

Scaled data based on original data using  
LM-79-2019 Approved Method: Electrical and Photometric Measurements of Solid-  
State Lighting Products

Test Report Prepared for  
Cooper Lighting Solutions  
(formerly Eaton)

Brand: LUMARK

Report Number: P855605

Luminaire Tested: **NHRS100U33BZ730-50%**

Issue Date: 07/17/2024

**Test Information**

Test Method: LM-79-2019  
Report Number: P855605  
Test Lab: INNOVATION CENTER(G2)  
Issue Date: 07/17/2024  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: LUMARK  
Catalog Number: NHRS100U33BZ730-50%  
Description: LUMARK NIGHT HARRIER 4 PANEL FLOOD SELECTABLE CCT NEMA3 @3000K 50%  
Output  
Light Source: (128) 3000K CCT, 70 CRI LEDS  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

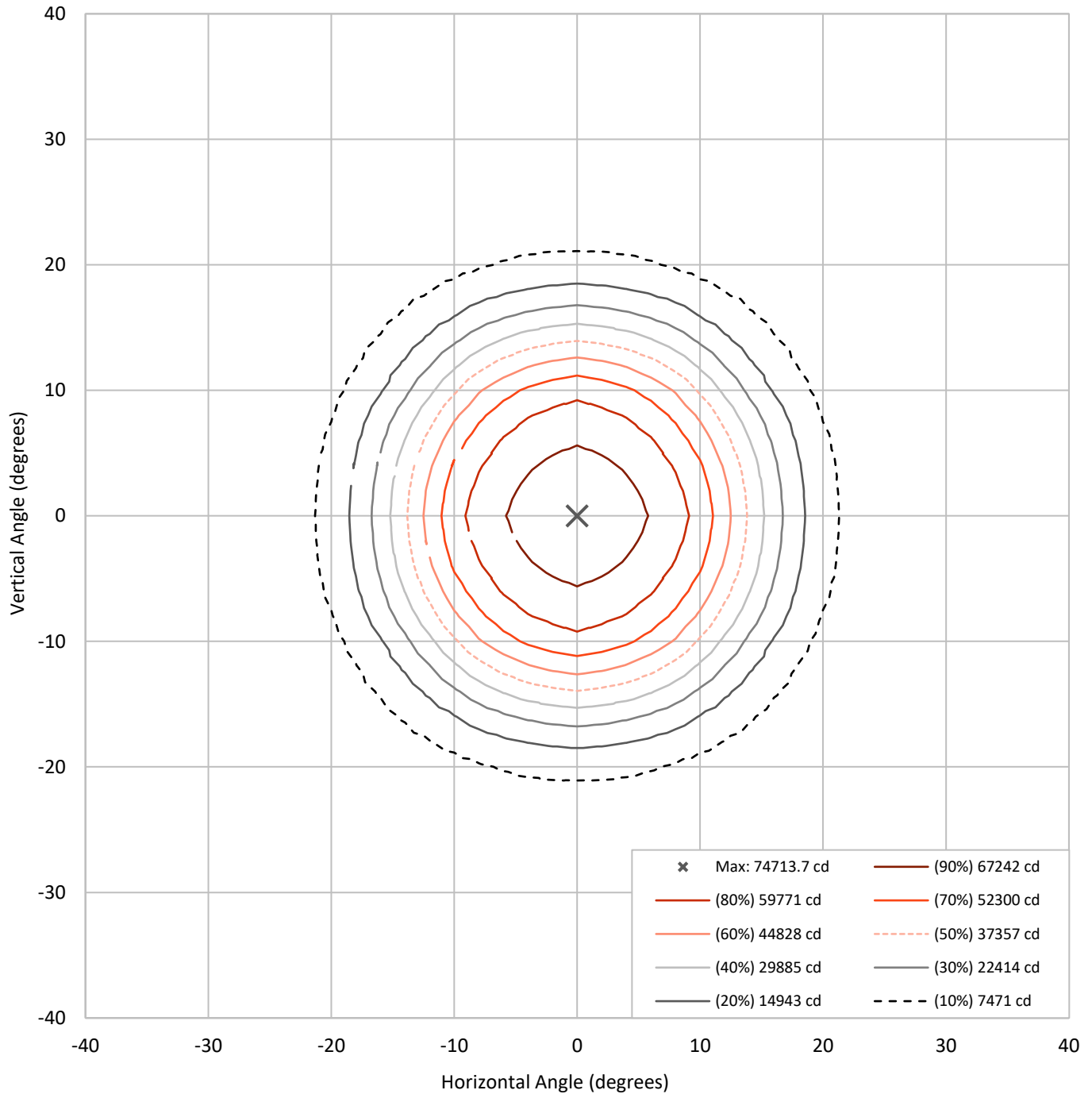
Lumens per Lamp:	N/A	NEMA Type:	3H x 3V
Luminaire Lumens:	19883.8 lumens	Max Intensity:	74713.7 candela
Efficiency:	N/A	Max Intensity Angle:	0°H x 0°V
Efficacy:	136.5 lumens/watt		
Luminous Opening:	Rectangular (W 1.29' x L: 1.12' x H: 0')		

