

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: HALO

Report Number: P832731

Luminaire Tested: **HLBT407FS5*-927**

Issue Date: 05/14/2024



Test Information

Test Method: LM-79-08
Report Number: P832731
Test Lab: ETA Testing Technology
Issue Date: 05/14/2024
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)
Product Line: HALO
Catalog Number: HLBT407FS5*-927
Description: HALO SLIM RETROFIT 4 inch 90 CRI COLOR SELECTABLE FIXTURE
Light Source: 2700K CCT, 90 CRI LEDS
Ballast/Driver: ELECTRONIC DRIVER

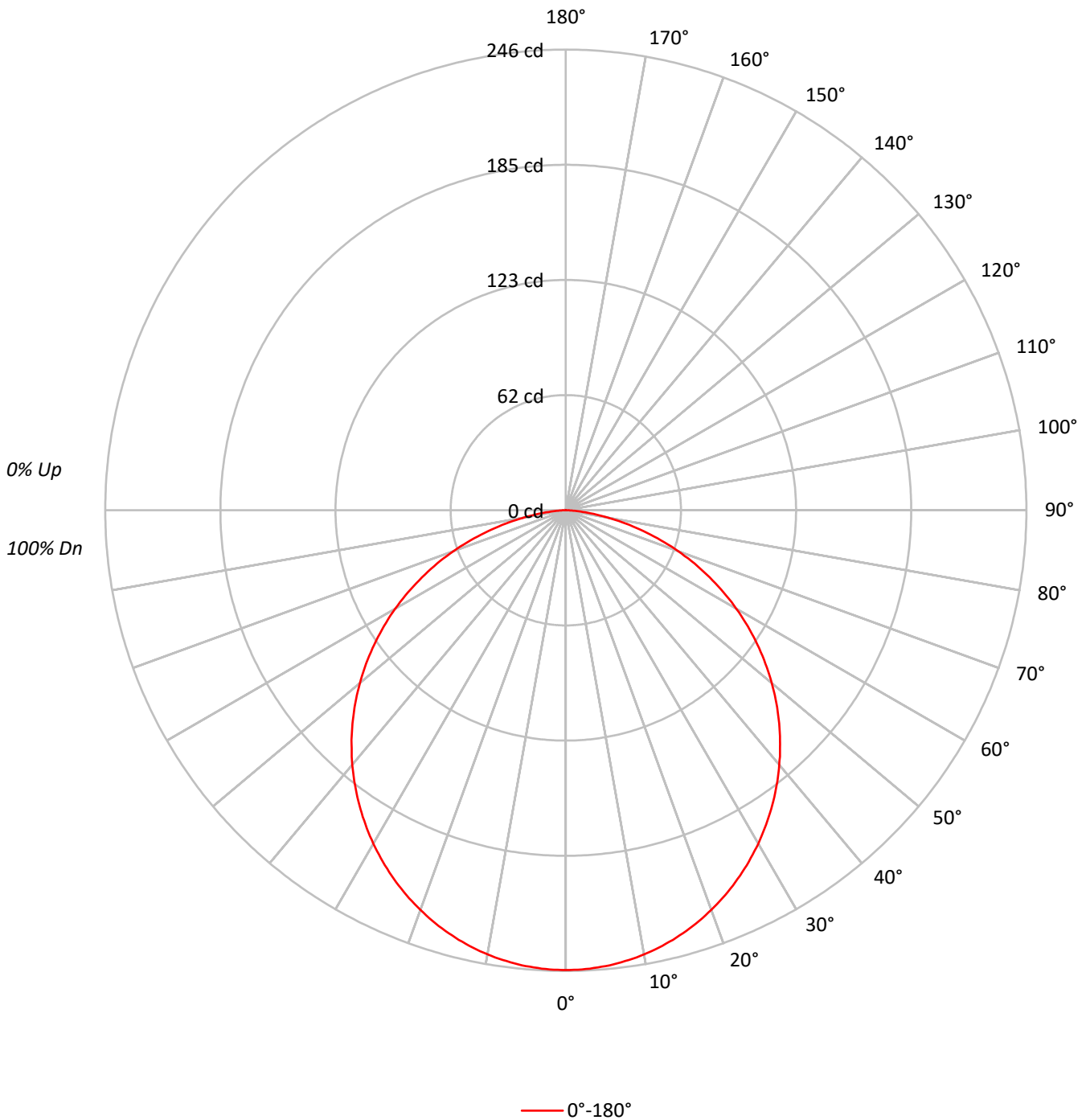
Summary

Lumens per Lamp: N/A
Luminaire Lumens: 685.2 lumens
Efficiency: N/A
Efficacy: 89.0 lumens/watt
Spacing Criteria (0/90/45): 1.25 / 1.25 / 1.36
Luminous Opening: Circular (Dia: 0.3' x H: 0')
CIE Type: Direct

Input Watts (W): 7.7
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

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CATALOG NUMBER: HLBT407FS5*-927

Luminous Intensity Polar Plot





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COEFFICIENT OF UTILIZATION - ZONAL CAVITY METHOD:

RF	20				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	100	100	100	100
1	109	104	100	96	106	102	98	95	98	95	92	94	91	89	90	88	86	84	84	84	84
2	99	91	84	78	96	89	83	77	85	80	76	82	78	74	79	75	72	70	70	70	70
3	90	80	72	65	88	78	71	65	75	69	63	72	67	62	70	65	61	59	59	59	59
4	83	71	62	55	80	69	61	55	67	60	54	64	58	53	62	57	53	50	50	50	50
5	76	63	54	48	74	62	54	47	60	52	47	58	51	46	56	50	46	44	44	44	44
6	70	57	48	41	68	56	47	41	54	47	41	52	46	41	51	45	40	38	38	38	38
7	65	52	43	37	63	51	42	36	49	42	36	48	41	36	46	40	36	34	34	34	34
8	61	47	38	33	59	46	38	33	45	38	32	44	37	32	43	36	32	30	30	30	30
9	57	43	35	29	55	43	35	29	41	34	29	40	34	29	39	33	29	27	27	27	27
10	53	40	32	27	52	39	32	27	38	31	26	37	31	26	36	30	26	24	24	24	24

AVERAGE LUMINANCE (cd/sqm):

	0°
0°	37384
5°	37344
10°	37234
15°	37048
20°	36802
25°	36494
30°	36152
35°	35729
40°	35264
45°	34694
50°	34019
55°	33160
60°	32039
65°	30555
70°	28406
75°	25241
80°	20520
85°	13803



