

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: P832735

Luminaire Tested: **HLBT407FS5*-950**

Issue Date: 05/14/2024



Test Information

Test Method: LM-79-08
Report Number: P832735
Test Lab: ETA Testing Technology
Issue Date: 05/14/2024
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)
Product Line: HALO
Catalog Number: HLBT407FS5*-950
Description: HALO SLIM RETROFIT 4 inch 90 CRI COLOR SELECTABLE FIXTURE
Light Source: 5000K CCT, 90 CRI LEDS
Ballast/Driver: ELECTRONIC DRIVER

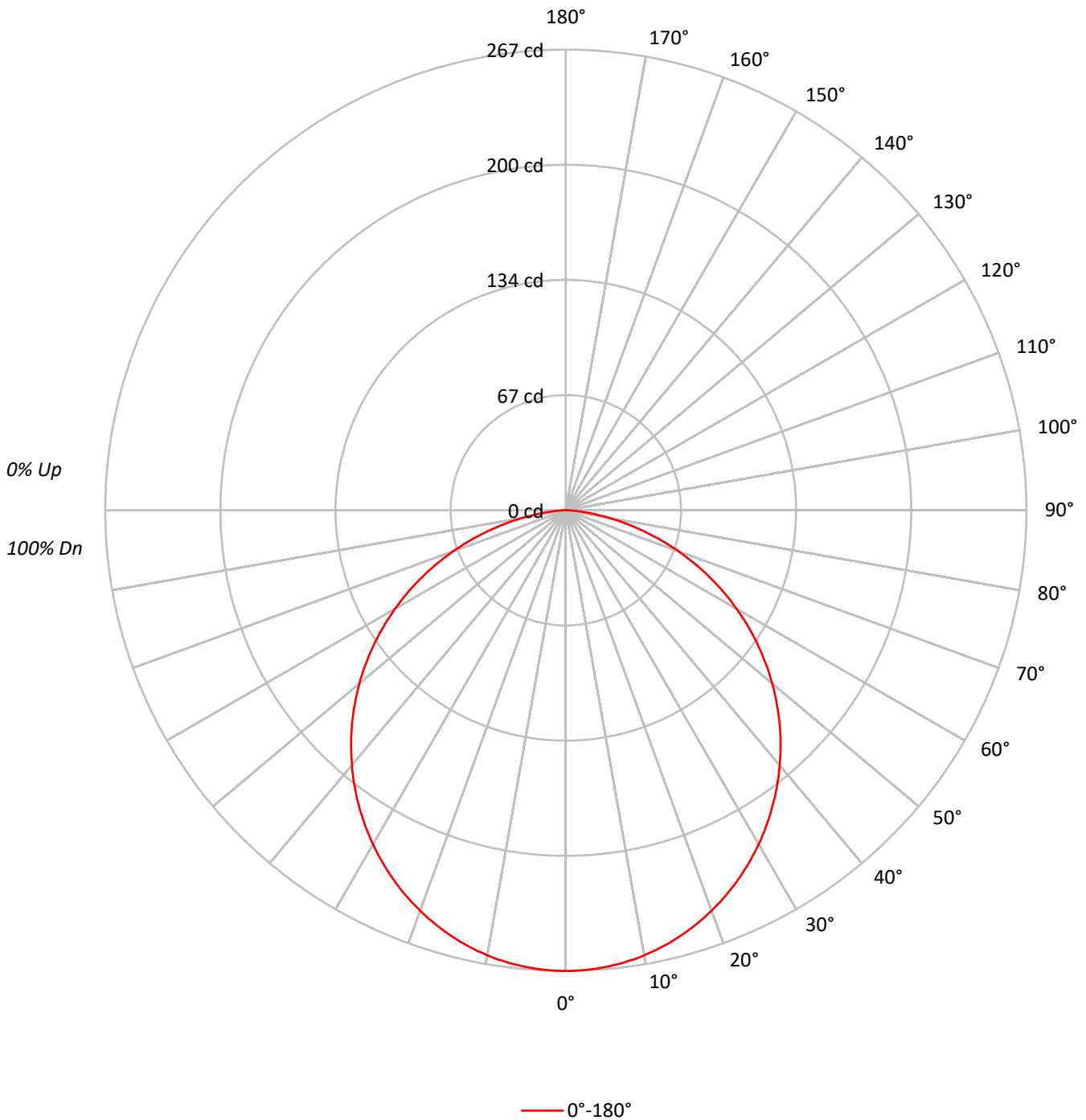
Summary

Lumens per Lamp: N/A
Luminaire Lumens: 745.2 lumens
Efficiency: N/A
Efficacy: 96.8 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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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
1	109	104	100	96	106	102	98	95	98	95	92	94	91	89	90	88	86	84				84
2	99	91	84	78	96	89	83	77	85	80	76	82	78	74	79	75	72	70				70
3	90	80	72	65	88	78	71	65	75	69	63	72	67	62	70	65	61	59				59
4	83	71	62	55	80	69	61	55	67	60	54	64	58	53	62	57	53	50				50
5	76	63	54	47	74	62	54	47	60	52	47	58	51	46	56	50	46	44				44
6	70	57	48	41	68	56	47	41	54	47	41	52	46	41	51	45	40	38				38
7	65	52	43	37	63	51	42	36	49	42	36	48	41	36	46	40	36	34				34
8	61	47	38	33	59	46	38	33	45	38	32	44	37	32	43	36	32	30				30
9	57	43	35	29	55	43	35	29	41	34	29	40	34	29	39	33	29	27				27
10	53	40	32	27	52	39	32	27	38	31	26	37	31	26	36	30	26	24				24

AVERAGE LUMINANCE (cd/sqm):

	0°
0°	40658
5°	40615
10°	40497
15°	40295
20°	40027
25°	39703
30°	39317
35°	38853
40°	38346
45°	37752
50°	37004
55°	36080
60°	34872
65°	33222
70°	30899
75°	27476
80°	22362
85°	15026



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ZONAL LUMENS:

Zone	Lumens	% Fixture
0°-10°	25.2	3.4
10°-20°	72.1	9.7
20°-30°	108.9	14.6
30°-40°	130.8	17.5
40°-50°	135.1	18.1
50°-60°	121.3	16.3
60°-70°	91.1	12.2
70°-80°	49.5	6.6
80°-90°	11.2	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°	206.2	27.7
0°-40°	337.0	45.2
0°-60°	593.4	79.6
0°-90°	745.2	100.0
90°-120°	0.0	0.0
90°-150°	0.0	0.0
90°-180°	0.0	0.0
0°-180°	745.2	100.0

CANDELA DISTRIBUTION:

	0°	Flux
0°	267	
5°	266	25
15°	256	72
25°	236	109
35°	209	131
45°	175	135
55°	136	121
65°	92	91
75°	47	49
85°	9	11
90°	1	



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CANDELA DISTRIBUTION (FULL):

	0°
0°	267.0
0.5°	267.0
1°	266.9
1.5°	266.9
2°	266.8
2.5°	266.7
3°	266.5
3.5°	266.4
4°	266.2
4.5°	265.9
5°	265.7
5.5°	265.4
6°	265.1
6.5°	264.8
7°	264.5
7.5°	264.1
8°	263.7
8.5°	263.3
9°	262.9
9.5°	262.4
10°	261.9
10.5°	261.3
11°	260.8
11.5°	260.3
12°	259.6
12.5°	259.0
13°	258.4
13.5°	257.7
14°	257.1
14.5°	256.3
15°	255.6
15.5°	254.9
16°	254.0
16.5°	253.2
17°	252.4
17.5°	251.6
18°	250.7
18.5°	249.8
19°	248.9
19.5°	247.9
20°	247.0
20.5°	246.0
21°	245.0
21.5°	244.0
22°	242.9



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CANDELA DISTRIBUTION (continued):

	0°
22.5°	241.9
23°	240.8
23.5°	239.7
24°	238.6
24.5°	237.4
25°	236.3
25.5°	235.1
26°	233.9
26.5°	232.6
27°	231.4
27.5°	230.1
28°	228.8
28.5°	227.5
29°	226.2
29.5°	224.9
30°	223.6
30.5°	222.2
31°	220.8
31.5°	219.4
32°	218.0
32.5°	216.5
33°	215.0
33.5°	213.6
34°	212.1
34.5°	210.6
35°	209.0
35.5°	207.5
36°	206.0
36.5°	204.4
37°	202.8
37.5°	201.2
38°	199.6
38.5°	197.9
39°	196.3
39.5°	194.6
40°	192.9
40.5°	191.2
41°	189.5
41.5°	187.8
42°	186.0
42.5°	184.3
43°	182.5
43.5°	180.7
44°	178.9
44.5°	177.1



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CANDELA DISTRIBUTION (continued):

	0°
45°	175.3
45.5°	173.4
46°	171.5
46.5°	169.7
47°	167.8
47.5°	165.8
48°	164.0
48.5°	162.0
49°	160.1
49.5°	158.1
50°	156.2
50.5°	154.2
51°	152.2
51.5°	150.2
52°	148.2
52.5°	146.2
53°	144.1
53.5°	142.1
54°	140.0
54.5°	137.9
55°	135.9
55.5°	133.8
56°	131.6
56.5°	129.6
57°	127.4
57.5°	125.3
58°	123.2
58.5°	121.0
59°	118.8
59.5°	116.6
60°	114.5
60.5°	112.2
61°	110.1
61.5°	107.9
62°	105.6
62.5°	103.4
63°	101.2
63.5°	98.9
64°	96.7
64.5°	94.5
65°	92.2
65.5°	90.0
66°	87.7
66.5°	85.4
67°	83.2



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CANDELA DISTRIBUTION (continued):

	0°
67.5°	80.9
68°	78.6
68.5°	76.3
69°	74.0
69.5°	71.7
70°	69.4
70.5°	67.1
71°	64.8
71.5°	62.6
72°	60.3
72.5°	58.0
73°	55.7
73.5°	53.4
74°	51.2
74.5°	48.9
75°	46.7
75.5°	44.5
76°	42.3
76.5°	40.1
77°	37.9
77.5°	35.8
78°	33.7
78.5°	31.6
79°	29.5
79.5°	27.5
80°	25.5
80.5°	23.5
81°	21.6
81.5°	19.7
82°	17.9
82.5°	16.2
83°	14.5
83.5°	12.9
84°	11.4
84.5°	10.0
85°	8.6
85.5°	7.4
86°	6.2
86.5°	5.2
87°	4.4
87.5°	3.6
88°	2.9
88.5°	2.4
89°	1.9
89.5°	1.5

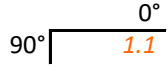
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Scaled Data Report



TEST NUMBER: P832735
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CANDELA DISTRIBUTION (continued):



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

Report Prepared for

Cooper Lighting Solutions

HALO

Report Number: SP1-2403-328-15

Test Date: 05/03/2024

Luminaire Tested: HLT407FS5-5000K

Data in this report applies to families of products HLT407FS5-5000K.

Test Information

Test Method: LM-79-2019
 Report Number: SP1-2403-328-15
 Test Lab: COOPER LIGHTING SOLUTIONS
 Photometer: SP1 - 76IN SPHERE
 Measurement Geometry: 4π
 Issue Date: 05/06/2024
 Manufacturer: COOPER LIGHTING SOLUTIONS
 Product Line: HALO
 Catalog Number: **HLT407FSS-5000K**
 Description: HLBSL RETROFIT 4 INCH SAMPLE #2.

Spectral Parameters

CCT (K): 5133
 CIE u': 0.2084
 CIE v': 0.4851
 Duv: 0.0023
 CIE x: 0.3417
 CIE y: 0.3535
 CIE z: 0.3048
 Peak Wavelength (nm): 632
 Dominant Wavelength (nm): 568
 Purity: 8.7

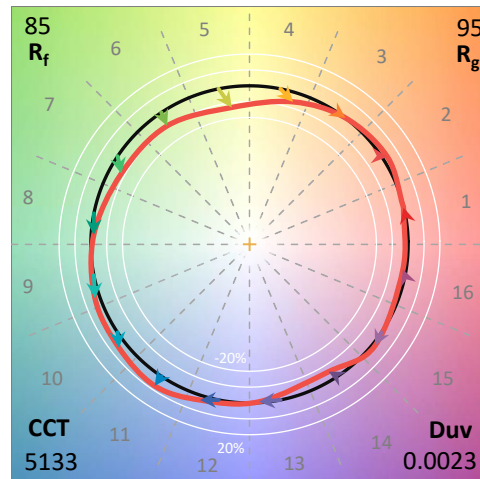
CRI (Ra): 90.4
 R1: 91.8
 R2: 91.4
 R3: 94.0
 R4: 89.0
 R5: 91.5
 R6: 88.8
 R7: 87.7
 R8: 89.4