Beam Angle (50%):	27.7°H x 27.9°V	Field Angle (10%):	42.6°H x 42.2°V
Beam Lumens:	7396.6 lumens	Field Lumens:	11171.6 lumens
Beam Efficiency:	37.2%	Field Efficiency:	56.2%

Input Watts (W): 145.7  
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: 28.75 FT

REPORT NUMBER: P855605  
CATALOG NUMBER: NHRS100U33BZ730-50%

### Iso-Candela Plot





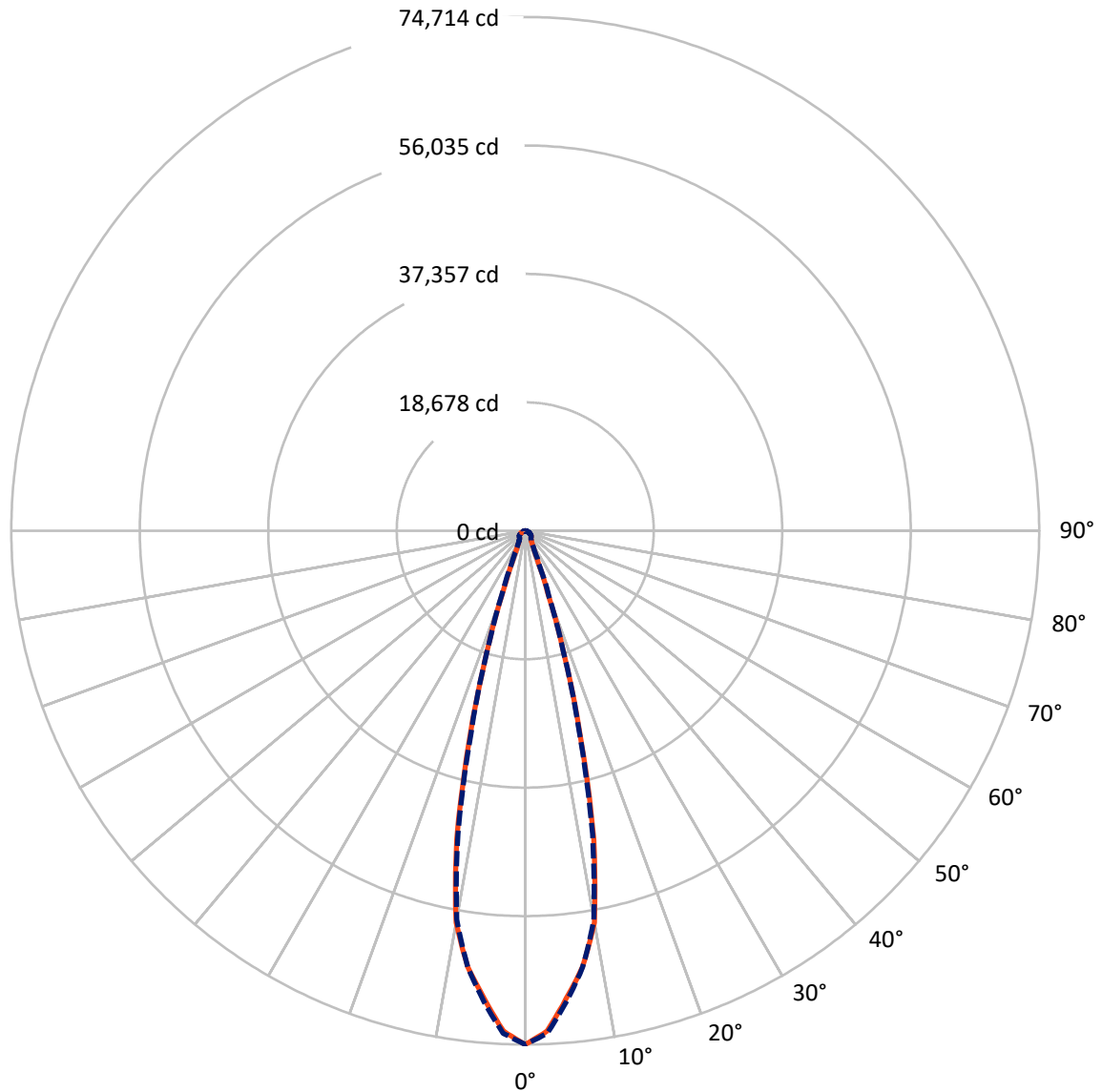
REPORT NUMBER: P855605  
 CATALOG NUMBER: NHRS100U33BZ730-50%