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ZONAL LUMENS:

Zone	Lumens	% Fixture
0°-10°	23.2	3.4
10°-20°	66.3	9.7
20°-30°	100.1	14.6
30°-40°	120.2	17.5
40°-50°	124.2	18.1
50°-60°	111.6	16.3
60°-70°	83.8	12.2
70°-80°	45.5	6.6
80°-90°	10.3	1.5
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°	189.6	27.7
0°-40°	309.8	45.2
0°-60°	545.6	79.6
0°-90°	685.2	100.0
90°-120°	0.0	0.0
90°-150°	0.0	0.0
90°-180°	0.0	0.0
0°-180°	685.2	100.0

CANDELA DISTRIBUTION:

	0°	Flux
0°	246	
5°	244	23
15°	235	66
25°	217	100
35°	192	120
45°	161	124
55°	125	112
65°	85	84
75°	43	45
85°	8	10
90°	1	



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CANDELA DISTRIBUTION (FULL):

	0°
0°	245.5
0.5°	245.5
1°	245.4
1.5°	245.4
2°	245.3
2.5°	245.2
3°	245.1
3.5°	244.9
4°	244.7
4.5°	244.5
5°	244.3
5.5°	244.1
6°	243.8
6.5°	243.5
7°	243.2
7.5°	242.8
8°	242.5
8.5°	242.1
9°	241.7
9.5°	241.2
10°	240.8
10.5°	240.3
11°	239.8
11.5°	239.3
12°	238.7
12.5°	238.2
13°	237.6
13.5°	236.9
14°	236.4
14.5°	235.7
15°	235.0
15.5°	234.3
16°	233.6
16.5°	232.8
17°	232.1
17.5°	231.3
18°	230.5
18.5°	229.7
19°	228.8
19.5°	227.9
20°	227.1
20.5°	226.2
21°	225.3
21.5°	224.3
22°	223.4



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CANDELA DISTRIBUTION (continued):

	0°
22.5°	222.4
23°	221.4
23.5°	220.4
24°	219.4
24.5°	218.3
25°	217.2
25.5°	216.1
26°	215.0
26.5°	213.9
27°	212.8
27.5°	211.6
28°	210.4
28.5°	209.2
29°	208.0
29.5°	206.8
30°	205.6
30.5°	204.3
31°	203.0
31.5°	201.7
32°	200.4
32.5°	199.1
33°	197.7
33.5°	196.4
34°	195.0
34.5°	193.6
35°	192.2
35.5°	190.8
36°	189.4
36.5°	187.9
37°	186.4
37.5°	185.0
38°	183.5
38.5°	182.0
39°	180.5
39.5°	178.9
40°	177.4
40.5°	175.8
41°	174.3
41.5°	172.6
42°	171.0
42.5°	169.4
43°	167.8
43.5°	166.2
44°	164.5
44.5°	162.8



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CANDELA DISTRIBUTION (continued):

	0°
45°	161.1
45.5°	159.4
46°	157.7
46.5°	156.0
47°	154.3
47.5°	152.5
48°	150.8
48.5°	149.0
49°	147.2
49.5°	145.4
50°	143.6
50.5°	141.8
51°	139.9
51.5°	138.1
52°	136.3
52.5°	134.4
53°	132.5
53.5°	130.6
54°	128.7
54.5°	126.8
55°	124.9
55.5°	123.0
56°	121.0
56.5°	119.1
57°	117.1
57.5°	115.2
58°	113.2
58.5°	111.2
59°	109.3
59.5°	107.2
60°	105.2
60.5°	103.2
61°	101.2
61.5°	99.2
62°	97.1
62.5°	95.1
63°	93.0
63.5°	91.0
64°	88.9
64.5°	86.9
65°	84.8
65.5°	82.7
66°	80.6
66.5°	78.5
67°	76.5



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CANDELA DISTRIBUTION (continued):

	0°
67.5°	74.4
68°	72.3
68.5°	70.2
69°	68.0
69.5°	65.9
70°	63.8
70.5°	61.7
71°	59.6
71.5°	57.5
72°	55.4
72.5°	53.3
73°	51.2
73.5°	49.1
74°	47.1
74.5°	45.0
75°	42.9
75.5°	40.9
76°	38.9
76.5°	36.8
77°	34.9
77.5°	32.9
78°	30.9
78.5°	29.0
79°	27.1
79.5°	25.3
80°	23.4
80.5°	21.6
81°	19.9
81.5°	18.1
82°	16.5
82.5°	14.9
83°	13.3
83.5°	11.9
84°	10.5
84.5°	9.2
85°	7.9
85.5°	6.8
86°	5.7
86.5°	4.8
87°	4.0
87.5°	3.3
88°	2.7
88.5°	2.2
89°	1.8
89.5°	1.4

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Scaled Data Report



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CANDELA DISTRIBUTION (continued):

90° | $\frac{0^\circ}{1.0}$

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



LM-79-2019: Approved Method: Electrical and Photometric Measurements of Solid-
State Lighting Products

Report Prepared for

Cooper Lighting Solutions

HALO

Report Number: SP1-2403-328-11

Test Date: 05/03/2024

Luminaire Tested: HLT407FS5-2700K

Data in this report applies to families of products HLT407FS5-2700K.

Test Information

Test Method: LM-79-2019
 Report Number: SP1-2403-328-11
 Test Lab: COOPER LIGHTING SOLUTIONS
 Photometer: SP1 - 76IN SPHERE
 Measurement Geometry: 4π
 Issue Date: 05/03/2024
 Manufacturer: COOPER LIGHTING SOLUTIONS
 Product Line: HALO
 Catalog Number: **HLT407FS5-2700K**
 Description: HLBSL RETROFIT 4 INCH SAMPLE #2.

