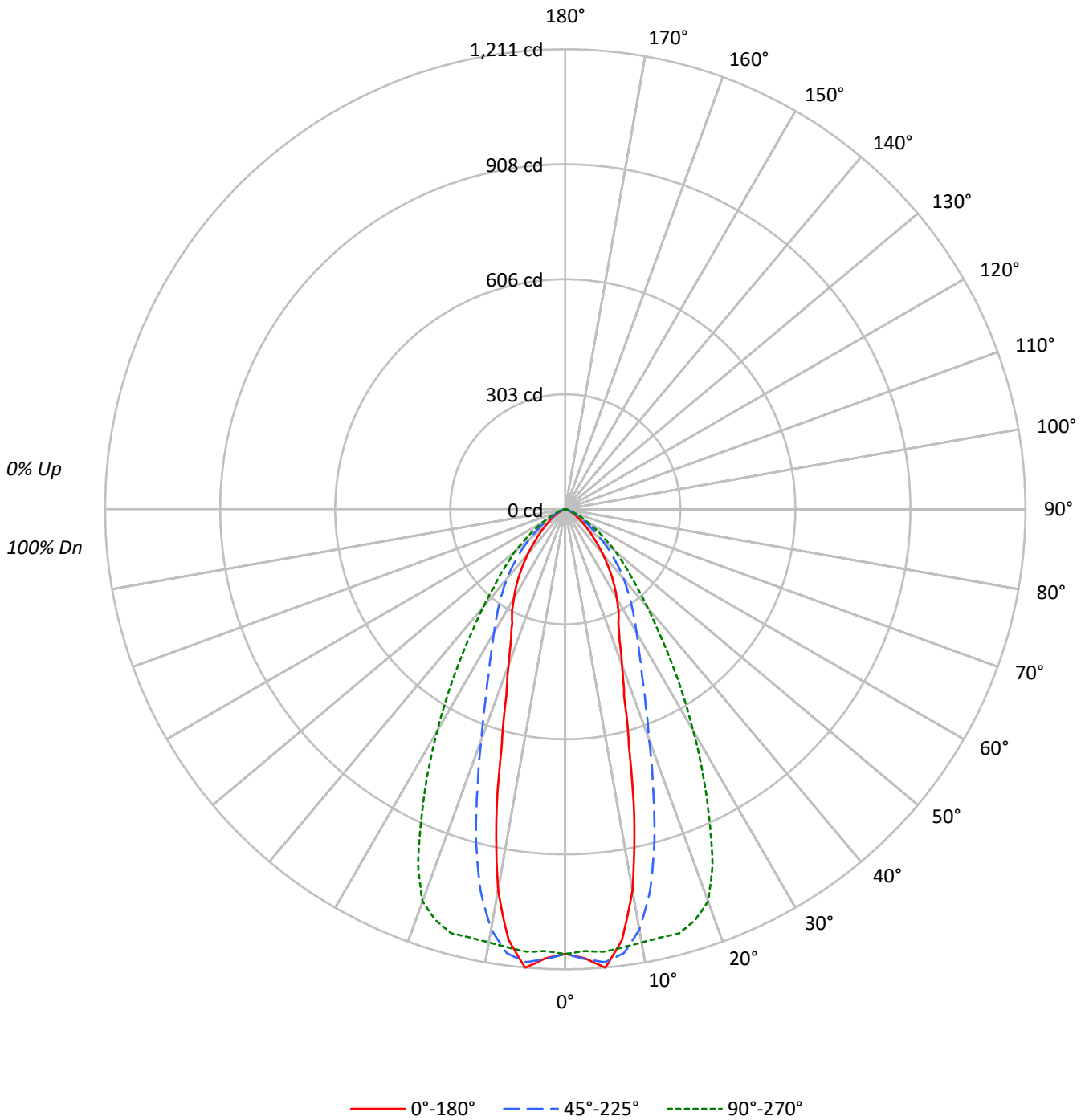
Summary

Lumens per Lamp: N/A
Luminaire Lumens: 1074.0 lumens
Efficiency: N/A
Efficacy: 72.1 lumens/watt
Spacing Criteria (0/90/45): 0.53 / 1.01 / 0.76
Luminous Opening: Rectangular (W 1' x L: 0.17' x H: 0')
CIE Type: Direct

Input Watts (W): 14.9
Input Voltage (V): 120
Input Current (Ain): NR
Voltage Rise (V): NR
Power Factor: NR
Total Harmonic Distortion (THDi): NR
Frequency (hertz): 60
Stabilization Time: NR
Operation Time: NR
Ambient Temperature (°C): NR
Test Distance: 25 FT

TEST NUMBER: P895853
CATALOG NUMBER: GRZ-15L-927-30x60-X-UNV-STD-1F

Luminous Intensity Polar Plot





TEST NUMBER: P895853

CATALOG NUMBER: GRZ-15L-927-30x60-X-UNV-STD-1F

COEFFICIENT OF UTILIZATION - ZONAL CAVITY METHOD:

RF	20				20				20				20				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	50	30	10	0
RCR																					
0	119	119	119	119	116	116	116	116	111	111	111	106	106	106	102	102	102	102	102	102	100
1	113	109	107	104	110	107	105	102	103	101	99	99	98	96	96	95	93	96	95	93	92
2	106	100	96	92	104	99	94	91	95	92	89	92	89	87	89	87	85	89	87	85	83
3	100	92	87	82	98	91	86	81	88	84	80	86	82	79	83	80	78	83	80	78	76
4	94	85	79	74	92	84	78	74	82	77	73	80	75	72	78	74	71	78	74	71	69
5	88	79	72	67	87	78	72	67	76	71	66	74	70	66	73	69	65	73	69	65	64
6	83	73	67	62	82	73	66	62	71	65	61	69	65	61	68	64	60	68	64	60	59
7	79	68	62	57	77	68	61	57	66	61	57	65	60	56	64	59	56	64	59	56	54
8	75	64	57	53	73	63	57	53	62	57	53	61	56	52	60	56	52	60	56	52	51
9	71	60	54	49	70	60	53	49	59	53	49	58	53	49	57	52	49	57	52	49	47
10	67	57	50	46	66	56	50	46	55	50	46	55	49	46	54	49	46	54	49	46	44

AVERAGE LUMINANCE (cd/sqm):

	0°	45°	90°
0°	75567	75567	75567
5°	78520	77560	75791
10°	66786	73625	75907
15°	43238	60631	77250
20°	29960	44300	75497
25°	23568	33927	63793
30°	20183	27960	50186
35°	16609	23750	37868
40°	12880	20154	28237
45°	9515	16263	21834
50°	6982	12486	17358
55°	5212	8893	12687
60°	3668	5979	8562
65°	2567	3866	5791
70°	1794	2586	3776
75°	1322	1572	2620
80°	781	1190	1971
85°	815	815	815