### Lumen Table

90	0.1		2.1		7.2		11.8		13.4		11.8		7.2		2.1		0.1		
80	0.1		2.1		7.2		11.8		13.4		11.8		7.2		2.1		0.1		
70	1.2	1.8	4.2	7.2	10.3	13.2	15.0	15.8	15.8	15.0	13.2	10.3	7.2	4.2	1.8	1.2			
60		3.3	7.4	12.3	17.5	22.4	25.8	27.7	27.7	25.8	22.4	17.5	12.3	7.4	3.3				
50	3.1	4.8	10.2	16.9	24.5	30.4	34.1	36.3	36.3	34.1	30.4	24.5	16.9	10.2	4.8	3.1			
40		6.0	12.4	20.9	28.8	34.4	39.8	44.3	44.3	39.8	34.4	28.8	20.9	12.4	6.0				
30	4.4	6.9	14.2	23.7	31.1	41.3	64.9	108.1	108.1	64.9	41.3	31.1	23.7	14.2	6.9	4.4			
20		7.4	15.7	25.2	33.8	61.5	287.2	828.6	828.6	287.2	61.5	33.8	25.2	15.7	7.4				
10	4.9	7.7	16.5	26.0	36.6	102.9	804.4	1860.7	1860.7	804.4	102.9	36.6	26.0	16.5	7.7	4.9			
0		7.7	16.5	26.0	36.6	102.9	804.4	1860.7	1860.7	804.4	102.9	36.6	26.0	16.5	7.7				
-10	4.4	7.4	15.7	25.2	33.8	61.5	287.2	828.6	828.6	287.2	61.5	33.8	25.2	15.7	7.4	4.4			
-20		6.9	14.2	23.7	31.1	41.3	64.9	108.1	108.1	64.9	41.3	31.1	23.7	14.2	6.9				
-30	3.1	6.0	12.4	20.9	28.8	34.4	39.8	44.3	44.3	39.8	34.4	28.8	20.9	12.4	6.0	3.1			
-40		4.8	10.2	16.9	24.5	30.4	34.1	36.3	36.3	34.1	30.4	24.5	16.9	10.2	4.8				
-50	1.2	3.3	7.4	12.3	17.5	22.4	25.8	27.7	27.7	25.8	22.4	17.5	12.3	7.4	3.3	1.2			
-60		1.8	4.2	7.2	10.3	13.2	15.0	15.8	15.8	15.0	13.2	10.3	7.2	4.2	1.8				
-70	0.1	2.1		7.2		11.8		13.4		11.8		7.2		2.1		0.1			
-80		2.1		7.2		11.8		13.4		11.8		7.2		2.1					
-90	0.1		2.1		7.2		11.8		13.4		11.8		7.2		2.1		0.1		
	-90	-80	-70	-60	-50	-40	-30	-20	-10	0	10	20	30	40	50	60	70	80	90