Spectral Parameters

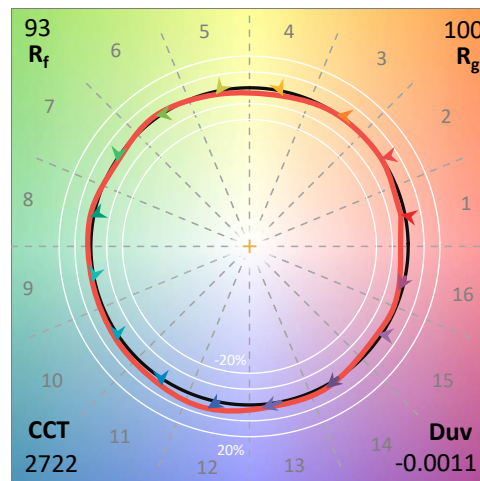
CCT (K): 2722
 CIE u': 0.2618
 CIE v': 0.5253
 Duv: -0.0011
 CIE x: 0.4561
 CIE y: 0.4068
 CIE z: 0.1371
 Peak Wavelength (nm): 632
 Dominant Wavelength (nm): 584
 Purity: 59.3

CRI (Ra):	95.8		
R1:	96.4	R9:	84.5
R2:	97.9	R10:	99.0
R3:	97.5	R11:	93.1
R4:	96.9	R12:	88.0
R5:	96.9	R13:	96.7
R6:	92.3	R14:	96.5
R7:	94.8		
R8:	93.5		

Rf: 92.8
 Rg: 100.3

Test Conditions

Stabilization Time: 21M
 Operation Time: 12H
 Room Temperature (°C) / RH%: 25.1/43%
 Sphere Temperature (°C): 24.9

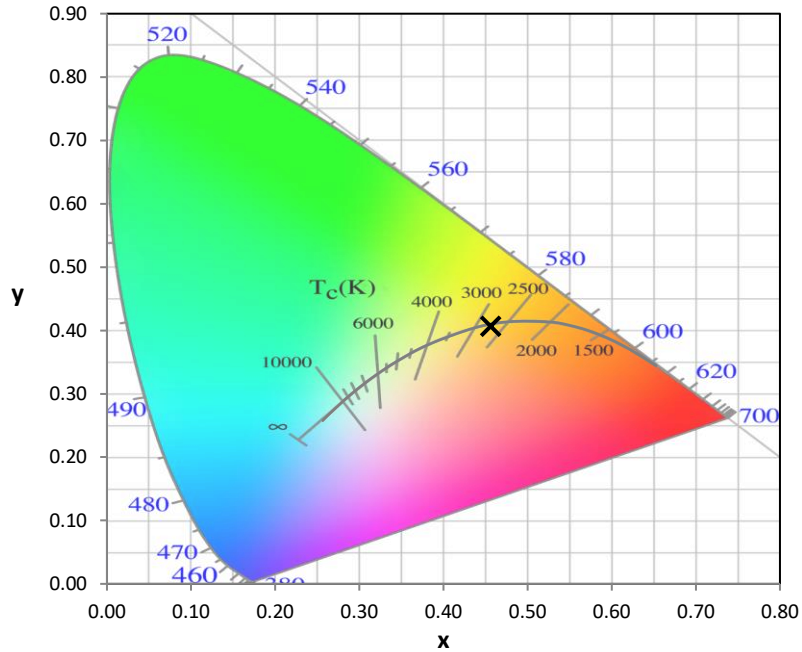


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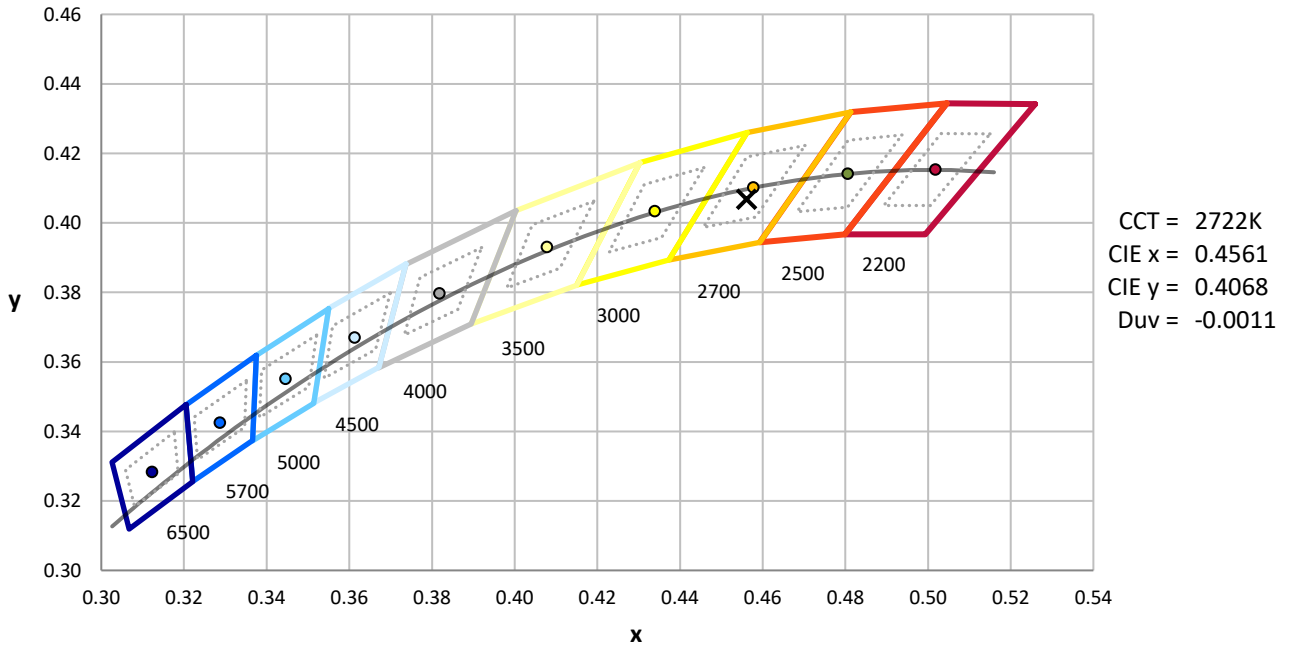
Measurement and Test Equipment			
Instrument	Identification Number	Calibration Date	Calibration Due Date
Photometer	76INCH SPHERE IN0058	2/12/2024	8/12/2024
Power Meter	XITRON 2801 IN0071	10/23/2023	10/23/2024
AC Power Source	CHROMA 61603 IN0063	10/24/2023	10/24/2024
DC Power Source	AGILENT E3634A IN0208	10/24/2023	10/24/2024
Sphere Thermometer	ONSET IN0085	10/24/2023	10/24/2024
Room Thermometer	ONSET IN0046	10/24/2023	10/24/2024

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CIE 1931 Chromaticity Diagram