TEST NUMBER: P895853
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ZONAL LUMENS:

Zone	Lumens	% Fixture
0°-10°	110.7	10.3
10°-20°	252.2	23.5
20°-30°	257.7	24.0
30°-40°	206.2	19.2
40°-50°	137.9	12.8
50°-60°	72.6	6.8
60°-70°	27.4	2.6
70°-80°	8.1	0.8
80°-90°	1.2	0.1
90°-100°	0.0	0.0
100°-110°	0.0	0.0
110°-120°	0.0	0.0
120°-130°	0.0	0.0
130°-140°	0.0	0.0
140°-150°	0.0	0.0
150°-160°	0.0	0.0
160°-170°	0.0	0.0
170°-180°	0.0	0.0
0°-30°	620.5	57.8
0°-40°	826.8	77.0
0°-60°	1037.3	96.6
0°-90°	1074.0	100.0
90°-120°	0.0	0.0
90°-150°	0.0	0.0
90°-180°	0.0	0.0
0°-180°	1074.0	100.0

CANDELA DISTRIBUTION:

	0°	22.5°	45°	67.5°	90°	Flux
0°	1170	1170	1170	1170	1170	
5°	1211	1194	1197	1178	1169	109
15°	647	714	907	1101	1156	185
25°	331	357	476	783	895	155
35°	211	229	301	436	480	131
45°	104	121	178	235	239	82
55°	46	52	79	108	113	42
65°	17	19	25	34	38	17
75°	5	5	6	9	10	6
85°	1	1	1	1	1	1
90°	0	0	0	0	0	

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CATALOG NUMBER: GRZ-15L-927-30x60-X-UNV-STD-1F

CANDELA DISTRIBUTION (FULL):

	0°	5°	15°	25°	35°	45°	55°	65°	75°	85°	90°
0°	1170.3	1170.3	1170.3	1170.3	1170.3	1170.3	1170.3	1170.3	1170.3	1170.3	1170.3
2.5°	1183.0	1181.9	1193.5	1185.1	1188.2	1185.1	1175.6	1170.3	1169.3	1158.7	1164.0
5°	1211.4	1194.5	1197.7	1192.4	1197.7	1196.6	1186.1	1179.8	1174.5	1168.2	1169.3
7.5°	1142.9	1145.0	1154.5	1158.7	1173.5	1178.7	1173.5	1169.3	1165.1	1161.9	1162.9
10°	1018.6	1025.9	1039.6	1067.1	1097.7	1122.9	1133.5	1145.0	1154.5	1155.6	1157.7
12.5°	838.5	849.0	871.2	900.6	968.0	1029.1	1080.8	1120.8	1144.0	1156.6	1154.5
15°	646.8	649.9	677.3	725.7	799.6	907.0	1009.1	1090.3	1132.4	1161.9	1155.6
17.5°	515.1	519.3	541.5	578.3	648.9	768.0	920.6	1041.7	1118.7	1139.8	1134.5
20°	436.0	432.9	449.7	480.4	539.4	644.7	803.8	965.9	1062.9	1092.4	1098.7
22.5°	372.9	376.0	386.6	410.8	462.5	549.9	695.2	866.9	974.4	1007.0	1012.3
25°	330.8	333.9	344.4	361.3	403.4	476.2	601.5	756.3	861.7	893.3	895.4
27.5°	303.4	301.3	308.6	321.3	358.1	420.3	523.6	652.0	750.0	781.7	783.8
30°	270.7	269.7	277.0	290.7	320.2	375.0	462.5	566.7	636.2	666.8	673.1
32.5°	241.2	240.2	248.6	260.2	289.7	337.1	412.9	494.1	541.5	566.7	573.1
35°	210.7	211.8	218.1	232.8	259.1	301.3	370.8	427.6	461.4	474.1	480.4
37.5°	181.2	182.3	190.7	205.4	231.8	269.7	325.5	369.7	389.7	399.2	398.1
40°	152.8	154.9	160.2	177.0	203.3	239.1	284.4	317.1	330.8	331.8	335.0
42.5°	127.4	127.4	135.8	149.5	174.9	208.6	248.6	271.8	282.3	281.3	279.2
45°	104.2	105.3	110.6	124.3	147.4	178.1	212.8	233.9	240.2	236.0	239.1
47.5°	85.3	86.3	90.6	103.2	123.2	152.8	180.2	200.2	205.4	202.3	202.3
50°	69.5	70.5	73.7	83.2	100.0	124.3	149.5	166.5	171.8	170.7	172.8
52.5°	56.9	56.9	60.0	67.4	81.1	101.1	121.1	135.8	140.0	139.0	137.9
55°	46.3	46.3	48.4	53.7	64.2	79.0	95.8	107.4	110.6	111.6	112.7
57.5°	36.9	36.9	37.9	42.1	49.5	61.1	73.7	82.1	85.3	86.3	87.4
60°	28.4	28.4	30.5	32.6	39.0	46.3	54.8	61.1	65.3	65.3	66.3
62.5°	22.1	22.1	23.2	25.3	29.5	34.7	40.0	45.3	47.4	49.5	50.5
65°	16.8	16.8	17.9	19.0	22.1	25.3	29.5	33.7	35.8	36.9	37.9
67.5°	12.6	12.6	12.6	14.7	16.8	19.0	21.1	24.2	25.3	27.4	28.4
70°	9.5	9.5	9.5	10.5	11.6	13.7	14.7	16.8	19.0	20.0	20.0
72.5°	7.4	7.4	7.4	7.4	8.4	9.5	10.5	11.6	13.7	14.7	14.7
75°	5.3	5.3	5.3	5.3	6.3	6.3	7.4	8.4	9.5	10.5	10.5
77.5°	4.2	4.2	3.2	4.2	4.2	4.2	5.3	5.3	6.3	7.4	7.4
80°	2.1	2.1	2.1	2.1	3.2	3.2	3.2	4.2	4.2	4.2	5.3
82.5°	1.1	1.1	1.1	1.1	2.1	2.1	2.1	2.1	2.1	3.2	3.2
85°	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
87.5°	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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

Cooper Lighting Solutions Photometric Lab
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Report Prepared for

Cooper Lighting Solutions

(formerly Eaton)

iO LED

Report Number: SP1-2101-124-1

Luminaire Tested: GRZ-05L-927-10X10-X-UNV-STD-2F

Test Date: 02/10/2021

Test Information

Test Method: LM-79-08
 Report Number: SP1-2101-124-1
 Test Lab: COOPER LIGHTING SOLUTIONS
 Photometer: SP1
 Measurement Geometry: 4π
 Issue Date: 02/10/2021
 Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)
 Product Line: iO LED
 Catalog Number: **GRZ-05L-927-10X10-X-UNV-STD-2F**
 Description: IO LED Wall Grazer GRZ