REPORT NUMBER: P855605  
CATALOG NUMBER: NHRS100U33BZ730-50%

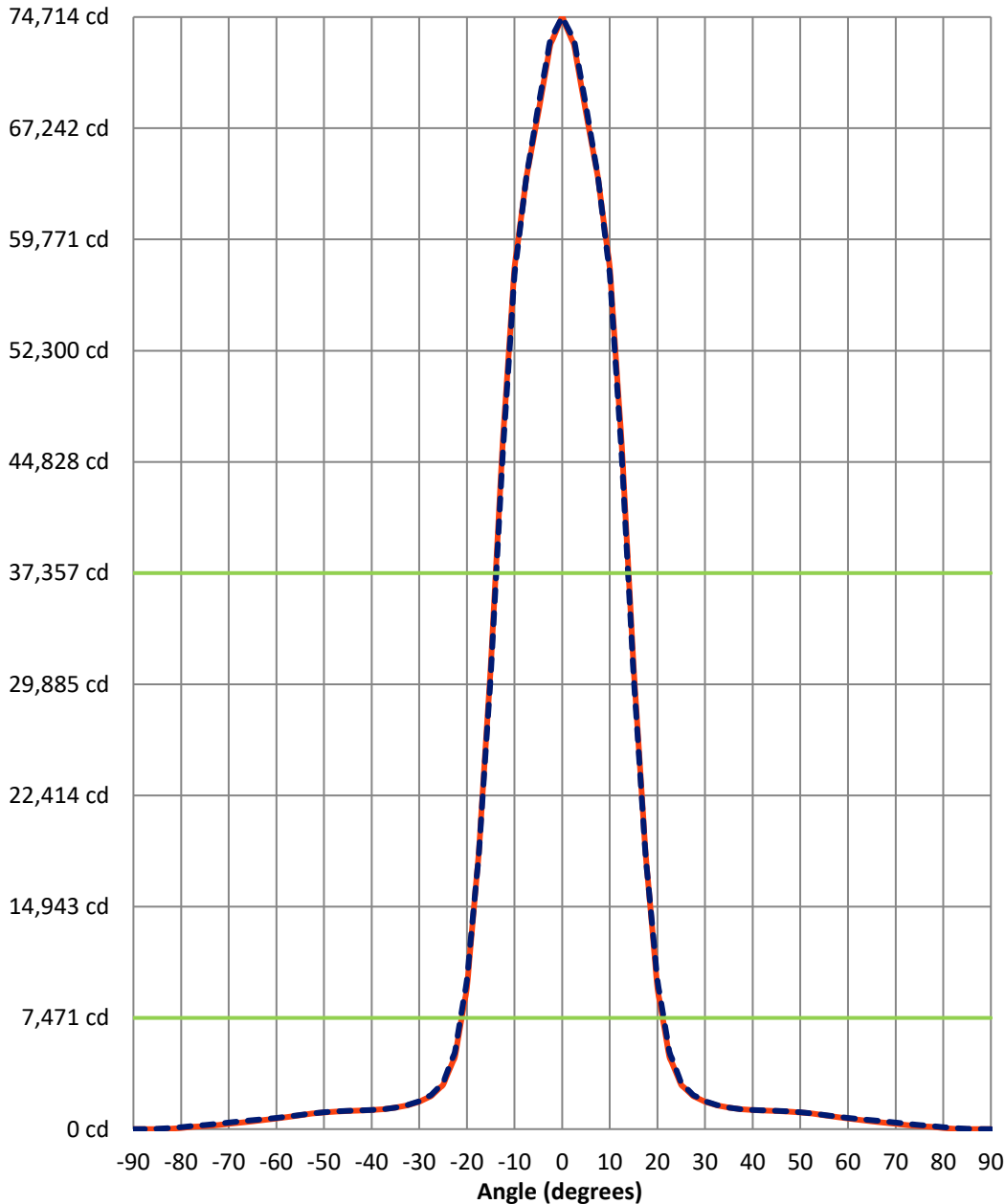
### Luminous Intensity Polar Plot



— Vertical Distribution Through 0-Deg      - - - Horizontal Distribution Through 0-Deg

REPORT NUMBER: P855605  
 CATALOG NUMBER: NHRS100U33BZ730-50%

### Luminous Intensity Plot



**Beam:**  
 H Angle: 27.7°  
 V Angle: 27.9°  
 Lumens: 7396.6  
 Efficiency: 37.2%

**Field:**  
 H Angle: 42.6°  
 V Angle: 42.2°  
 Lumens: 11171.6  
 Efficiency: 56.2%

**Spill:**  
 Lumens: 8712.2  
 Efficiency: 43.8%

— Vertical Distribution through 0-Deg  
 - - Horizontal Distribution through 0-Deg



REPORT NUMBER: P855605  
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FIELD  
 BEAM

**CANDELA DISTRIBUTION:**

	0°	2.5°	5°	7.5°	10°	12.5°	15°	17.5°	20°	22.5°	25°
90°	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
87.5°	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
85°	0.6	0.6	0.6	0.6	1.1	1.1	1.1	1.1	1.1	1.1	1.1
82.5°	17.2	16.6	16.0	16.6	16.6	17.2	17.2	17.7	18.3	18.9	18.9
80°	72.1	71.5	71.0	71.5	69.3	68.1	66.4	68.1	68.7	68.1	67.0
77.5°	156.2	156.2	156.2	152.8	150.0	146.5	142.5	139.6	136.8	133.4	129.9
75°	200.3	199.7	199.2	198.6	198.0	197.5	195.7	194.6	193.4	190.6	187.2
72.5°	265.6	264.4	263.8	261.6	260.4	258.1	256.4	255.8	253.5	250.1	244.4
70°	355.4	354.3	353.7	349.7	346.8	342.8	338.8	336.0	332.0	326.2	317.1
67.5°	435.5	434.4	434.4	431.0	429.2	425.2	423.0	420.7	416.7	410.9	399.5
65°	520.8	520.2	516.8	516.8	514.5	510.5	508.2	505.9	501.9	495.6	483.0
62.5°	617.5	614.1	608.4	607.8	605.0	600.4	596.4	592.9	587.8	580.9	565.5
60°	714.3	709.7	702.8	701.1	697.1	690.8	685.7	679.4	671.9	661.6	644.4
57.5°	819.0	812.7	804.1	800.7	795.0	786.4	779.5	769.8	756.6	741.7	724.6
55°	931.2	925.5	916.3	911.7	903.7	892.8	882.0	869.4	855.1	835.6	812.1
52.5°	1047.4	1042.2	1030.8	1020.5	1007.9	994.1	981.0	966.7	950.6	927.7	902.0
50°	1118.9	1114.3	1105.7	1097.2	1086.3	1074.3	1062.2	1048.5	1030.8	1009.0	985.0
47.5°	1176.1	1170.4	1161.8	1153.2	1142.9	1133.2	1122.9	1110.9	1094.9	1076.6	1057.1
45°	1216.2	1211.6	1203.6	1195.6	1186.4	1177.9	1169.3	1161.3	1145.8	1130.9	1113.8
42.5°	1246.0	1242.0	1235.7	1228.2	1219.6	1212.8	1205.3	1195.0	1185.3	1173.3	1157.3
40°	1280.9	1275.2	1267.7	1260.8	1251.7	1243.7	1234.5	1225.4	1216.2	1207.0	1192.2
37.5°	1337.5	1331.2	1321.5	1311.8	1298.6	1284.3	1266.0	1255.1	1244.2	1232.2	1219.6
35°	1444.6	1437.1	1422.2	1404.5	1381.0	1352.4	1321.5	1300.3	1276.9	1259.1	1243.7
32.5°	1596.2	1606.0	1583.6	1555.0	1515.5	1465.7	1417.7	1375.3	1330.1	1299.2	1268.9
30°	1839.5	1854.9	1817.1	1771.4	1709.0	1631.7	1561.9	1488.6	1418.8	1359.3	1312.4
27.5°	2220.6	2208.6	2170.3	2097.0	1987.7	1854.4	1756.5	1643.2	1543.0	1440.6	1373.6
25°	2972.1	2955.5	2861.7	2682.5	2435.3	2200.6	2032.9	1842.3	1701.0	1569.3	1453.1
22.5°	4874.0	4839.6	4561.5	4009.2	3290.3	2826.2	2478.2	2137.1	1889.3	1718.7	1568.8
20°	9488.1	9334.1	8502.0	7124.4	5311.2	4304.5	3209.1	2613.3	2166.3	1895.0	1701.5
17.5°	18574.4	17702.2	16178.6	13474.9	10041.0	7449.5	4776.7	3405.4	2630.4	2145.7	1840.6
15°	31028.3	29626.7	27100.4	22937.9	17616.9	12259.9	7857.5	4817.9	3247.4	2479.3	2028.9
12.5°	45998.2	44041.4	40340.7	34063.4	26757.0	19003.7	12052.7	7334.4	4364.6	2866.8	2199.5
10°	57857.4	55832.0	52080.9	46072.0	36190.7	26320.3	17185.9	10121.1	5567.1	3446.6	2469.0
7.5°	63953.9	62405.2	59865.2	54254.6	45353.2	33580.3	22706.6	13727.9	7552.5	4184.3	2731.2
5°	68300.8	66755.5	64052.3	59437.1	51686.6	39991.6	26961.9	16561.0	8983.3	4722.9	2925.2
2.5°	72833.0	70396.1	66954.6	62467.0	55593.3	43973.9	29422.9	17934.5	9679.8	5034.2	3038.5
0°	74713.7	73163.8	68742.0	64002.0	57424.2	45195.2	30458.3	18446.8	9996.9	5207.1	3104.9