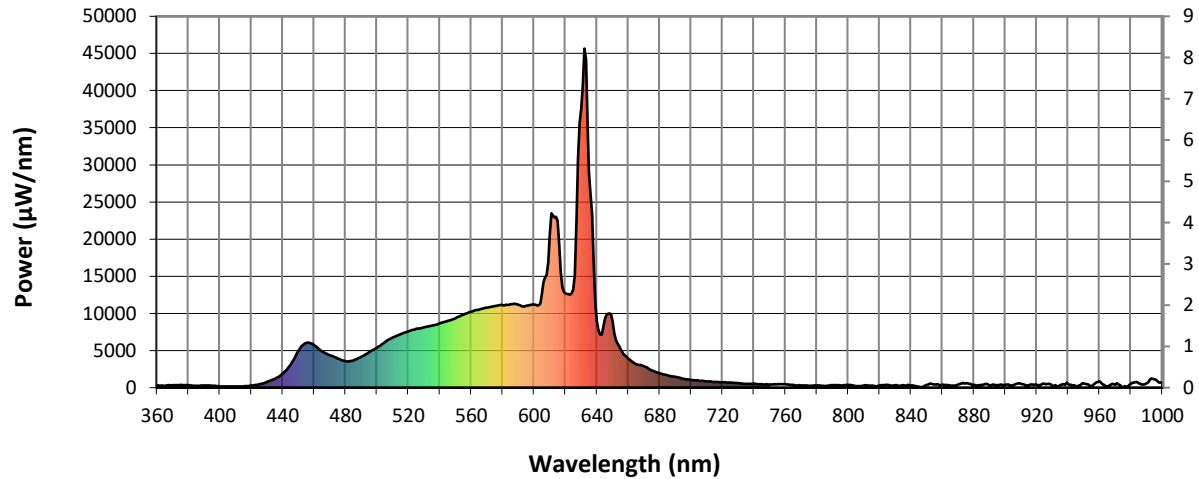
CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles



Point lies inside the ANSI 2700K 4-step quadrangle

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Photopic Flux vs. Wavelength

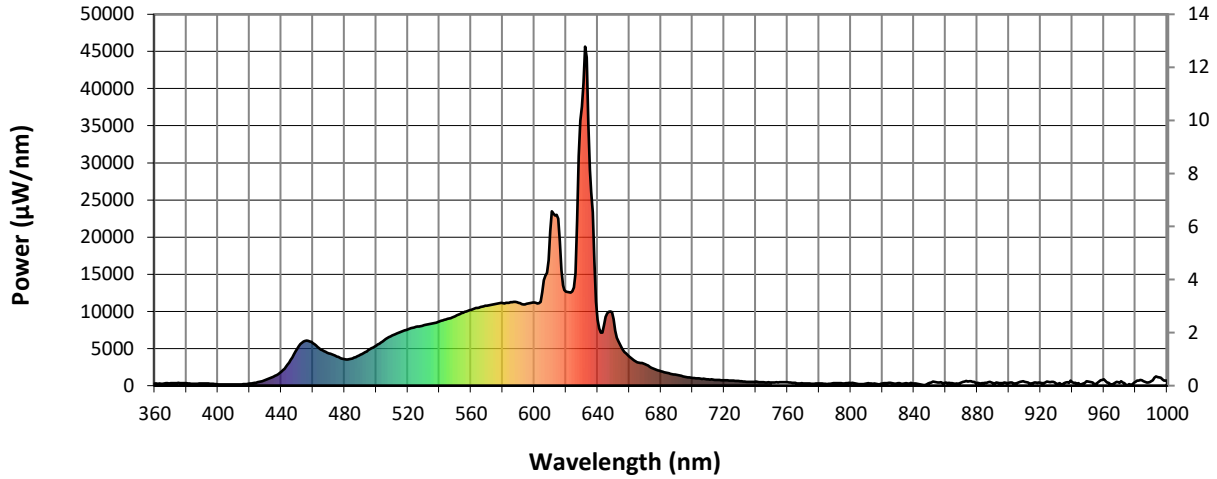


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λ (nm)	Power (µW/nm)	Lumens (φ/nm)	λ (nm)	Power (µW/nm)	Lumens (φ/nm)	λ (nm)	Power (µW/nm)	Lumens (φ/nm)	λ (nm)	Power (µW/nm)	Lumens (φ/nm)	λ (nm)	Power (µW/nm)	Lumens (φ/nm)
360	308	NR	490	4156	NR	620	12654	NR	750	433	NR	880	377	NR
365	263	NR	495	4755	NR	625	13232	NR	755	455	NR	885	373	NR
370	331	NR	500	5390	NR	630	37558	NR	760	472	NR	890	347	NR
375	362	NR	505	6107	NR	635	29011	NR	765	361	NR	895	322	NR
380	326	NR	510	6735	NR	640	8850	NR	770	306	NR	900	379	NR
385	249	NR	515	7194	NR	645	9274	NR	775	262	NR	905	341	NR
390	297	NR	520	7592	NR	650	8952	NR	780	309	NR	910	498	NR
395	260	NR	525	7907	NR	655	5212	NR	785	228	NR	915	328	NR
400	184	NR	530	8124	NR	660	3923	NR	790	348	NR	920	364	NR
405	159	NR	535	8338	NR	665	3141	NR	795	303	NR	925	492	NR
410	153	NR	540	8662	NR	670	2900	NR	800	354	NR	930	201	NR
415	170	NR	545	8982	NR	675	2316	NR	805	225	NR	935	340	NR
420	273	NR	550	9362	NR	680	1951	NR	810	307	NR	940	479	NR
425	451	NR	555	9827	NR	685	1651	NR	815	273	NR	945	126	NR
430	757	NR	560	10205	NR	690	1444	NR	820	298	NR	950	562	NR
435	1205	NR	565	10522	NR	695	1204	NR	825	370	NR	955	198	NR
440	1878	NR	570	10777	NR	700	1037	NR	830	330	NR	960	849	NR
445	3113	NR	575	10966	NR	705	925	NR	835	323	NR	965	121	NR
450	4961	NR	580	11114	NR	710	844	NR	840	315	NR	970	377	NR
455	6023	NR	585	11254	NR	715	771	NR	845	106	NR	975	35	NR
460	5741	NR	590	11170	NR	720	732	NR	850	364	NR	980	527	NR
465	4876	NR	595	11027	NR	725	691	NR	855	418	NR	985	609	NR
470	4357	NR	600	11205	NR	730	609	NR	860	422	NR	990	608	NR
475	3927	NR	605	12572	NR	735	504	NR	865	272	NR	995	1130	NR
480	3563	NR	610	20796	NR	740	532	NR	870	413	NR	1000	671	NR
485	3669	NR	615	22487	NR	745	466	NR	875	586	NR			