R9: 83.2
 R10: 84.1
 R11: 94.2
 R12: 73.7
 R13: 91.0
 R14: 97.3

Rf: 85.1
 Rg: 95

Test Conditions

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

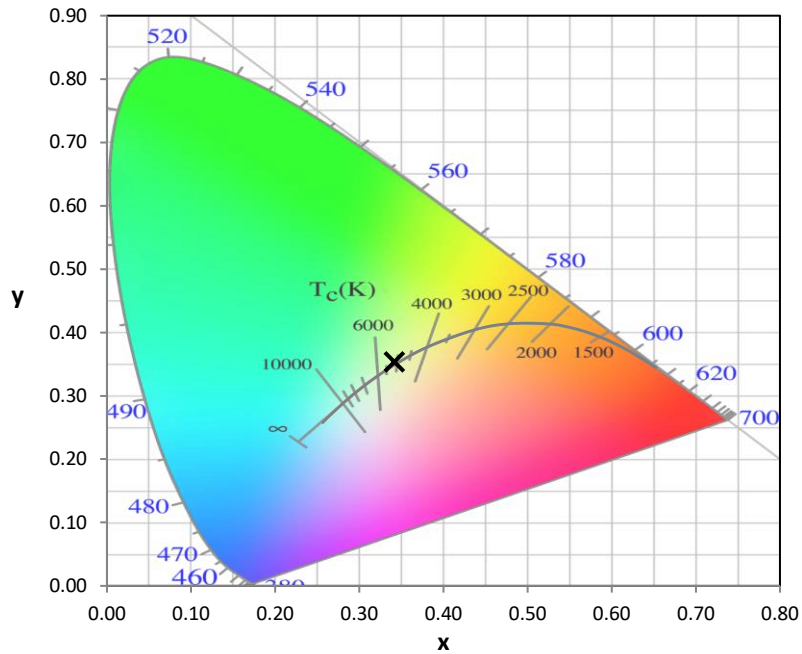


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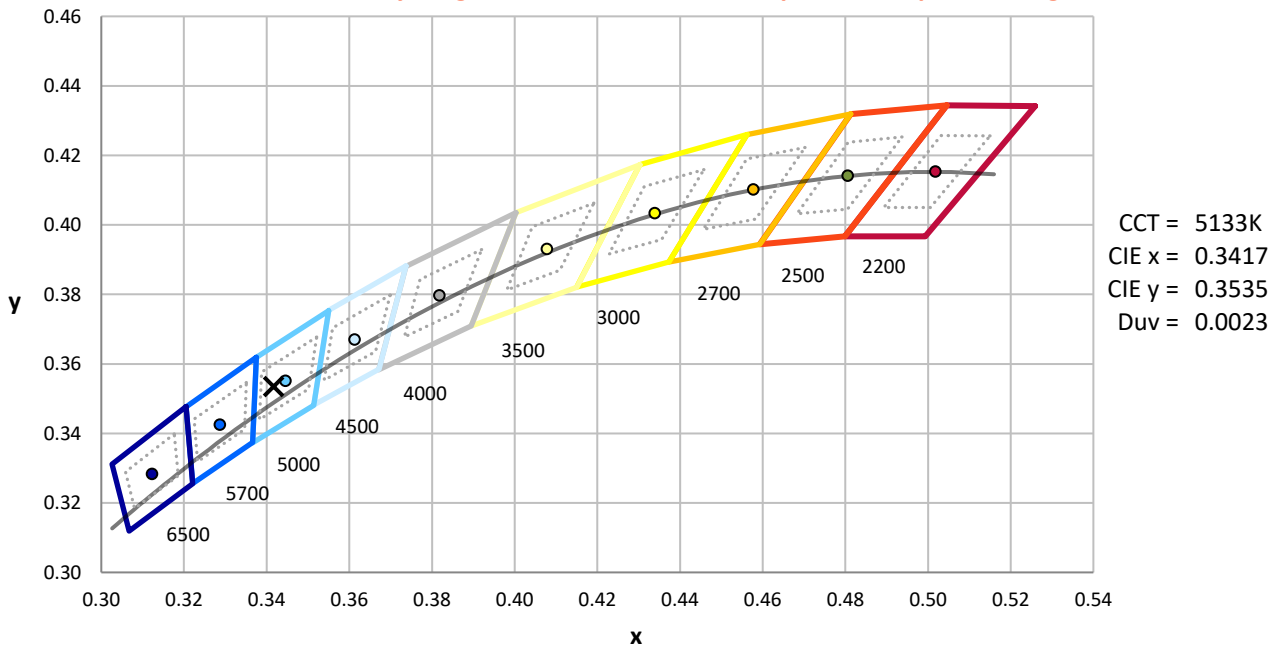
Measurement and Test Equipment			
Instrument	Identification Number	Calibration Date	Calibration Due Date
Photometer	76INCH SPHERE IN0058	2/12/2024	8/12/2024
Power Meter	XITRON 2801 IN0071	10/23/2023	10/23/2024
AC Power Source	CHROMA 61603 IN0063	10/24/2023	10/24/2024
DC Power Source	AGILENT E3634A IN0208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