REPORT NUMBER: P855605  
 CATALOG NUMBER: NHRS100U33BZ730-50%

**CANDELA DISTRIBUTION (continued):**

	27.5°	30°	32.5°	35°	37.5°	40°	42.5°	45°	47.5°	50°	52.5°
90°	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
87.5°	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
85°	1.7	1.7	2.3	2.3	2.3	2.9	2.9	2.9	2.3	2.3	1.7
82.5°	18.3	18.3	17.7	16.6	16.0	14.9	13.2	10.9	8.0	7.4	6.9
80°	64.7	60.7	56.7	52.1	46.9	41.8	38.9	36.6	33.8	30.3	26.3
77.5°	125.3	120.8	115.6	109.9	101.9	93.9	85.3	77.3	68.7	60.7	52.7
75°	182.0	176.3	170.6	162.5	154.5	144.8	134.5	123.1	111.0	100.2	88.7
72.5°	235.2	225.5	216.9	210.6	204.3	195.2	184.3	171.1	156.8	141.9	126.5
70°	305.6	293.6	281.6	270.1	259.3	246.7	235.2	220.9	204.3	185.4	167.1
67.5°	384.6	369.2	353.1	339.4	324.5	309.6	293.6	274.1	253.5	232.9	211.2
65°	467.6	449.9	429.8	412.7	396.1	377.7	356.6	332.5	309.1	283.9	260.4
62.5°	548.3	529.4	509.4	488.8	467.6	446.4	427.5	396.6	367.4	337.7	308.5
60°	625.6	605.5	586.1	560.3	536.3	511.1	485.3	458.4	428.7	394.9	360.0
57.5°	704.0	679.4	655.9	630.7	603.2	574.6	546.0	516.8	485.3	451.6	413.2
55°	787.0	760.1	732.0	702.2	671.9	639.3	605.0	572.3	539.7	503.7	464.2
52.5°	874.5	843.6	810.4	780.1	741.7	703.4	663.9	626.7	590.1	552.9	512.2
50°	956.9	924.3	888.3	850.5	811.6	766.4	721.7	678.8	638.7	597.5	556.3
47.5°	1029.6	998.7	964.4	923.2	880.8	828.2	778.4	730.9	683.9	639.3	595.8
45°	1090.3	1064.0	1029.6	992.4	942.6	889.4	835.6	780.7	729.1	679.4	633.0
42.5°	1138.4	1116.0	1085.7	1049.7	1002.2	948.9	891.7	832.7	773.2	719.4	667.9
40°	1176.7	1156.7	1133.8	1096.0	1057.7	1002.2	944.3	882.5	819.0	757.8	701.7
37.5°	1205.3	1188.2	1166.4	1135.5	1096.0	1054.2	993.6	930.0	865.9	796.1	735.4
35°	1228.8	1212.2	1191.6	1166.4	1130.9	1088.6	1039.4	974.7	905.4	834.5	768.6
32.5°	1251.7	1232.8	1213.3	1189.9	1160.1	1122.9	1076.0	1017.0	946.1	871.7	799.0
30°	1275.7	1252.8	1231.7	1211.6	1183.6	1149.8	1108.0	1054.8	984.4	908.3	830.5
27.5°	1315.8	1274.6	1249.4	1227.1	1203.6	1173.3	1133.8	1084.0	1020.5	943.2	861.4
25°	1373.6	1310.1	1267.7	1243.1	1219.1	1190.4	1156.1	1111.5	1051.9	974.7	891.1
22.5°	1441.7	1356.4	1296.9	1258.6	1232.8	1206.5	1175.0	1132.1	1075.4	1003.3	919.2
20°	1540.1	1413.7	1326.1	1276.3	1246.5	1219.6	1189.9	1151.0	1096.6	1029.6	944.3
17.5°	1636.9	1482.3	1370.7	1299.2	1258.6	1231.1	1203.0	1171.6	1114.9	1050.8	966.7
15°	1750.2	1555.6	1413.1	1319.2	1269.4	1241.4	1213.3	1181.3	1132.1	1068.5	986.7
12.5°	1849.8	1624.8	1459.4	1349.0	1285.5	1250.5	1223.1	1192.2	1147.5	1085.1	1003.9
10°	1986.0	1700.4	1506.9	1377.6	1300.3	1259.1	1231.1	1201.3	1160.7	1099.4	1018.2
7.5°	2101.6	1765.1	1548.7	1401.6	1313.5	1266.6	1238.0	1209.3	1171.0	1112.0	1030.2
5°	2206.9	1817.1	1580.2	1420.0	1324.4	1272.3	1243.7	1215.6	1179.6	1122.3	1039.4
2.5°	2284.2	1861.8	1607.7	1436.0	1333.0	1279.2	1250.0	1223.1	1187.6	1130.9	1048.5
0°	2295.0	1872.7	1614.5	1441.7	1335.8	1283.7	1254.5	1227.6	1191.6	1133.8	1050.2