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Scotopic Flux vs. Wavelength



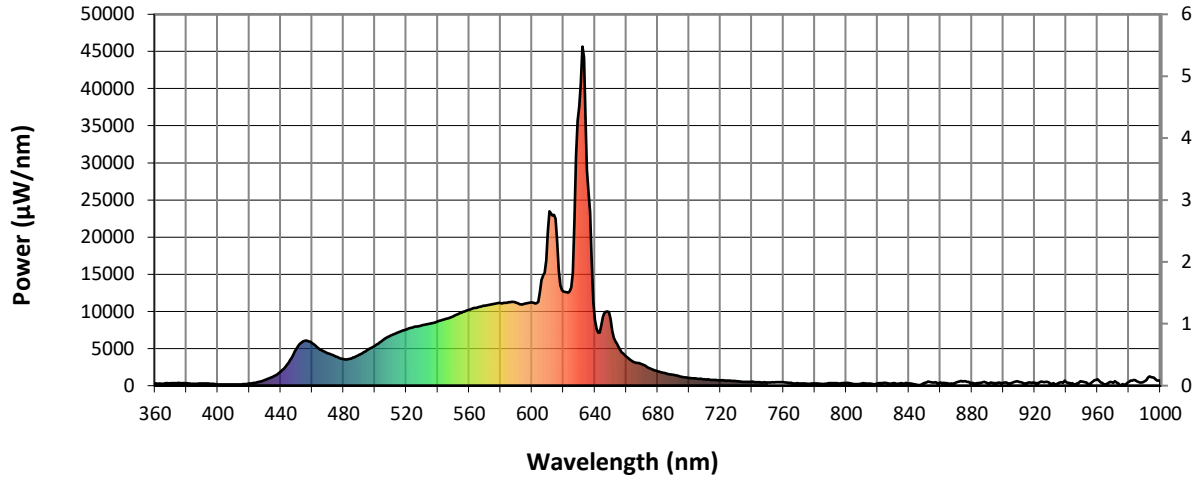
Scotopic Lumens: 1025

S/P: 1.36

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	308	NR	490	4156	NR	620	12654	NR	750	433	NR	880	377	NR
365	263	NR	495	4755	NR	625	13232	NR	755	455	NR	885	373	NR
370	331	NR	500	5390	NR	630	37558	NR	760	472	NR	890	347	NR
375	362	NR	505	6107	NR	635	29011	NR	765	361	NR	895	322	NR
380	326	NR	510	6735	NR	640	8850	NR	770	306	NR	900	379	NR
385	249	NR	515	7194	NR	645	9274	NR	775	262	NR	905	341	NR
390	297	NR	520	7592	NR	650	8952	NR	780	309	NR	910	498	NR
395	260	NR	525	7907	NR	655	5212	NR	785	228	NR	915	328	NR
400	184	NR	530	8124	NR	660	3923	NR	790	348	NR	920	364	NR
405	159	NR	535	8338	NR	665	3141	NR	795	303	NR	925	492	NR
410	153	NR	540	8662	NR	670	2900	NR	800	354	NR	930	201	NR
415	170	NR	545	8982	NR	675	2316	NR	805	225	NR	935	340	NR
420	273	NR	550	9362	NR	680	1951	NR	810	307	NR	940	479	NR
425	451	NR	555	9827	NR	685	1651	NR	815	273	NR	945	126	NR
430	757	NR	560	10205	NR	690	1444	NR	820	298	NR	950	562	NR
435	1205	NR	565	10522	NR	695	1204	NR	825	370	NR	955	198	NR
440	1878	NR	570	10777	NR	700	1037	NR	830	330	NR	960	849	NR
445	3113	NR	575	10966	NR	705	925	NR	835	323	NR	965	121	NR
450	4961	NR	580	11114	NR	710	844	NR	840	315	NR	970	377	NR
455	6023	NR	585	11254	NR	715	771	NR	845	106	NR	975	35	NR
460	5741	NR	590	11170	NR	720	732	NR	850	364	NR	980	527	NR
465	4876	NR	595	11027	NR	725	691	NR	855	418	NR	985	609	NR
470	4357	NR	600	11205	NR	730	609	NR	860	422	NR	990	608	NR
475	3927	NR	605	12572	NR	735	504	NR	865	272	NR	995	1130	NR
480	3563	NR	610	20796	NR	740	532	NR	870	413	NR	1000	671	NR
485	3669	NR	615	22487	NR	745	466	NR	875	586	NR			

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Melanopic Flux vs. Wavelength