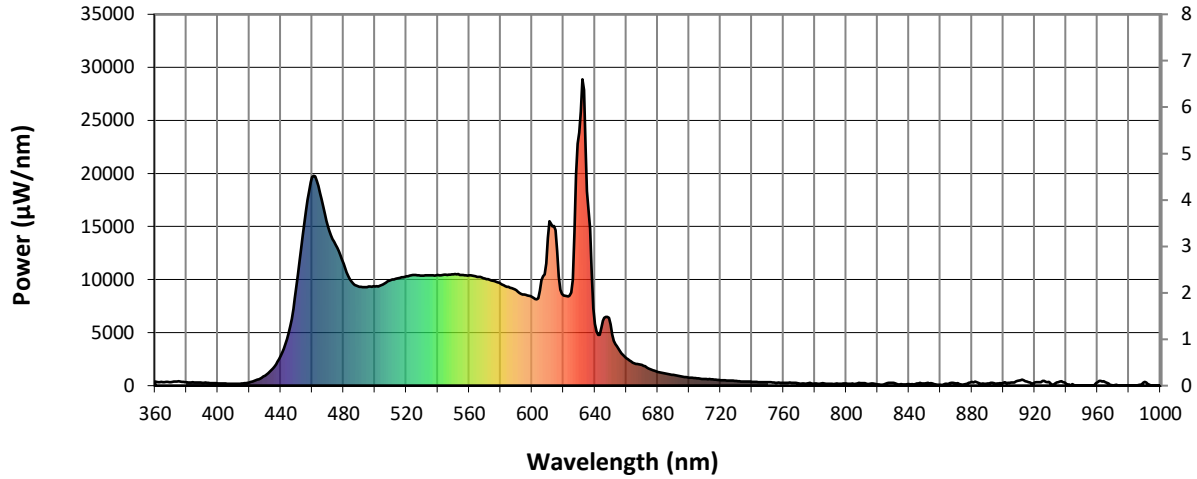
CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles



Point lies inside the ANSI 5000K 4-step quadrangle

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Photopic Flux vs. Wavelength

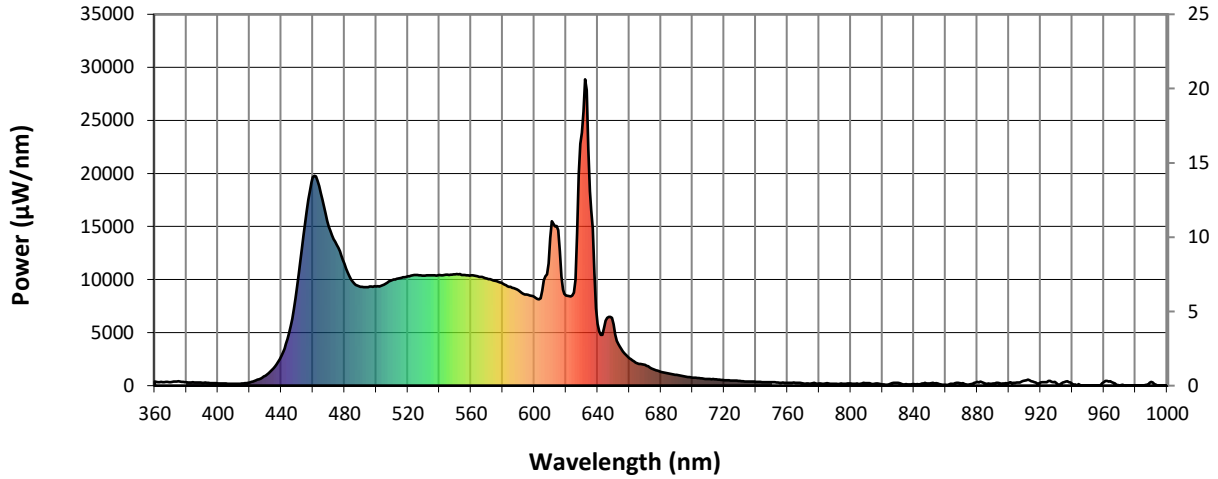


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λ (nm)	Power ($\mu\text{W}/\text{nm}$)	Lumens (ϕ/nm)	λ (nm)	Power ($\mu\text{W}/\text{nm}$)	Lumens (ϕ/nm)	λ (nm)	Power ($\mu\text{W}/\text{nm}$)	Lumens (ϕ/nm)	λ (nm)	Power ($\mu\text{W}/\text{nm}$)	Lumens (ϕ/nm)	λ (nm)	Power ($\mu\text{W}/\text{nm}$)	Lumens (ϕ/nm)
360	390	NR	490	9318	NR	620	8499	NR	750	313	NR	880	369	NR
365	326	NR	495	9296	NR	625	8771	NR	755	280	NR	885	219	NR
370	331	NR	500	9356	NR	630	23864	NR	760	261	NR	890	201	NR
375	402	NR	505	9534	NR	635	18327	NR	765	278	NR	895	182	NR
380	325	NR	510	9936	NR	640	5814	NR	770	199	NR	900	276	NR
385	294	NR	515	10130	NR	645	6119	NR	775	207	NR	905	282	NR
390	278	NR	520	10304	NR	650	5775	NR	780	203	NR	910	484	NR
395	246	NR	525	10416	NR	655	3455	NR	785	234	NR	915	379	NR
400	219	NR	530	10373	NR	660	2593	NR	790	177	NR	920	281	NR
405	197	NR	535	10414	NR	665	2102	NR	795	187	NR	925	435	NR
410	181	NR	540	10420	NR	670	1943	NR	800	197	NR	930	222	NR
415	195	NR	545	10449	NR	675	1559	NR	805	158	NR	935	328	NR
420	309	NR	550	10487	NR	680	1306	NR	810	222	NR	940	176	NR
425	554	NR	555	10425	NR	685	1134	NR	815	182	NR	945	51	NR
430	943	NR	560	10391	NR	690	1013	NR	820	128	NR	950	0	NR
435	1629	NR	565	10258	NR	695	865	NR	825	168	NR	955	0	NR
440	2811	NR	570	10092	NR	700	752	NR	830	256	NR	960	331	NR
445	4960	NR	575	9880	NR	705	699	NR	835	131	NR	965	317	NR
450	9330	NR	580	9616	NR	710	616	NR	840	159	NR	970	0	NR
455	15325	NR	585	9318	NR	715	593	NR	845	190	NR	975	0	NR
460	19654	NR	590	8980	NR	720	503	NR	850	220	NR	980	22	NR
465	18161	NR	595	8587	NR	725	477	NR	855	213	NR	985	0	NR
470	14991	NR	600	8362	NR	730	450	NR	860	75	NR	990	358	NR
475	13264	NR	605	8961	NR	735	386	NR	865	151	NR	995	0	NR
480	11474	NR	610	13913	NR	740	368	NR	870	195	NR	1000	0	NR
485	9830	NR	615	14653	NR	745	316	NR	875	104	NR			

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Scotopic Flux vs. Wavelength