REPORT NUMBER: P855605  
 CATALOG NUMBER: NHRS100U33BZ730-50%

**CANDELA DISTRIBUTION (continued):**

	55°	57.5°	60°	62.5°	65°	67.5°	70°	72.5°	75°	77.5°	80°
90°	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
87.5°	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.6	0.6	0.0	0.0
85°	1.1	1.1	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
82.5°	6.9	6.3	5.7	5.2	4.0	2.9	1.1	1.1	1.1	0.6	0.6
80°	21.7	16.6	11.4	10.9	9.7	8.0	5.7	4.0	1.7	1.1	1.1
77.5°	46.9	40.1	33.2	26.3	18.3	13.2	10.9	8.0	5.2	2.3	1.1
75°	78.4	67.0	56.7	46.9	37.2	26.9	16.6	12.6	9.2	5.7	1.7
72.5°	113.9	99.6	85.8	71.0	56.1	44.1	32.1	18.9	13.2	9.2	4.6
70°	151.1	133.9	116.8	99.6	81.3	61.2	46.9	32.6	17.7	12.6	7.4
67.5°	190.6	171.1	151.1	129.3	108.2	85.8	62.4	45.8	29.2	15.5	10.3
65°	234.1	210.0	186.0	162.0	135.6	110.5	84.7	59.0	40.1	21.7	12.6
62.5°	278.7	250.7	222.6	194.0	164.8	135.1	106.5	76.7	50.9	30.9	15.5
60°	326.8	293.0	259.8	227.2	193.4	160.8	128.2	96.2	63.0	39.5	18.3
57.5°	374.3	336.5	298.8	259.8	222.6	186.6	150.5	114.5	76.7	47.5	24.6
55°	422.4	379.5	338.2	292.5	250.7	211.2	172.3	134.5	91.6	56.1	30.9
52.5°	468.2	423.0	376.0	326.2	280.4	235.2	194.0	150.5	106.5	64.1	37.2
50°	512.2	464.2	412.7	358.9	306.8	258.7	214.6	168.3	120.2	76.1	42.9
47.5°	552.9	503.7	448.7	391.5	335.4	281.0	234.1	185.4	133.9	87.0	48.6
45°	587.2	540.3	481.9	423.0	362.3	305.1	252.4	202.0	148.2	97.3	54.4
42.5°	619.8	569.5	513.4	456.7	389.2	327.9	269.0	216.9	161.4	107.6	59.5
40°	649.0	596.4	543.1	480.2	415.5	350.3	286.2	231.2	174.6	116.8	65.8
37.5°	677.1	621.6	566.6	505.9	440.7	370.3	303.9	244.4	187.2	125.9	72.7
35°	704.0	645.6	588.4	529.4	463.6	390.9	320.5	256.4	199.2	135.1	79.6
32.5°	730.3	667.9	610.7	549.4	482.5	409.8	336.0	267.9	209.5	144.2	85.8
30°	754.9	689.7	628.4	567.2	500.8	427.5	350.8	279.3	218.6	152.8	91.6
27.5°	781.2	710.3	645.6	583.2	517.4	443.6	364.6	290.7	227.2	160.8	97.3
25°	807.0	728.6	662.2	598.1	532.8	457.9	377.2	301.6	234.7	168.3	102.4
22.5°	830.5	746.9	677.1	611.8	544.9	469.9	389.2	310.8	241.5	175.1	107.0
20°	852.8	765.8	691.9	623.8	555.7	481.3	400.1	319.4	247.8	182.0	111.6
17.5°	873.9	783.5	705.1	634.7	565.5	491.1	409.2	326.8	253.5	187.7	115.0
15°	892.3	799.0	716.6	643.9	574.0	499.1	416.7	333.1	258.7	193.4	118.5
12.5°	908.3	812.1	726.3	651.3	580.9	505.9	424.1	339.4	262.7	198.0	121.3
10°	921.5	822.4	734.3	657.6	586.6	512.8	429.8	344.5	266.1	202.0	123.6
7.5°	931.8	830.5	741.2	663.3	591.8	518.0	435.0	348.0	269.0	204.9	127.1
5°	940.3	837.9	746.3	667.3	595.8	524.8	440.7	353.1	272.4	208.9	127.6
2.5°	947.8	843.6	750.9	670.8	599.2	524.8	440.7	353.1	272.4	209.5	127.6
0°	948.4	844.8	751.5	671.3	599.2	524.8	440.7	353.1	272.4	210.0	127.6