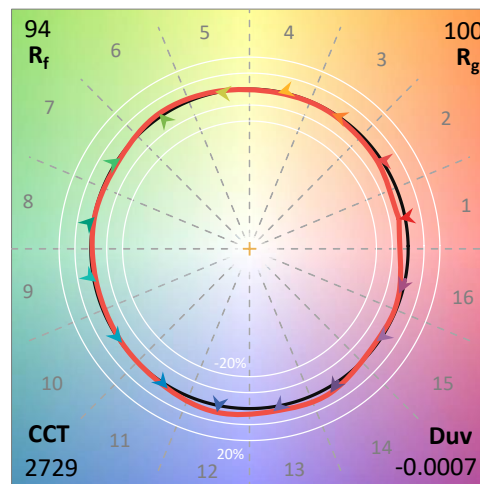
Spectral Parameters

CCT (K): 2729
 CIE u': 0.2613
 CIE v': 0.5257
 Duv: -0.0007
 CIE x: 0.4561
 CIE y: 0.4078
 CIE z: 0.1361
 Peak Wavelength (nm): 624
 Dominant Wavelength (nm): 584
 Purity: 59.5
 Rf: 93.5
 Rg: 99.9

CRI (Ra):	94.7		
R1:	95.4	R9:	67.0
R2:	98.0	R10:	94.1
R3:	98.7	R11:	96.2
R4:	95.1	R12:	88.6
R5:	95.2	R13:	96.3
R6:	97.5	R14:	98.5
R7:	92.8		
R8:	84.7		

Test Conditions

Stabilization Time: 176M
 Operation Time: 12H
 Room Temperature (°C) / RH%: 25.1/39%
 Sphere Temperature (°C): 24.5

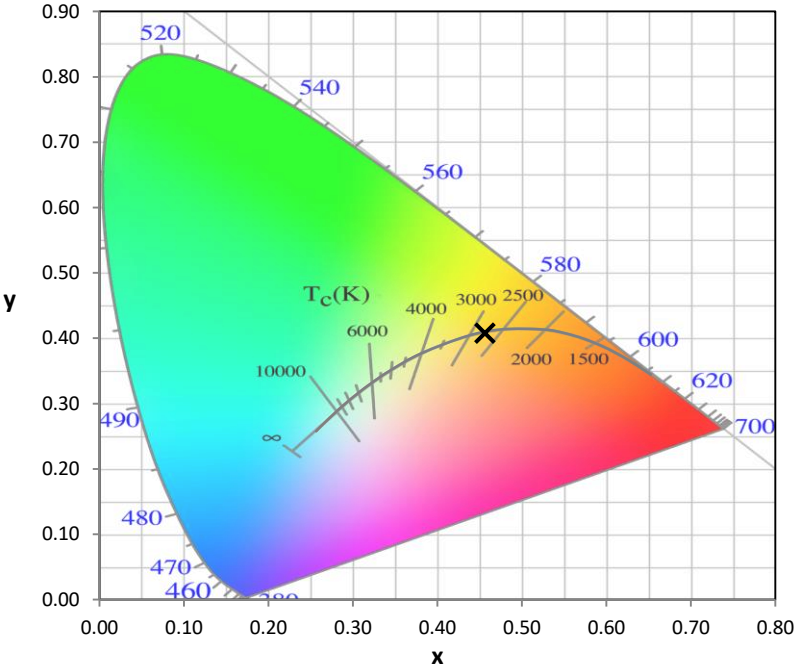


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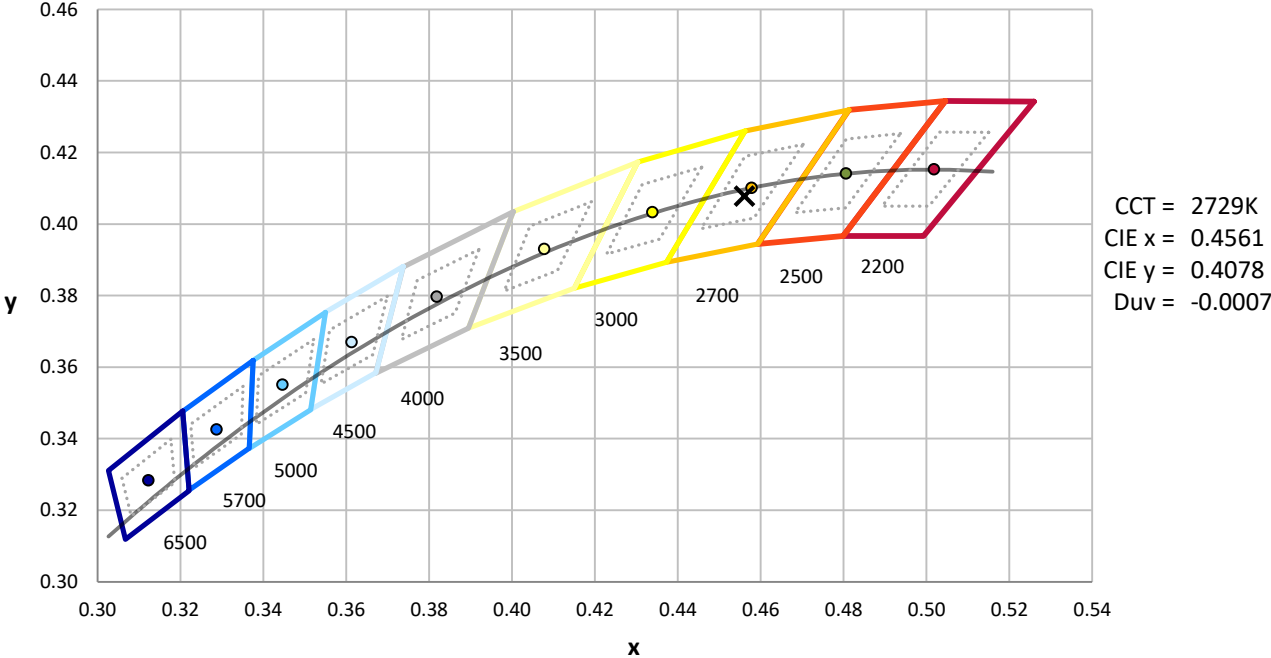
Measurement and Test Equipment			
Instrument	Identification Number	Calibration Date	Calibration Due Date
Photometer	IN0058	1/31/2021	7/31/2021
Power Meter	IN0071	12/1/2020	12/1/2021
AC Power Source	IN0063	12/1/2020	12/1/2021
DC Power Source	IN0208	12/1/2020	12/1/2021
Sphere Thermometer	IN0085	12/1/2020	12/1/2021
Room Thermometer	IN0046	12/1/2020	12/1/2021

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CIE 1931 Chromaticity Diagram