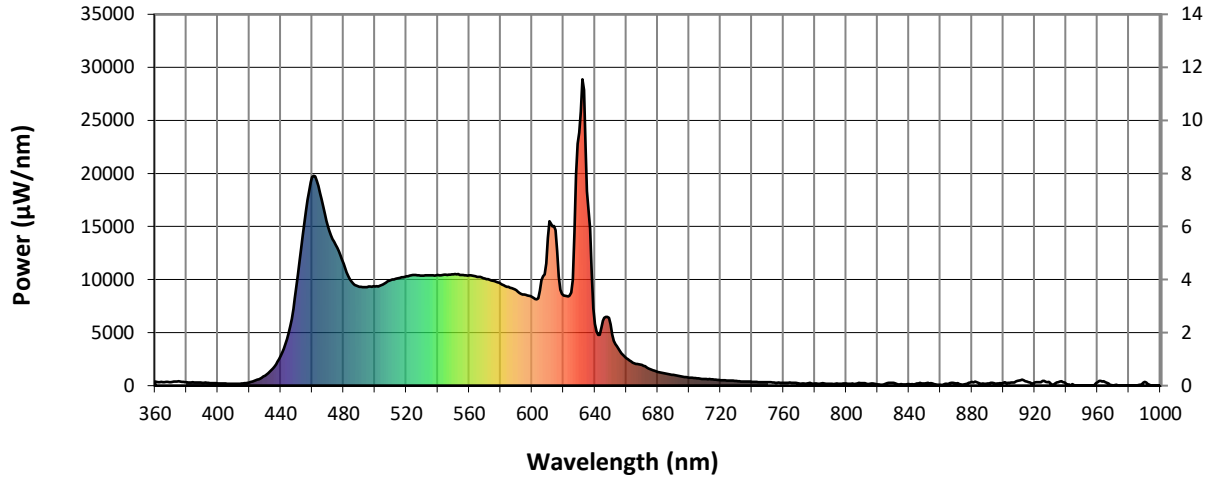
Scotopic Lumens: 1717.6

S/P: 2.3

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	390	NR	490	9318	NR	620	8499	NR	750	313	NR	880	369	NR
365	326	NR	495	9296	NR	625	8771	NR	755	280	NR	885	219	NR
370	331	NR	500	9356	NR	630	23864	NR	760	261	NR	890	201	NR
375	402	NR	505	9534	NR	635	18327	NR	765	278	NR	895	182	NR
380	325	NR	510	9936	NR	640	5814	NR	770	199	NR	900	276	NR
385	294	NR	515	10130	NR	645	6119	NR	775	207	NR	905	282	NR
390	278	NR	520	10304	NR	650	5775	NR	780	203	NR	910	484	NR
395	246	NR	525	10416	NR	655	3455	NR	785	234	NR	915	379	NR
400	219	NR	530	10373	NR	660	2593	NR	790	177	NR	920	281	NR
405	197	NR	535	10414	NR	665	2102	NR	795	187	NR	925	435	NR
410	181	NR	540	10420	NR	670	1943	NR	800	197	NR	930	222	NR
415	195	NR	545	10449	NR	675	1559	NR	805	158	NR	935	328	NR
420	309	NR	550	10487	NR	680	1306	NR	810	222	NR	940	176	NR
425	554	NR	555	10425	NR	685	1134	NR	815	182	NR	945	51	NR
430	943	NR	560	10391	NR	690	1013	NR	820	128	NR	950	0	NR
435	1629	NR	565	10258	NR	695	865	NR	825	168	NR	955	0	NR
440	2811	NR	570	10092	NR	700	752	NR	830	256	NR	960	331	NR
445	4960	NR	575	9880	NR	705	699	NR	835	131	NR	965	317	NR
450	9330	NR	580	9616	NR	710	616	NR	840	159	NR	970	0	NR
455	15325	NR	585	9318	NR	715	593	NR	845	190	NR	975	0	NR
460	19654	NR	590	8980	NR	720	503	NR	850	220	NR	980	22	NR
465	18161	NR	595	8587	NR	725	477	NR	855	213	NR	985	0	NR
470	14991	NR	600	8362	NR	730	450	NR	860	75	NR	990	358	NR
475	13264	NR	605	8961	NR	735	386	NR	865	151	NR	995	0	NR
480	11474	NR	610	13913	NR	740	368	NR	870	195	NR	1000	0	NR
485	9830	NR	615	14653	NR	745	316	NR	875	104	NR			

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Melanopic Flux vs. Wavelength