Melanopic Lumens: 392.2

M/P: 0.52

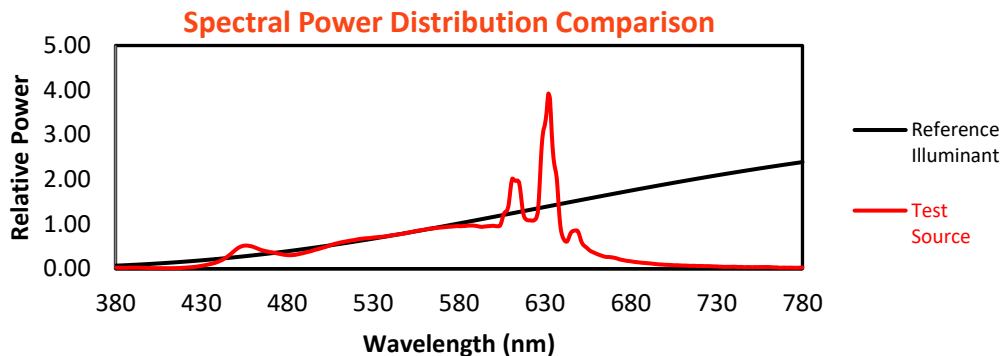
λ (nm)	Power (µW/nm)	Lumens (φ/nm)	λ (nm)	Power (µW/nm)	Lumens (φ/nm)	λ (nm)	Power (µW/nm)	Lumens (φ/nm)	λ (nm)	Power (µW/nm)	Lumens (φ/nm)	λ (nm)	Power (µW/nm)	Lumens (φ/nm)
360	308	NR	490	4156	NR	620	12654	NR	750	433	NR	880	377	NR
365	263	NR	495	4755	NR	625	13232	NR	755	455	NR	885	373	NR
370	331	NR	500	5390	NR	630	37558	NR	760	472	NR	890	347	NR
375	362	NR	505	6107	NR	635	29011	NR	765	361	NR	895	322	NR
380	326	NR	510	6735	NR	640	8850	NR	770	306	NR	900	379	NR
385	249	NR	515	7194	NR	645	9274	NR	775	262	NR	905	341	NR
390	297	NR	520	7592	NR	650	8952	NR	780	309	NR	910	498	NR
395	260	NR	525	7907	NR	655	5212	NR	785	228	NR	915	328	NR
400	184	NR	530	8124	NR	660	3923	NR	790	348	NR	920	364	NR
405	159	NR	535	8338	NR	665	3141	NR	795	303	NR	925	492	NR
410	153	NR	540	8662	NR	670	2900	NR	800	354	NR	930	201	NR
415	170	NR	545	8982	NR	675	2316	NR	805	225	NR	935	340	NR
420	273	NR	550	9362	NR	680	1951	NR	810	307	NR	940	479	NR
425	451	NR	555	9827	NR	685	1651	NR	815	273	NR	945	126	NR
430	757	NR	560	10205	NR	690	1444	NR	820	298	NR	950	562	NR
435	1205	NR	565	10522	NR	695	1204	NR	825	370	NR	955	198	NR
440	1878	NR	570	10777	NR	700	1037	NR	830	330	NR	960	849	NR
445	3113	NR	575	10966	NR	705	925	NR	835	323	NR	965	121	NR
450	4961	NR	580	11114	NR	710	844	NR	840	315	NR	970	377	NR
455	6023	NR	585	11254	NR	715	771	NR	845	106	NR	975	35	NR
460	5741	NR	590	11170	NR	720	732	NR	850	364	NR	980	527	NR
465	4876	NR	595	11027	NR	725	691	NR	855	418	NR	985	609	NR
470	4357	NR	600	11205	NR	730	609	NR	860	422	NR	990	608	NR
475	3927	NR	605	12572	NR	735	504	NR	865	272	NR	995	1130	NR
480	3563	NR	610	20796	NR	740	532	NR	870	413	NR	1000	671	NR
485	3669	NR	615	22487	NR	745	466	NR	875	586	NR			

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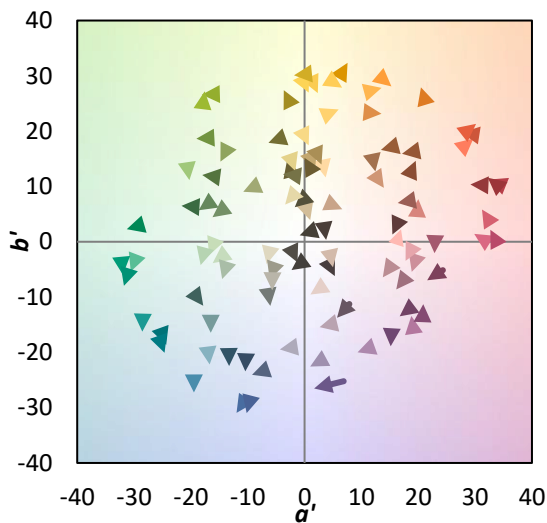
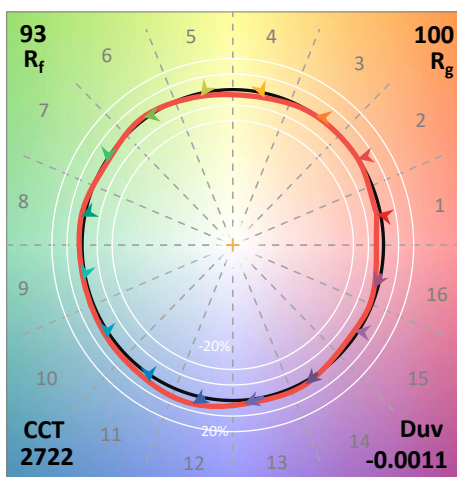
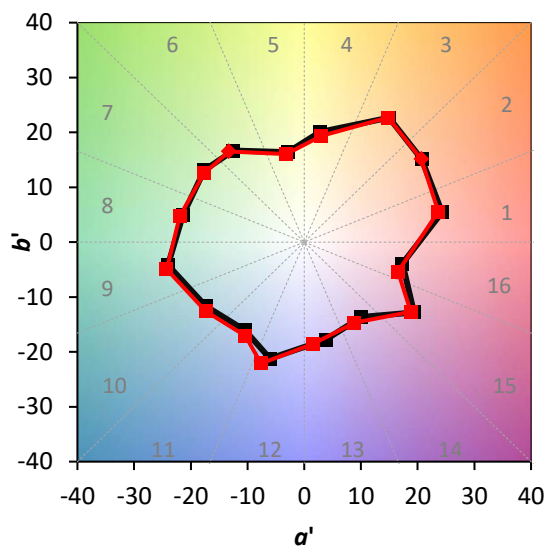
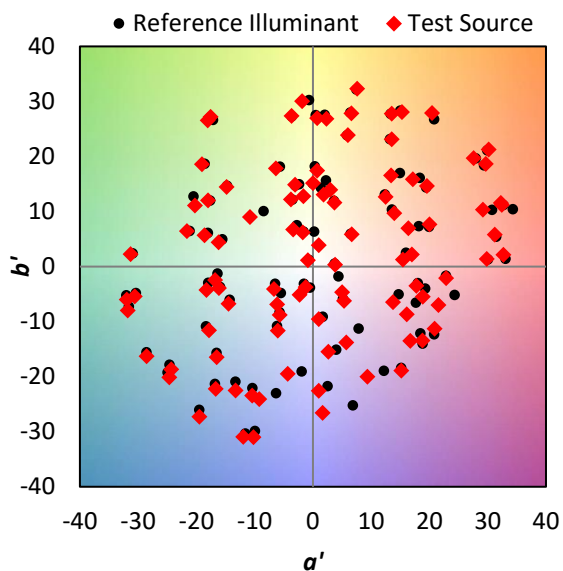
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Summary