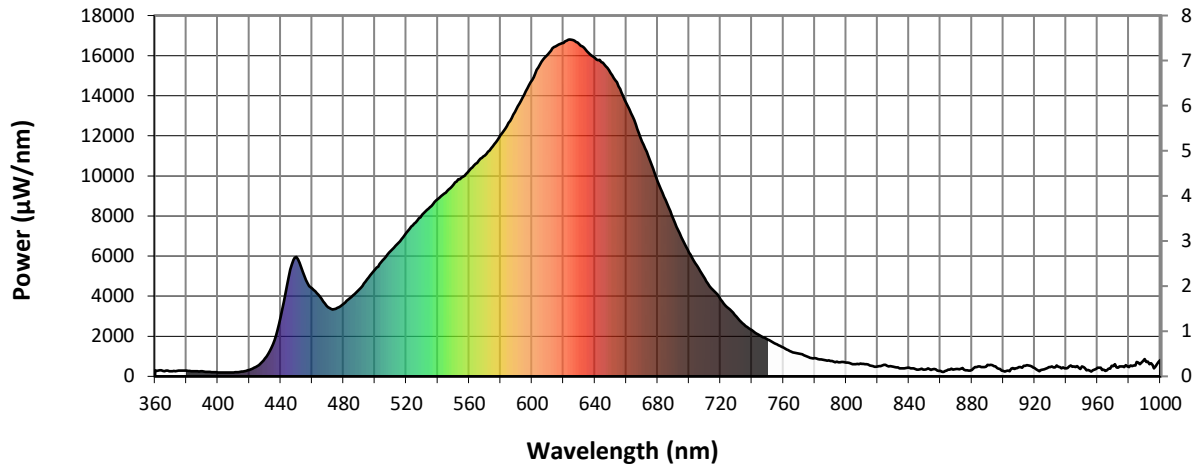
CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles



Point lies inside the ANSI 2700K 4-step quadrangle

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Photopic Flux vs. Wavelength

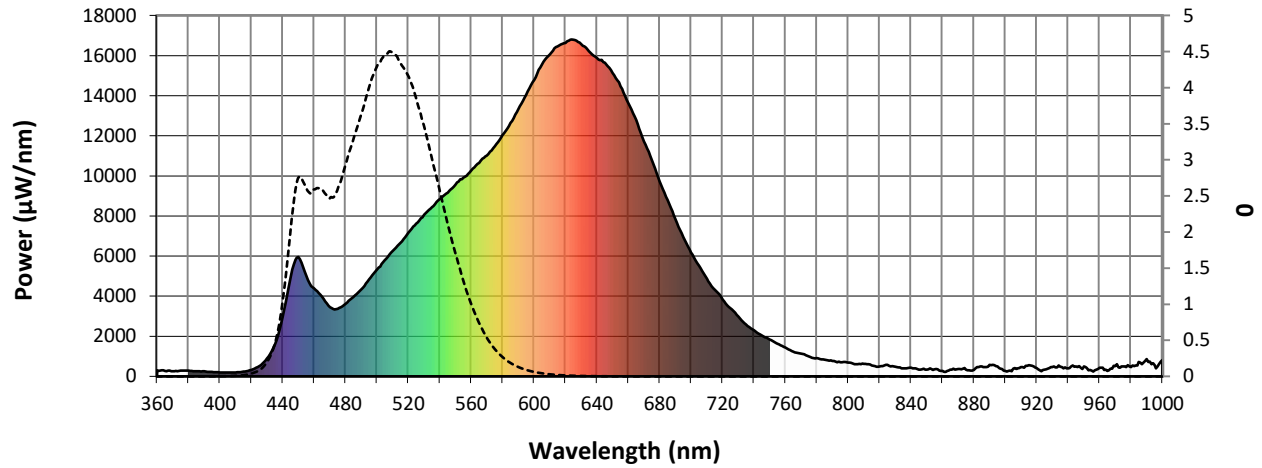


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λ (nm)	Power (µW/nm)	Lumens (φ/nm)	λ (nm)	Power (µW/nm)	Lumens (φ/nm)	λ (nm)	Power (µW/nm)	Lumens (φ/nm)	λ (nm)	Power (µW/nm)	Lumens (φ/nm)	λ (nm)	Power (µW/nm)	Lumens (φ/nm)
360	309	0.0	490	4342	0.6	620	16630	4.3	750	1836	0.0	880	324	0.0
365	277	0.0	495	4830	0.9	625	16799	3.7	755	1629	0.0	885	500	0.0
370	260	0.0	500	5328	1.2	630	16562	3.0	760	1434	0.0	890	571	0.0
375	295	0.0	505	5798	1.6	635	16219	2.4	765	1231	0.0	895	494	0.0
380	288	0.0	510	6250	2.1	640	15881	1.9	770	1141	0.0	900	267	0.0
385	260	0.0	515	6656	2.8	645	15637	1.5	775	986	0.0	905	379	0.0
390	252	0.0	520	7162	3.5	650	15133	1.1	780	904	0.0	910	465	0.0
395	226	0.0	525	7622	4.1	655	14463	0.8	785	827	0.0	915	557	0.0
400	191	0.0	530	8063	4.7	660	13640	0.6	790	768	0.0	920	412	0.0
405	196	0.0	535	8439	5.2	665	12787	0.4	795	711	0.0	925	332	0.0
410	195	0.0	540	8846	5.8	670	11721	0.3	800	693	0.0	930	466	0.0
415	235	0.0	545	9169	6.1	675	10776	0.2	805	609	0.0	935	480	0.0
420	323	0.0	550	9555	6.5	680	9728	0.1	810	615	0.0	940	404	0.0
425	510	0.0	555	9909	6.8	685	8803	0.1	815	547	0.0	945	502	0.0
430	889	0.0	560	10257	7.0	690	7856	0.0	820	491	0.0	950	495	0.0
435	1599	0.0	565	10655	7.1	695	6947	0.0	825	570	0.0	955	285	0.0
440	2967	0.0	570	11020	7.2	700	6181	0.0	830	477	0.0	960	433	0.0
445	4944	0.1	575	11481	7.1	705	5516	0.0	835	401	0.0	965	277	0.0
450	5950	0.2	580	12032	7.1	710	4865	0.0	840	440	0.0	970	517	0.0
455	5013	0.2	585	12647	7.0	715	4321	0.0	845	330	0.0	975	498	0.0
460	4393	0.2	590	13350	6.9	720	3839	0.0	850	336	0.0	980	465	0.0
465	3971	0.2	595	14054	6.7	725	3403	0.0	855	350	0.0	985	724	0.0
470	3442	0.2	600	14775	6.4	730	2978	0.0	860	266	0.0	990	861	0.0
475	3372	0.3	605	15552	6.0	735	2581	0.0	865	338	0.0	995	562	0.0
480	3623	0.3	610	16054	5.5	740	2292	0.0	870	363	0.0	1000	816	0.0
485	3960	0.5	615	16452	5.0	745	2037	0.0	875	335	0.0			