Melanopic Lumens: 765.6

M/P: 1.02

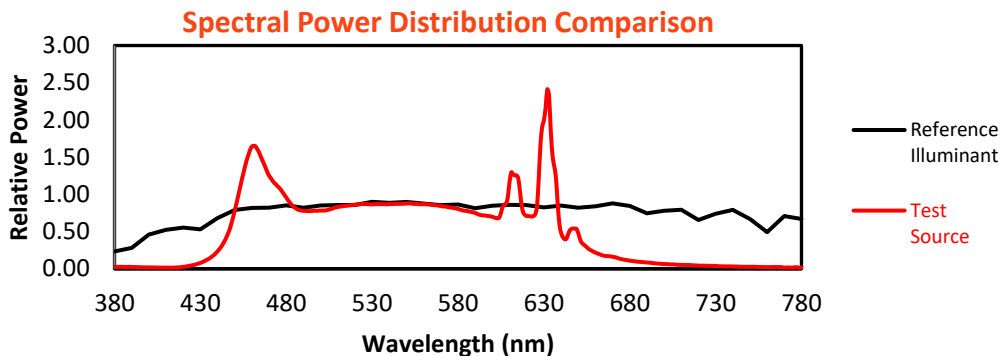
λ (nm)	Power (µW/nm)	Lumens (φ/nm)	λ (nm)	Power (µW/nm)	Lumens (φ/nm)	λ (nm)	Power (µW/nm)	Lumens (φ/nm)	λ (nm)	Power (µW/nm)	Lumens (φ/nm)	λ (nm)	Power (µW/nm)	Lumens (φ/nm)
360	390	NR	490	9318	NR	620	8499	NR	750	313	NR	880	369	NR
365	326	NR	495	9296	NR	625	8771	NR	755	280	NR	885	219	NR
370	331	NR	500	9356	NR	630	23864	NR	760	261	NR	890	201	NR
375	402	NR	505	9534	NR	635	18327	NR	765	278	NR	895	182	NR
380	325	NR	510	9936	NR	640	5814	NR	770	199	NR	900	276	NR
385	294	NR	515	10130	NR	645	6119	NR	775	207	NR	905	282	NR
390	278	NR	520	10304	NR	650	5775	NR	780	203	NR	910	484	NR
395	246	NR	525	10416	NR	655	3455	NR	785	234	NR	915	379	NR
400	219	NR	530	10373	NR	660	2593	NR	790	177	NR	920	281	NR
405	197	NR	535	10414	NR	665	2102	NR	795	187	NR	925	435	NR
410	181	NR	540	10420	NR	670	1943	NR	800	197	NR	930	222	NR
415	195	NR	545	10449	NR	675	1559	NR	805	158	NR	935	328	NR
420	309	NR	550	10487	NR	680	1306	NR	810	222	NR	940	176	NR
425	554	NR	555	10425	NR	685	1134	NR	815	182	NR	945	51	NR
430	943	NR	560	10391	NR	690	1013	NR	820	128	NR	950	0	NR
435	1629	NR	565	10258	NR	695	865	NR	825	168	NR	955	0	NR
440	2811	NR	570	10092	NR	700	752	NR	830	256	NR	960	331	NR
445	4960	NR	575	9880	NR	705	699	NR	835	131	NR	965	317	NR
450	9330	NR	580	9616	NR	710	616	NR	840	159	NR	970	0	NR
455	15325	NR	585	9318	NR	715	593	NR	845	190	NR	975	0	NR
460	19654	NR	590	8980	NR	720	503	NR	850	220	NR	980	22	NR
465	18161	NR	595	8587	NR	725	477	NR	855	213	NR	985	0	NR
470	14991	NR	600	8362	NR	730	450	NR	860	75	NR	990	358	NR
475	13264	NR	605	8961	NR	735	386	NR	865	151	NR	995	0	NR
480	11474	NR	610	13913	NR	740	368	NR	870	195	NR	1000	0	NR
485	9830	NR	615	14653	NR	745	316	NR	875	104	NR			

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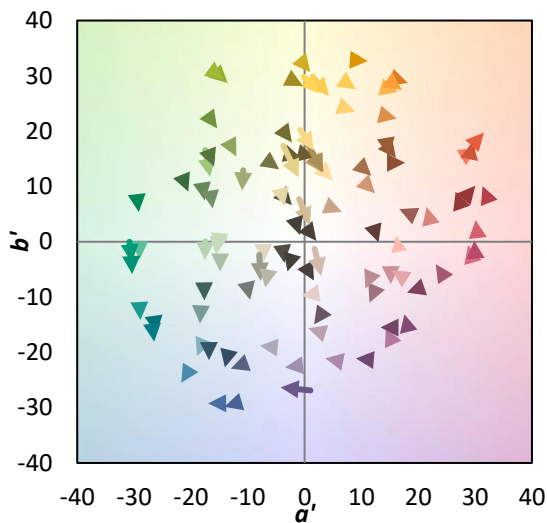
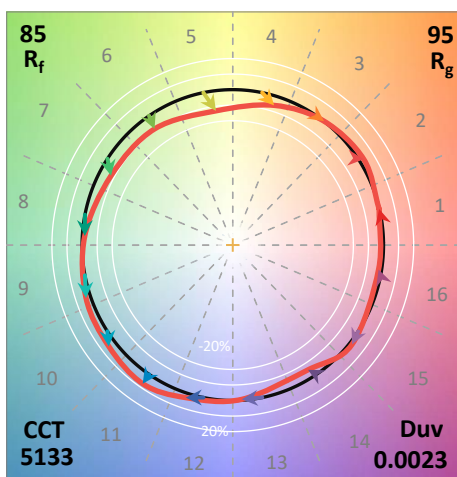
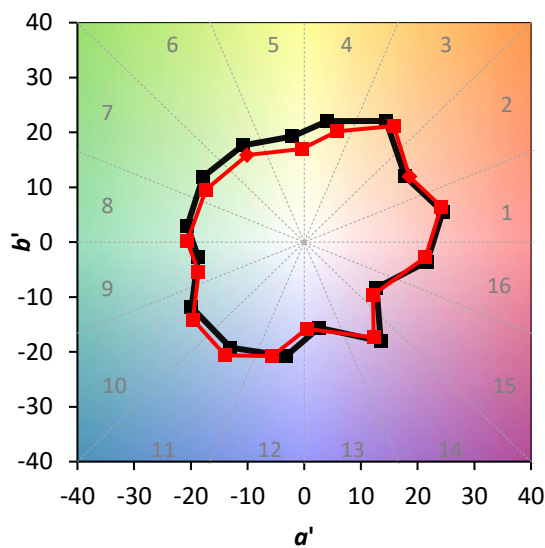
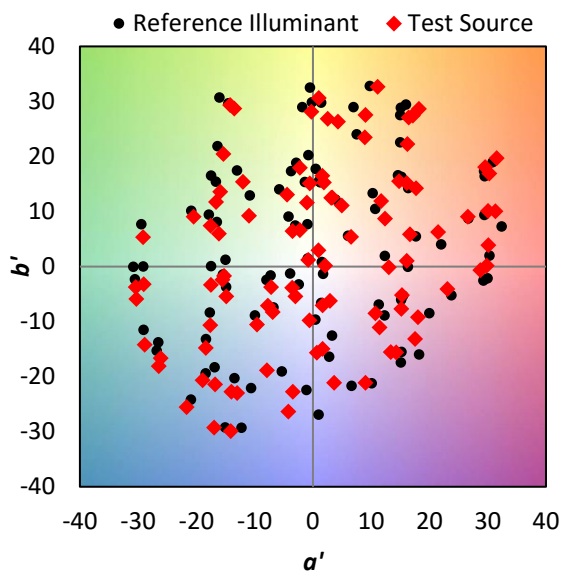
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Summary