$R_f = 92.8$
 $R_g = 100.3$
 CIE $R_a = 95.8$
 $R_9 = 84.5$



Color Vector Graphics

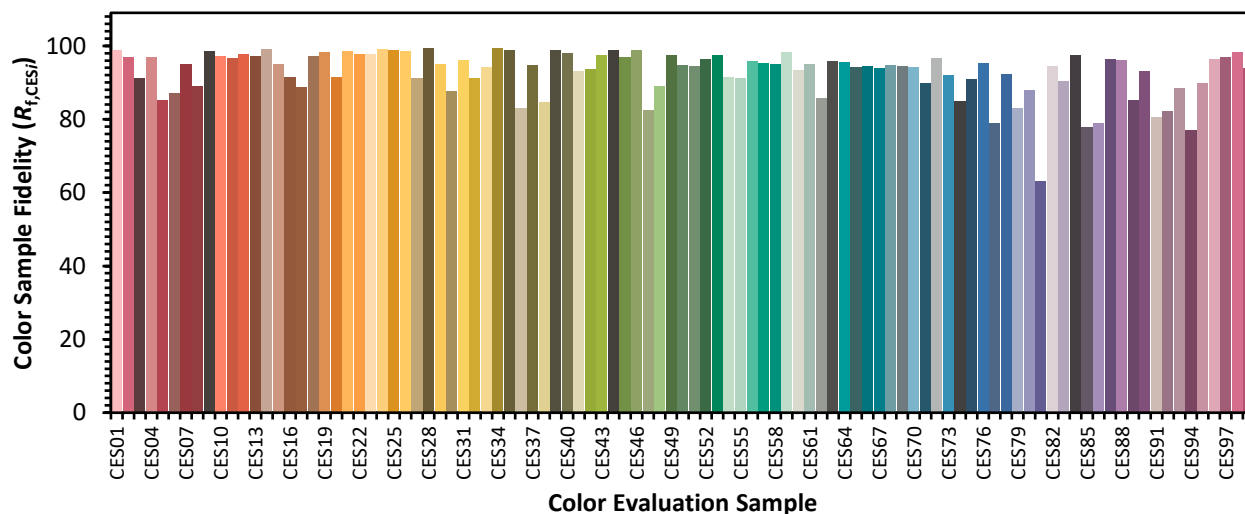


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Individual Sample Fidelity Index ($R_{f,i}$)

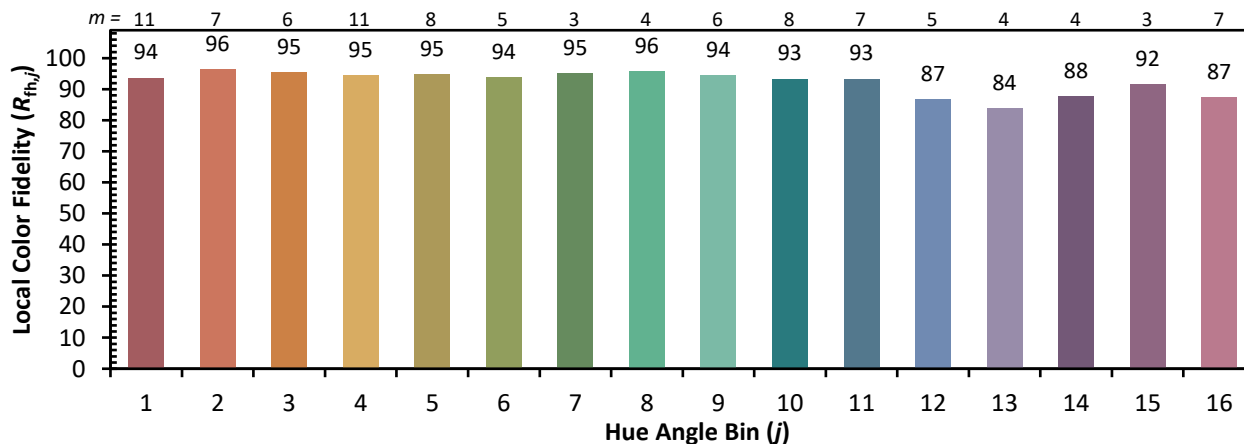
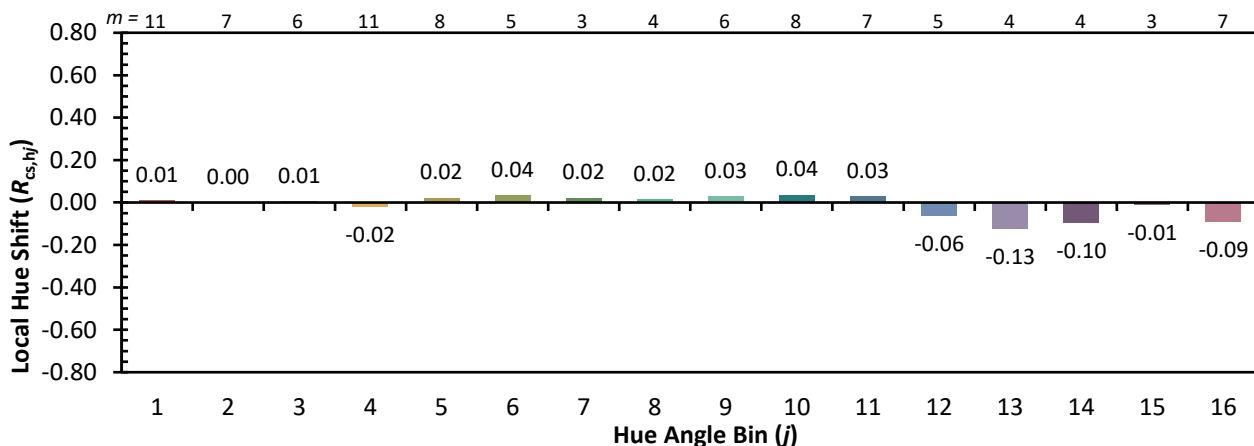
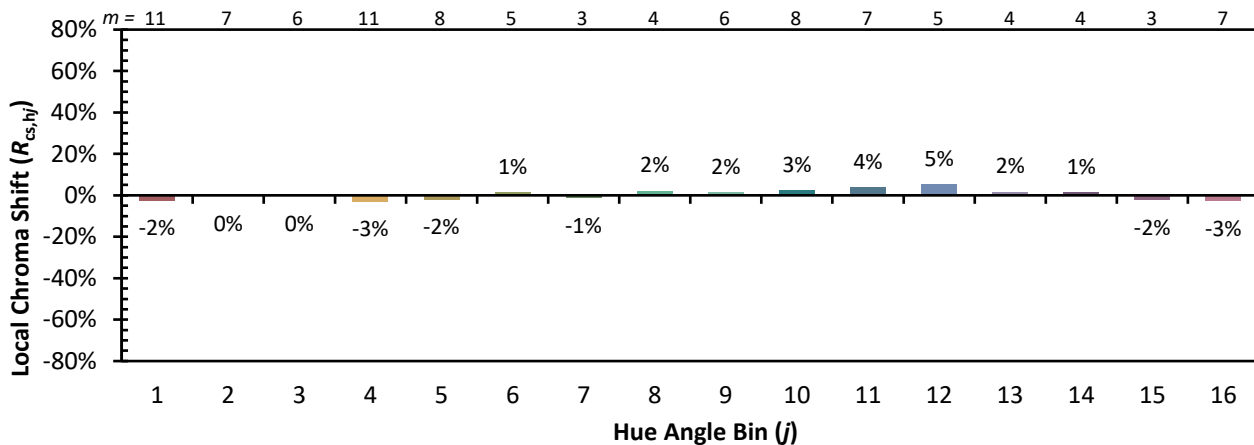
CES01 = 86	CES26 = 98	CES51 = 94	CES76 = 95
CES02 = 64	CES27 = 91	CES52 = 96	CES77 = 79
CES03 = 32	CES28 = 99	CES53 = 98	CES78 = 92
CES04 = 70	CES29 = 95	CES54 = 91	CES79 = 83
CES05 = 52	CES30 = 88	CES55 = 91	CES80 = 88
CES06 = 51	CES31 = 96	CES56 = 96	CES81 = 63
CES07 = 45	CES32 = 91	CES57 = 95	CES82 = 94
CES08 = 43	CES33 = 94	CES58 = 95	CES83 = 90
CES09 = 29	CES34 = 99	CES59 = 98	CES84 = 97
CES10 = 77	CES35 = 99	CES60 = 93	CES85 = 78
CES11 = 59	CES36 = 83	CES61 = 95	CES86 = 79
CES12 = 66	CES37 = 95	CES62 = 86	CES87 = 96
CES13 = 45	CES38 = 85	CES63 = 96	CES88 = 96
CES14 = 74	CES39 = 99	CES64 = 96	CES89 = 85
CES15 = 72	CES40 = 98	CES65 = 94	CES90 = 93
CES16 = 49	CES41 = 93	CES66 = 94	CES91 = 81
CES17 = 50	CES42 = 94	CES67 = 94	CES92 = 82
CES18 = 57	CES43 = 97	CES68 = 95	CES93 = 88
CES19 = 72	CES44 = 99	CES69 = 95	CES94 = 77
CES20 = 68	CES45 = 97	CES70 = 94	CES95 = 90
CES21 = 87	CES46 = 99	CES71 = 90	CES96 = 96
CES22 = 79	CES47 = 82	CES72 = 97	CES97 = 97
CES23 = 92	CES48 = 89	CES73 = 92	CES98 = 98
CES24 = 91	CES49 = 97	CES74 = 85	CES99 = 94
CES25 = 72	CES50 = 95	CES75 = 91	