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Scotopic Flux vs. Wavelength



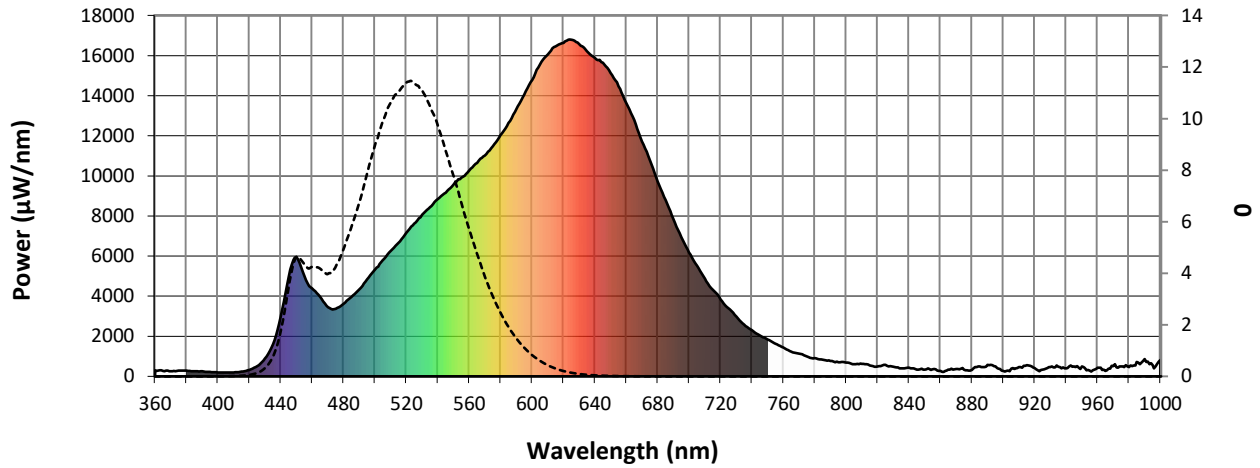
Scotopic Lumens: 1011.1

S/P: 1.32

λ (nm)	Power (µW/nm)	Lumens (φ/nm)	λ (nm)	Power (µW/nm)	Lumens (φ/nm)	λ (nm)	Power (µW/nm)	Lumens (φ/nm)	λ (nm)	Power (µW/nm)	Lumens (φ/nm)	λ (nm)	Power (µW/nm)	Lumens (φ/nm)
360	309	0.0	490	4342	6.7	620	16630	0.2	750	1836	0.0	880	324	0.0
365	277	0.0	495	4830	7.8	625	16799	0.1	755	1629	0.0	885	500	0.0
370	260	0.0	500	5328	8.9	630	16562	0.1	760	1434	0.0	890	571	0.0
375	295	0.0	505	5798	9.9	635	16219	0.1	765	1231	0.0	895	494	0.0
380	288	0.0	510	6250	10.6	640	15881	0.0	770	1141	0.0	900	267	0.0
385	260	0.0	515	6656	11.0	645	15637	0.0	775	986	0.0	905	379	0.0
390	252	0.0	520	7162	11.4	650	15133	0.0	780	904	0.0	910	465	0.0
395	226	0.0	525	7622	11.4	655	14463	0.0	785	827	0.0	915	557	0.0
400	191	0.0	530	8063	11.1	660	13640	0.0	790	768	0.0	920	412	0.0
405	196	0.0	535	8439	10.5	665	12787	0.0	795	711	0.0	925	332	0.0
410	195	0.0	540	8846	9.8	670	11721	0.0	800	693	0.0	930	466	0.0
415	235	0.0	545	9169	8.8	675	10776	0.0	805	609	0.0	935	480	0.0
420	323	0.1	550	9555	7.8	680	9728	0.0	810	615	0.0	940	404	0.0
425	510	0.1	555	9909	6.8	685	8803	0.0	815	547	0.0	945	502	0.0
430	889	0.3	560	10257	5.7	690	7856	0.0	820	491	0.0	950	495	0.0
435	1599	0.7	565	10655	4.8	695	6947	0.0	825	570	0.0	955	285	0.0
440	2967	1.7	570	11020	3.9	700	6181	0.0	830	477	0.0	960	433	0.0
445	4944	3.3	575	11481	3.1	705	5516	0.0	835	401	0.0	965	277	0.0
450	5950	4.6	580	12032	2.5	710	4865	0.0	840	440	0.0	970	517	0.0
455	5013	4.4	585	12647	1.9	715	4321	0.0	845	330	0.0	975	498	0.0
460	4393	4.2	590	13350	1.5	720	3839	0.0	850	336	0.0	980	465	0.0
465	3971	4.2	595	14054	1.1	725	3403	0.0	855	350	0.0	985	724	0.0
470	3442	4.0	600	14775	0.8	730	2978	0.0	860	266	0.0	990	861	0.0
475	3372	4.2	605	15552	0.6	735	2581	0.0	865	338	0.0	995	562	0.0
480	3623	4.9	610	16054	0.4	740	2292	0.0	870	363	0.0	1000	816	0.0
485	3960	5.7	615	16452	0.3	745	2037	0.0	875	335	0.0			