REPORT NUMBER: P855605  
 CATALOG NUMBER: NHRS100U33BZ730-50%

**CANDELA DISTRIBUTION (continued):**

	82.5°	85°	87.5°	90°
90°	0.0	0.0	0.0	0.0
87.5°	0.0	0.0	0.0	0.0
85°	0.6	0.6	0.0	0.0
82.5°	0.6	0.6	0.0	0.0
80°	0.6	0.6	0.6	0.0
77.5°	1.1	0.6	0.6	0.0
75°	1.1	1.1	0.6	0.0
72.5°	1.7	1.1	0.6	0.0
70°	1.7	1.1	0.6	0.0
67.5°	4.0	1.1	0.6	0.0
65°	6.3	1.7	0.6	0.0
62.5°	8.0	1.7	1.1	0.0
60°	10.3	1.7	1.1	0.0
57.5°	12.0	2.9	1.1	0.0
55°	14.3	4.6	1.1	0.0
52.5°	16.0	5.7	1.1	0.0
50°	17.7	6.9	1.1	0.0
47.5°	20.0	8.0	1.1	0.0
45°	24.6	9.2	1.7	0.0
42.5°	28.0	10.3	1.7	0.0
40°	32.1	11.4	1.7	0.0
37.5°	35.5	12.6	1.7	0.0
35°	38.9	13.7	1.7	0.0
32.5°	42.4	14.3	1.7	0.0
30°	45.8	15.5	1.7	0.0
27.5°	48.6	16.0	1.7	0.0
25°	50.9	17.2	1.7	0.0
22.5°	53.8	17.7	2.3	0.0
20°	56.1	18.3	2.3	0.0
17.5°	58.4	18.9	2.3	0.0
15°	60.1	19.5	2.3	0.0
12.5°	61.8	20.0	2.3	0.0
10°	63.0	20.6	2.3	0.0
7.5°	65.2	21.2	2.3	0.0
5°	65.8	21.2	2.3	0.0
2.5°	65.8	21.2	2.3	0.0
0°	66.4	21.2	2.3	0.0

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

LUMARK

Report Number: SP1-2401-297-3

Test Date: 02/27/2024

Luminaire Tested: NHRS100U33BZ730

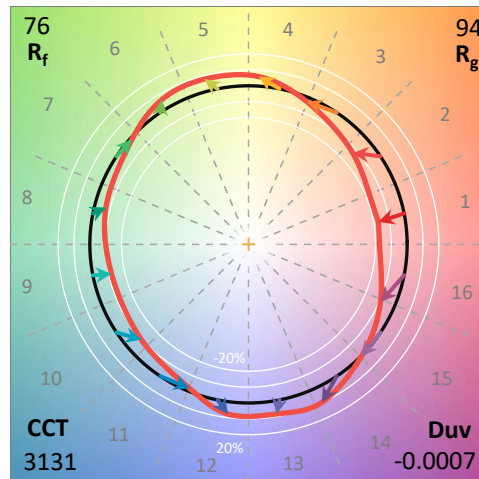
Data in this report applies to families of products NHRS100U33BZ730.

**Test Information**

Test Method: LM-79-2019  
 Report Number: SP1-2401-297-3  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1 - 76IN SPHERE  
 Measurement Geometry: 4π  
 Issue Date: 02/29/2024  
 Manufacturer: COOPER LIGHTING SOLUTIONS  
 Product Line: LUMARK  
 Catalog Number: **NHRS100U33BZ730**  
 Description: LUMARK NIGHT HARRIER 4 PANEL FLOOD SELECTABLE CCT NEMA 3 AT 3000K.

**Spectral Parameters**

CCT (K):	3131	CRI (Ra):	72.3	R9:	-36.4
CIE u':	0.2464	R1:	68.1	R10:	62.9
CIE v':	0.5177	R2:	83.3	R11:	63.5
Duv:	-0.0007	R3:	94.4	R12:	56.6
CIE x:	0.4269	R4:	67.8	R13:	71.1
CIE y:	0.3987	R5:	68.5	R14:	97.2
CIE z:	0.1745	R6:	77.6		
Peak Wavelength (nm):	591	R7:	76.5		
Dominant Wavelength (nm):	582	R8:	42.1		
Purity:	48.1				
Rf:	76.2				
Rg:	93.8				