$R_f = 85.1$
 $R_g = 95$
 CIE $R_a = 90.4$
 $R_9 = 83.2$



Color Vector Graphics

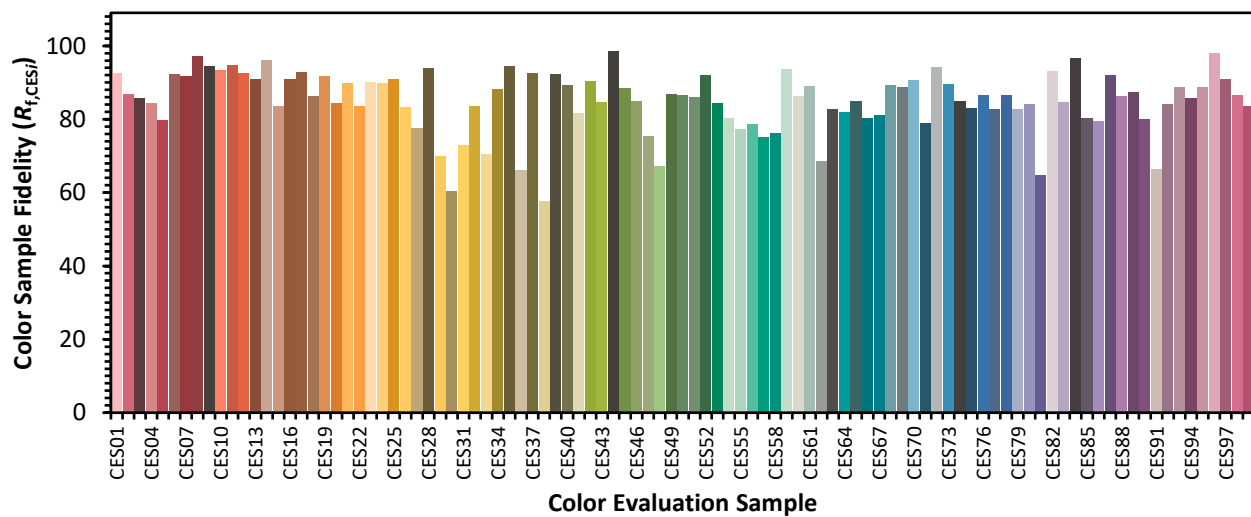


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Individual Sample Fidelity Index ($R_{f,i}$)

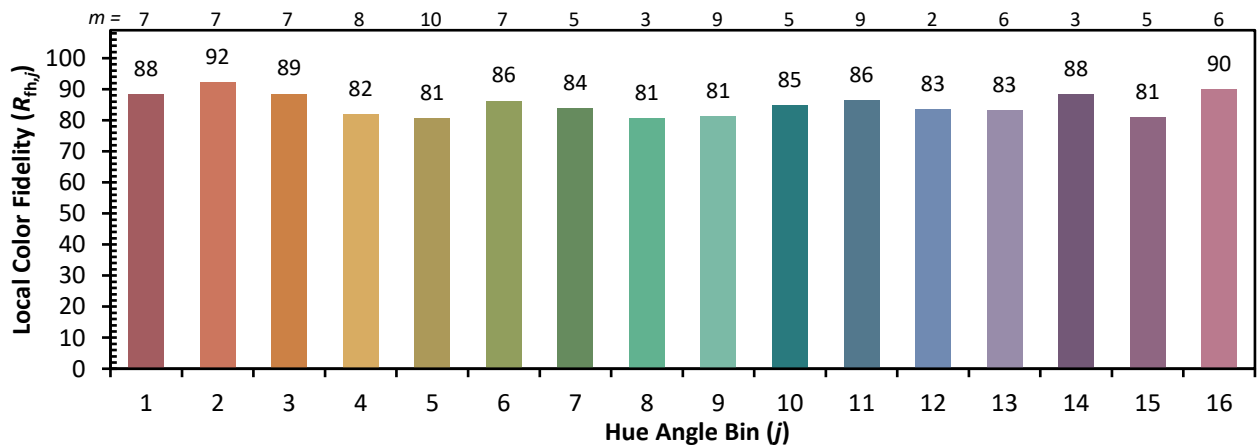
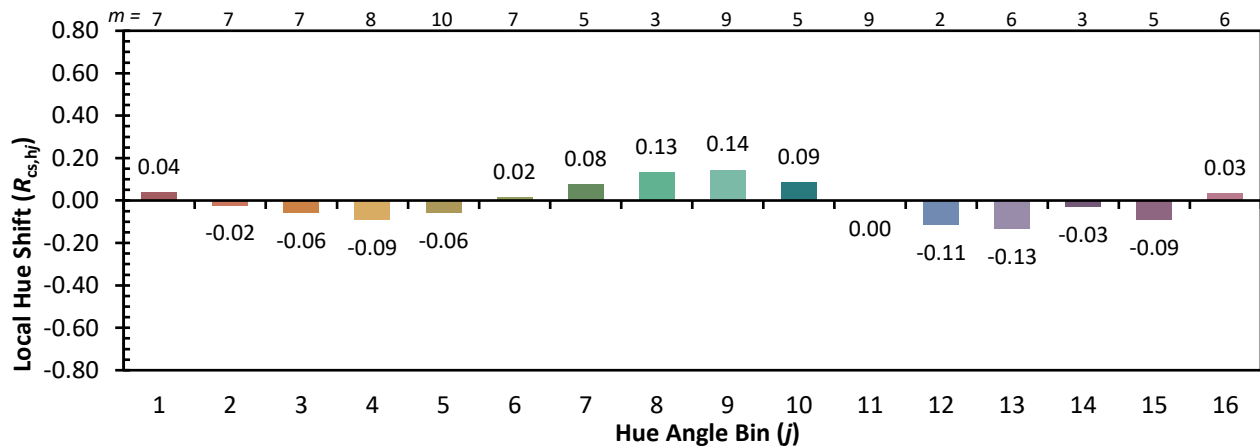
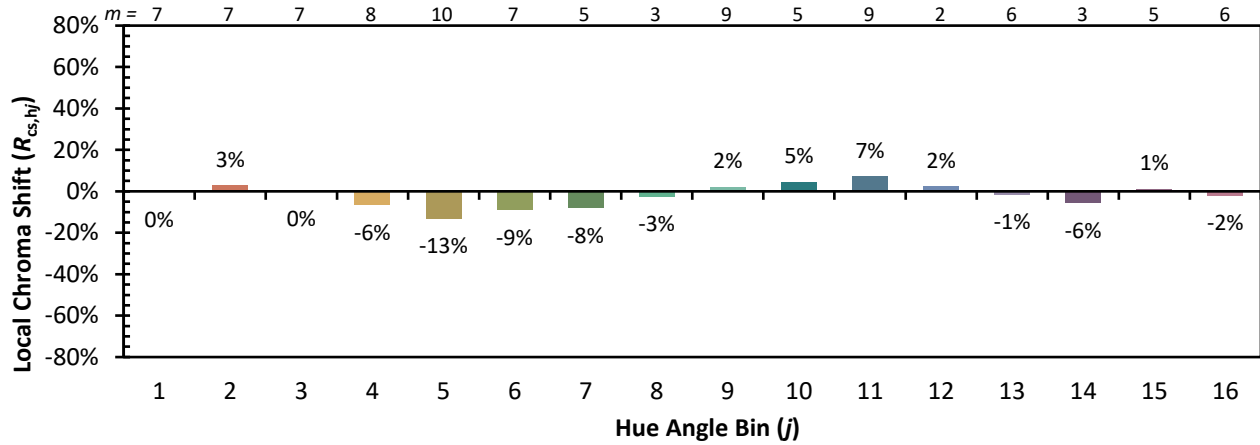
CES01 = 85	CES26 = 83	CES51 = 86	CES76 = 87
CES02 = 61	CES27 = 78	CES52 = 92	CES77 = 83
CES03 = 31	CES28 = 94	CES53 = 84	CES78 = 87
CES04 = 68	CES29 = 70	CES54 = 80	CES79 = 83
CES05 = 48	CES30 = 60	CES55 = 77	CES80 = 84
CES06 = 50	CES31 = 73	CES56 = 79	CES81 = 65
CES07 = 42	CES32 = 84	CES57 = 75	CES82 = 93
CES08 = 41	CES33 = 71	CES58 = 76	CES83 = 85
CES09 = 29	CES34 = 88	CES59 = 94	CES84 = 97
CES10 = 73	CES35 = 94	CES60 = 86	CES85 = 80
CES11 = 55	CES36 = 66	CES61 = 89	CES86 = 79
CES12 = 62	CES37 = 92	CES62 = 69	CES87 = 92
CES13 = 43	CES38 = 58	CES63 = 83	CES88 = 86
CES14 = 74	CES39 = 92	CES64 = 82	CES89 = 87
CES15 = 71	CES40 = 89	CES65 = 85	CES90 = 80
CES16 = 47	CES41 = 82	CES66 = 80	CES91 = 66
CES17 = 48	CES42 = 90	CES67 = 81	CES92 = 84
CES18 = 56	CES43 = 85	CES68 = 89	CES93 = 89
CES19 = 70	CES44 = 99	CES69 = 89	CES94 = 86
CES20 = 65	CES45 = 88	CES70 = 91	CES95 = 89
CES21 = 84	CES46 = 85	CES71 = 79	CES96 = 98
CES22 = 77	CES47 = 75	CES72 = 94	CES97 = 91
CES23 = 91	CES48 = 67	CES73 = 90	CES98 = 87
CES24 = 89	CES49 = 87	CES74 = 85	CES99 = 84
CES25 = 70	CES50 = 87	CES75 = 83	