REPORT NUMBER: SP1-2101-124-1

Melanopic Flux vs. Wavelength



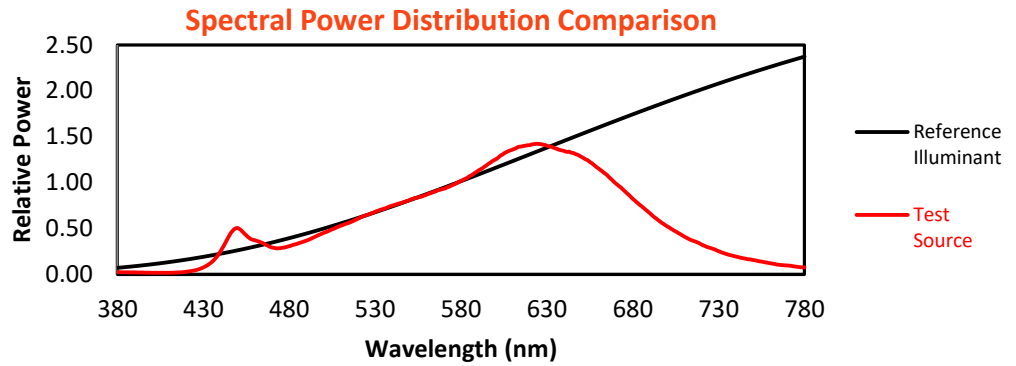
Melanopic Lumens: 382.4

M/P: 0.5

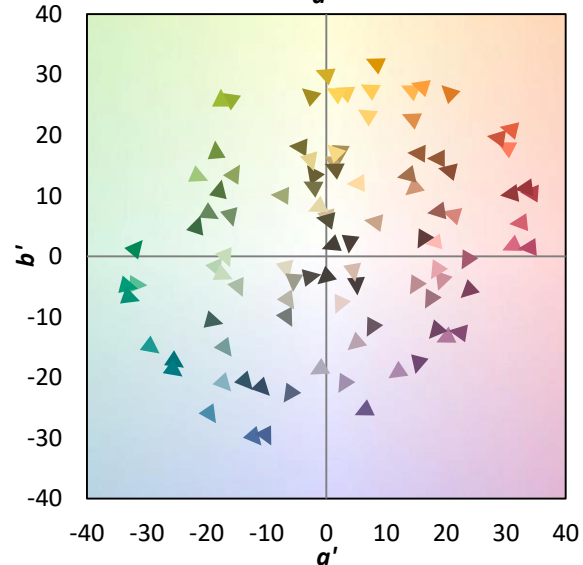
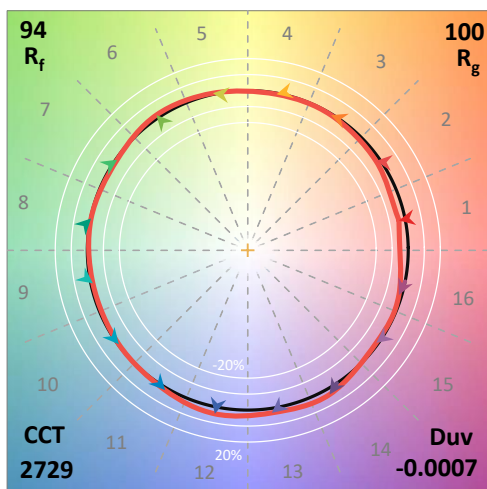
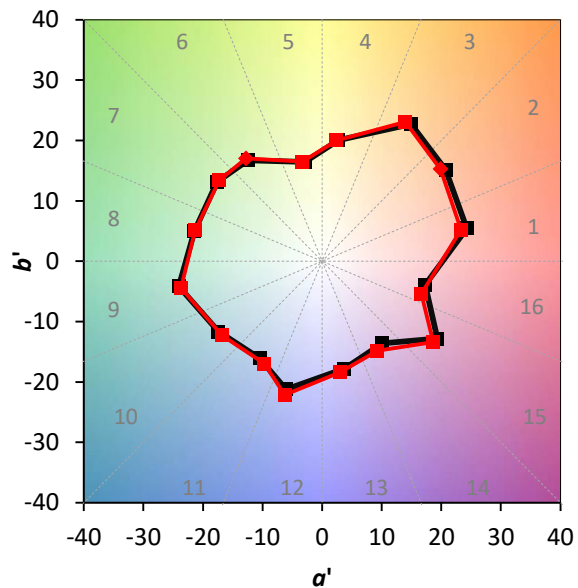
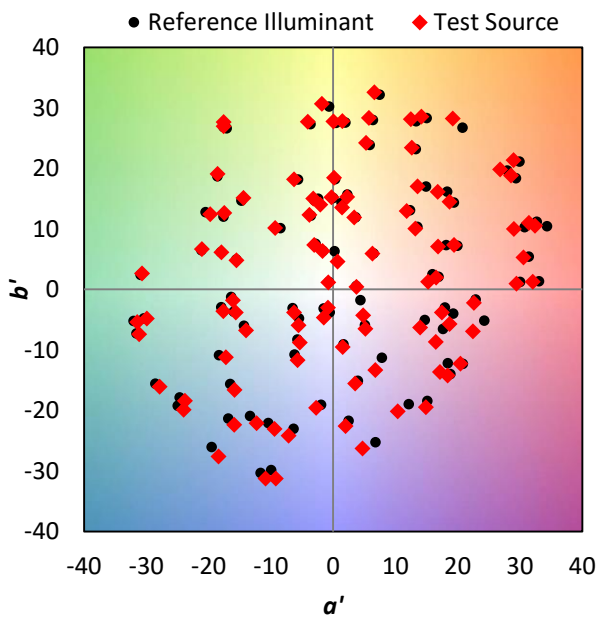
λ (nm)	Power (µW/nm)	Lumens (Φ/nm)	λ (nm)	Power (µW/nm)	Lumens (Φ/nm)	λ (nm)	Power (µW/nm)	Lumens (Φ/nm)	λ (nm)	Power (µW/nm)	Lumens (Φ/nm)	λ (nm)	Power (µW/nm)	Lumens (Φ/nm)
360	309	0.0	490	4342	3.6	620	16630	0.0	750	1836	0.0	880	324	0.0
365	277	0.0	495	4830	4.0	625	16799	0.0	755	1629	0.0	885	500	0.0
370	260	0.0	500	5328	4.3	630	16562	0.0	760	1434	0.0	890	571	0.0
375	295	0.0	505	5798	4.5	635	16219	0.0	765	1231	0.0	895	494	0.0
380	288	0.0	510	6250	4.5	640	15881	0.0	770	1141	0.0	900	267	0.0
385	260	0.0	515	6656	4.3	645	15637	0.0	775	986	0.0	905	379	0.0
390	252	0.0	520	7162	4.2	650	15133	0.0	780	904	0.0	910	465	0.0
395	226	0.0	525	7622	3.9	655	14463	0.0	785	827	0.0	915	557	0.0
400	191	0.0	530	8063	3.5	660	13640	0.0	790	768	0.0	920	412	0.0
405	196	0.0	535	8439	3.0	665	12787	0.0	795	711	0.0	925	332	0.0
410	195	0.0	540	8846	2.6	670	11721	0.0	800	693	0.0	930	466	0.0
415	235	0.0	545	9169	2.1	675	10776	0.0	805	609	0.0	935	480	0.0
420	323	0.0	550	9555	1.7	680	9728	0.0	810	615	0.0	940	404	0.0
425	510	0.1	555	9909	1.3	685	8803	0.0	815	547	0.0	945	502	0.0
430	889	0.2	560	10257	1.0	690	7856	0.0	820	491	0.0	950	495	0.0
435	1599	0.4	565	10655	0.7	695	6947	0.0	825	570	0.0	955	285	0.0
440	2967	1.0	570	11020	0.5	700	6181	0.0	830	477	0.0	960	433	0.0
445	4944	2.0	575	11481	0.4	705	5516	0.0	835	401	0.0	965	277	0.0
450	5950	2.7	580	12032	0.3	710	4865	0.0	840	440	0.0	970	517	0.0
455	5013	2.6	585	12647	0.2	715	4321	0.0	845	330	0.0	975	498	0.0
460	4393	2.6	590	13350	0.1	720	3839	0.0	850	336	0.0	980	465	0.0
465	3971	2.6	595	14054	0.1	725	3403	0.0	855	350	0.0	985	724	0.0
470	3442	2.5	600	14775	0.1	730	2978	0.0	860	266	0.0	990	861	0.0
475	3372	2.6	605	15552	0.0	735	2581	0.0	865	338	0.0	995	562	0.0
480	3623	2.9	610	16054	0.0	740	2292	0.0	870	363	0.0	1000	816	0.0
485	3960	3.3	615	16452	0.0	745	2037	0.0	875	335	0.0			