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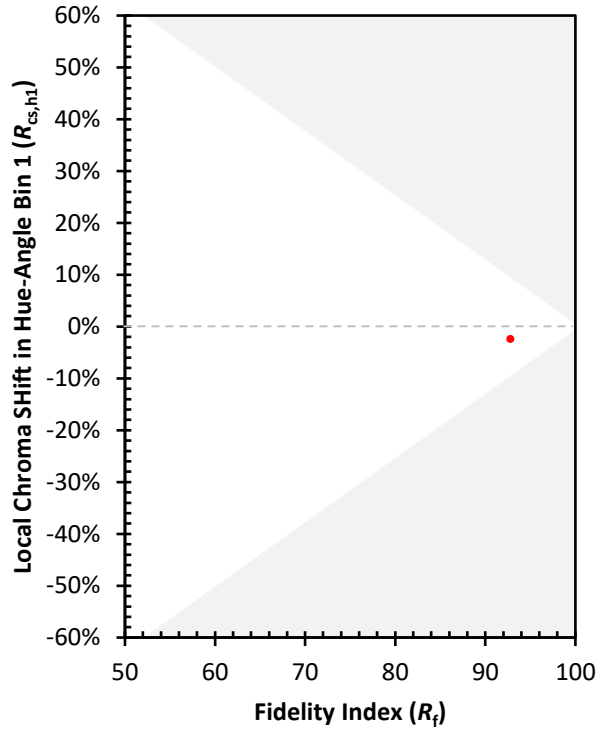
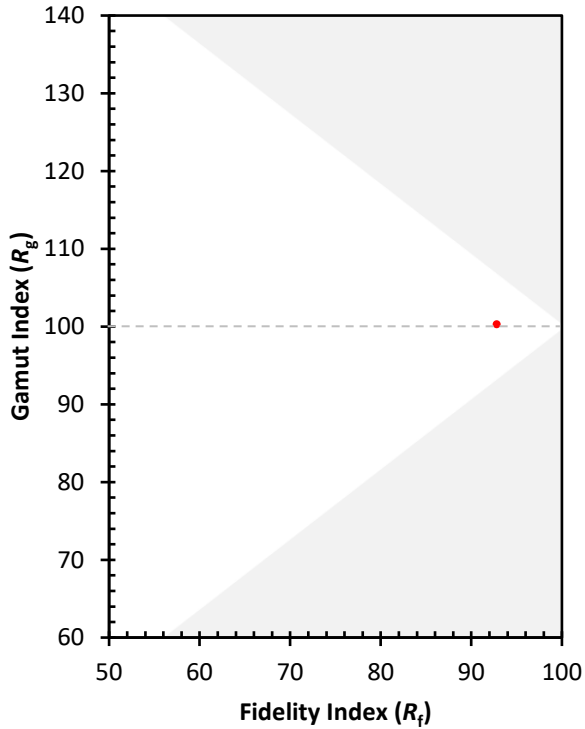
Color Rendition by Hue-Angle Bin



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Measure Comparisons



(END OF REPORT)