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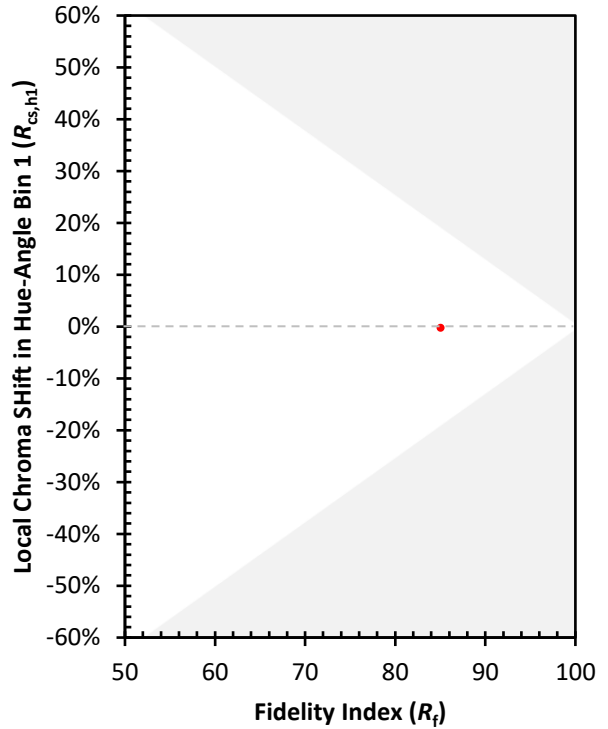
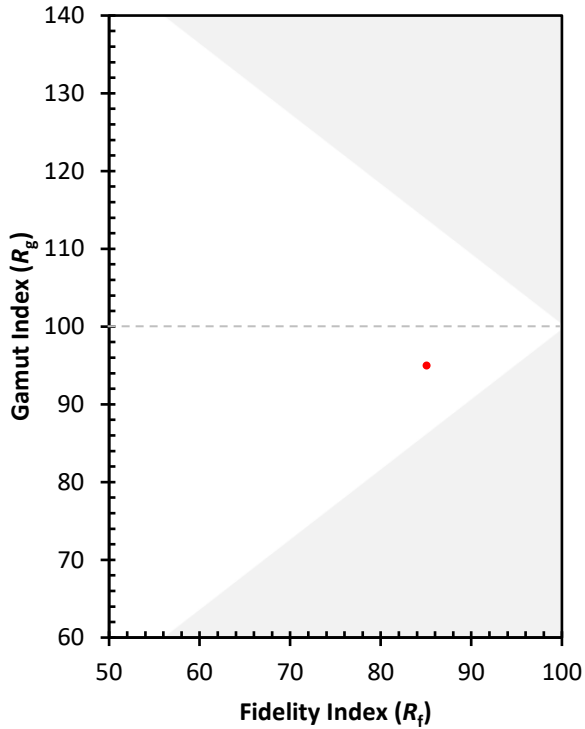
Color Rendition by Hue-Angle Bin



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Measure Comparisons



(END OF REPORT)