Summary

$R_f = 93.5$
 $R_g = 99.9$
 CIE $R_a = 94.7$
 $R_9 = 67.0$

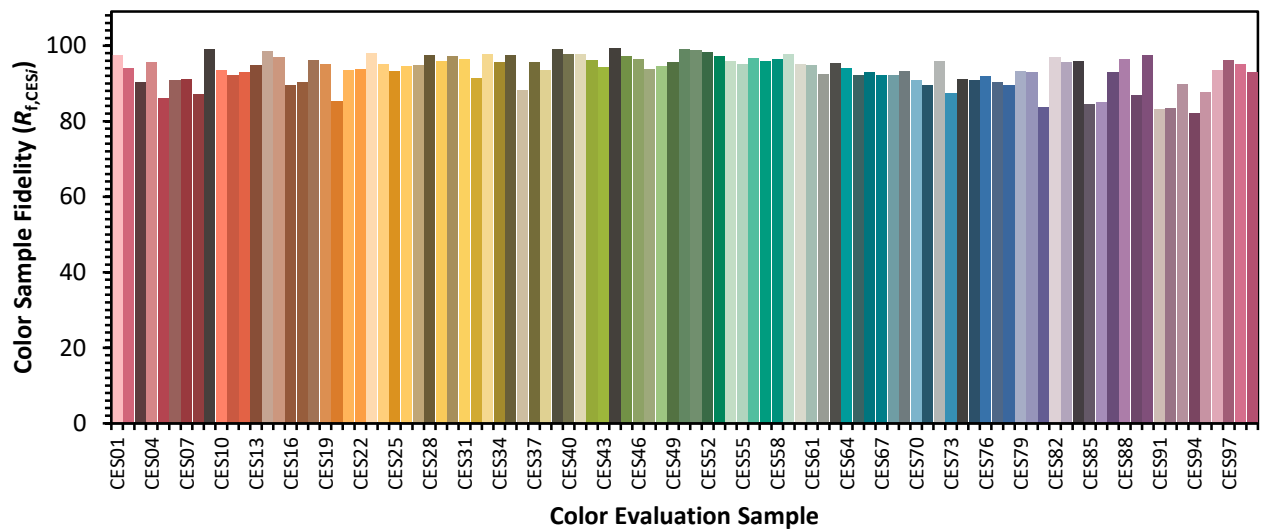


Color Vector Graphics

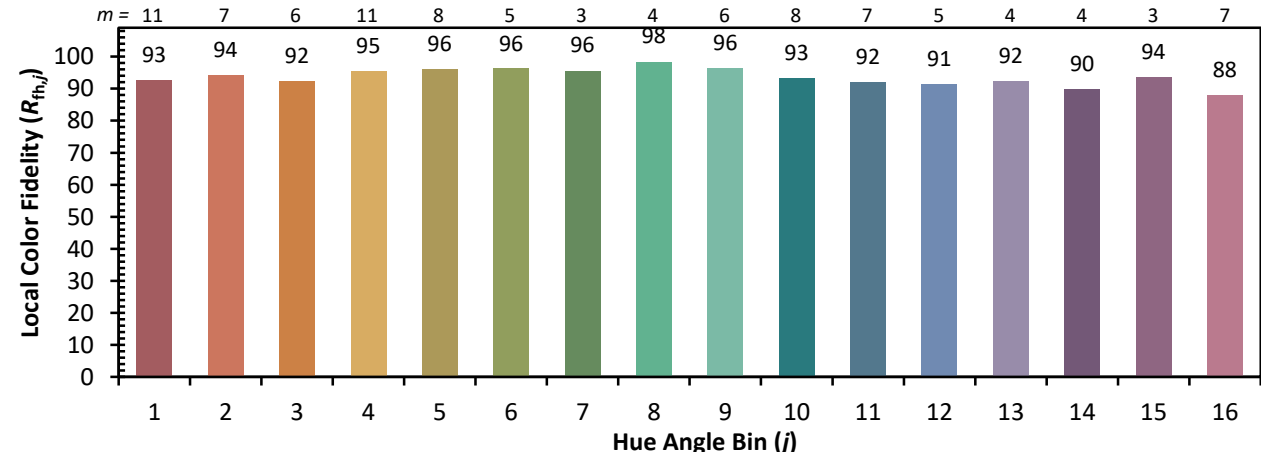
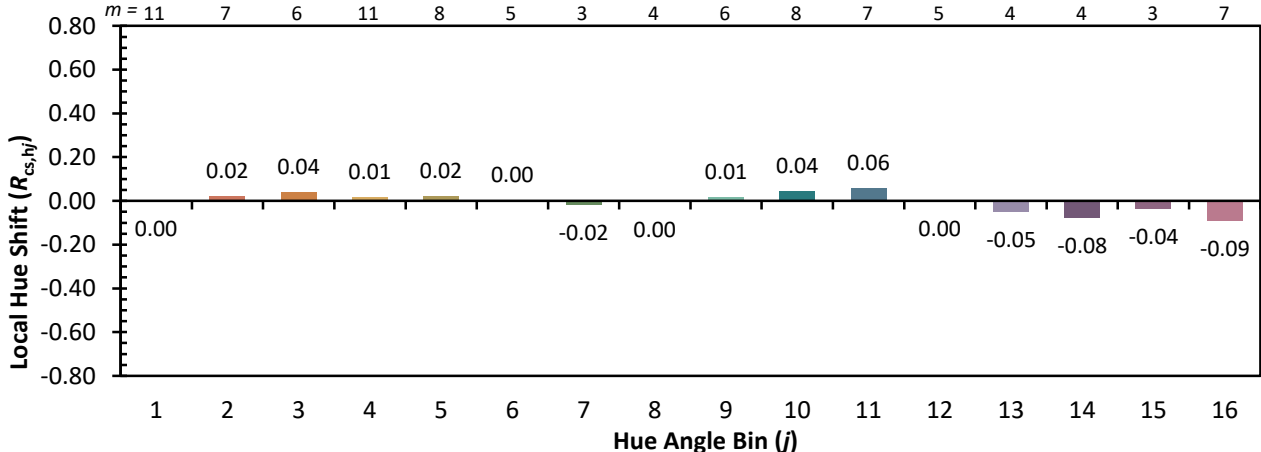
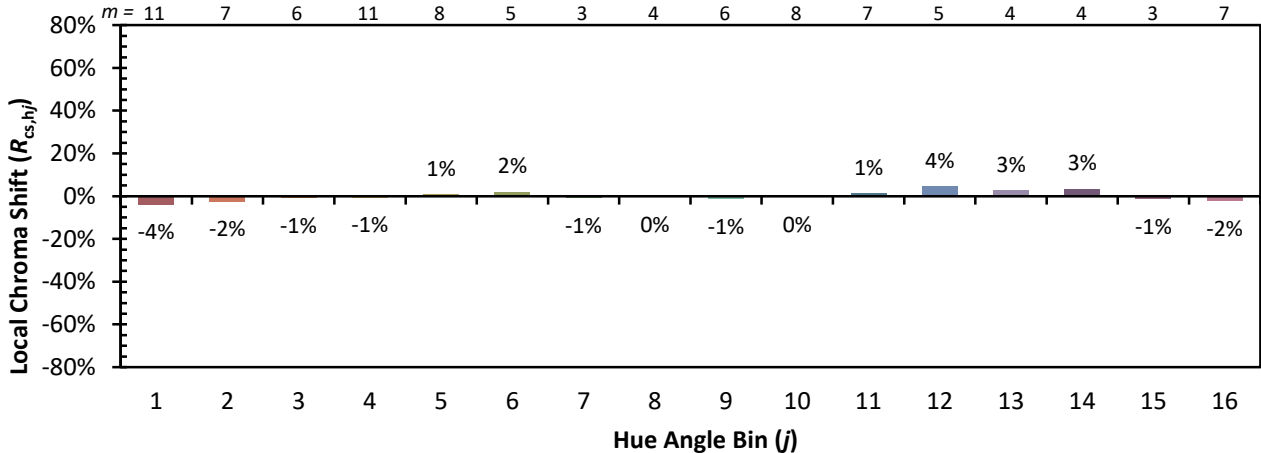


Individual Sample Fidelity Index ($R_{f,i}$)

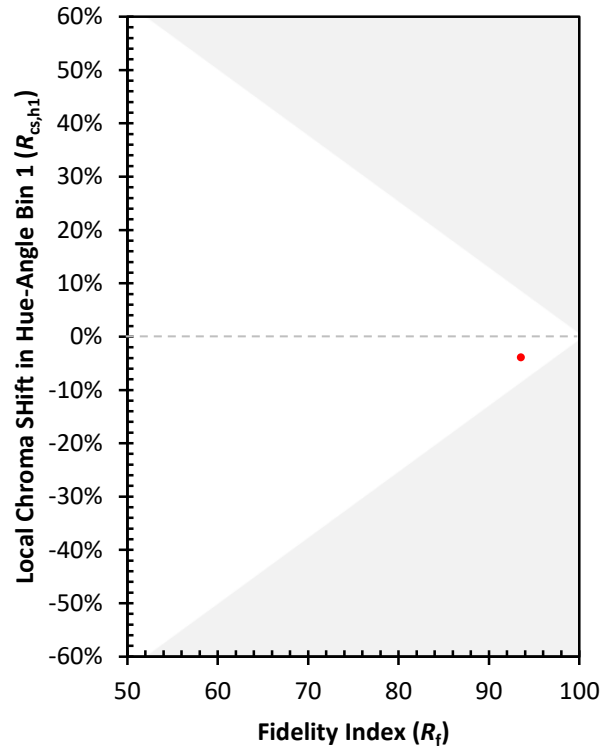
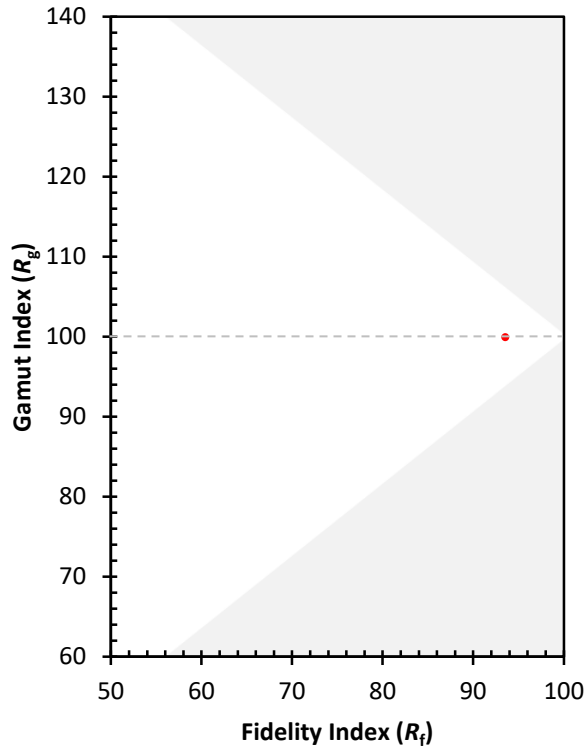
CES01 = 86	CES26 = 95	CES51 = 99	CES76 = 92
CES02 = 64	CES27 = 95	CES52 = 98	CES77 = 90
CES03 = 32	CES28 = 98	CES53 = 97	CES78 = 90
CES04 = 71	CES29 = 96	CES54 = 96	CES79 = 93
CES05 = 51	CES30 = 97	CES55 = 95	CES80 = 93
CES06 = 52	CES31 = 96	CES56 = 97	CES81 = 84
CES07 = 44	CES32 = 91	CES57 = 96	CES82 = 97
CES08 = 43	CES33 = 98	CES58 = 97	CES83 = 96
CES09 = 29	CES34 = 96	CES59 = 98	CES84 = 96
CES10 = 77	CES35 = 97	CES60 = 95	CES85 = 85
CES11 = 59	CES36 = 88	CES61 = 95	CES86 = 85
CES12 = 66	CES37 = 96	CES62 = 93	CES87 = 93
CES13 = 44	CES38 = 94	CES63 = 95	CES88 = 96
CES14 = 74	CES39 = 99	CES64 = 94	CES89 = 87
CES15 = 72	CES40 = 98	CES65 = 92	CES90 = 97
CES16 = 48	CES41 = 98	CES66 = 93	CES91 = 83
CES17 = 50	CES42 = 96	CES67 = 92	CES92 = 83
CES18 = 57	CES43 = 94	CES68 = 92	CES93 = 90
CES19 = 72	CES44 = 99	CES69 = 93	CES94 = 82
CES20 = 68	CES45 = 97	CES70 = 91	CES95 = 88
CES21 = 87	CES46 = 96	CES71 = 90	CES96 = 94
CES22 = 79	CES47 = 94	CES72 = 96	CES97 = 96
CES23 = 92	CES48 = 95	CES73 = 87	CES98 = 95
CES24 = 91	CES49 = 96	CES74 = 91	CES99 = 93
CES25 = 72	CES50 = 99	CES75 = 91	



Color Rendition by Hue-Angle Bin



Measure Comparisons



(END OF REPORT)