**Test Conditions**

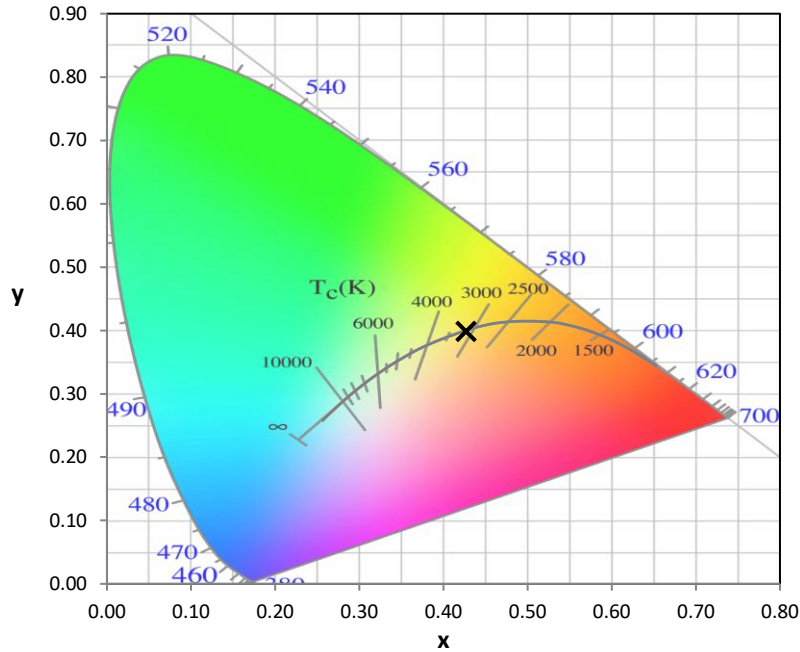
Stabilization Time: 15M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 25.9/30%  
 Sphere Temperature (°C): 25.0

REPORT NUMBER: SP1-2401-297-3

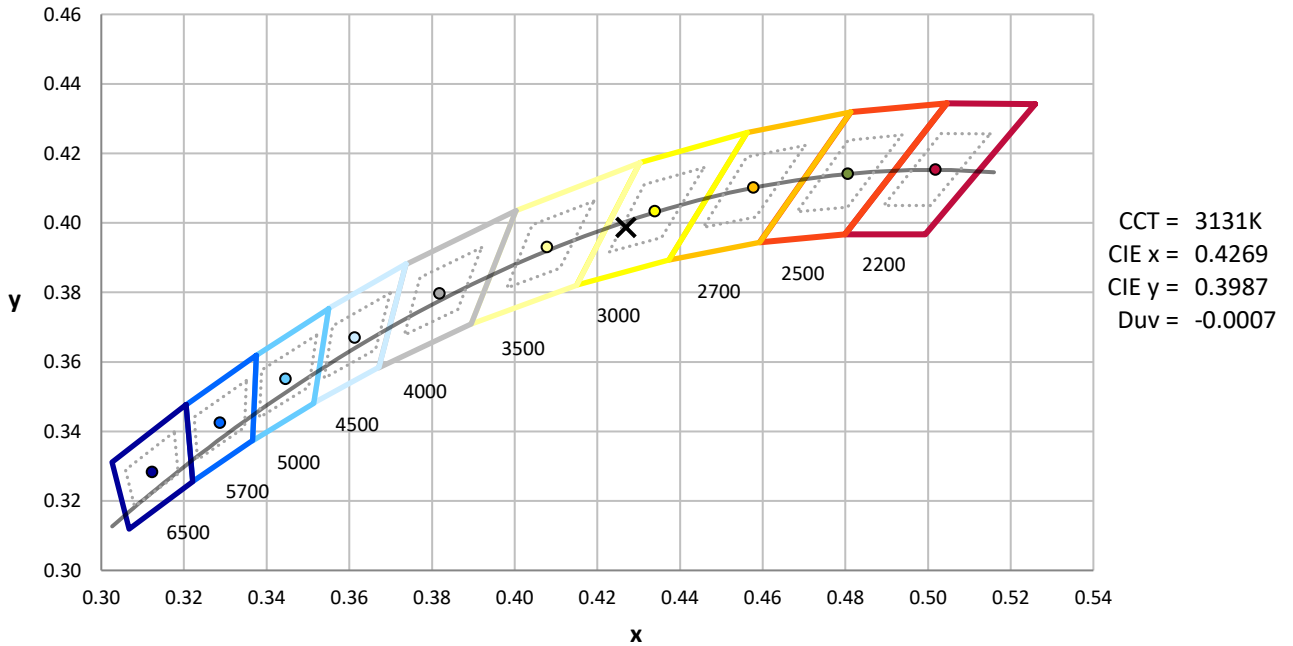
Measurement and Test Equipment			
Instrument	Identification Number	Calibration Date	Calibration Due Date
Photometer	76INCH SPHERE IN0058	2/12/2024	8/12/2024
Power Meter	XITRON 2801 IN0071	10/23/2023	10/23/2024
AC Power Source	CHROMA 61603 IN0063	10/24/2023	10/24/2024
DC Power Source	AGILENT E3634A IN0208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

REPORT NUMBER: SP1-2401-297-3

CIE 1931 Chromaticity Diagram



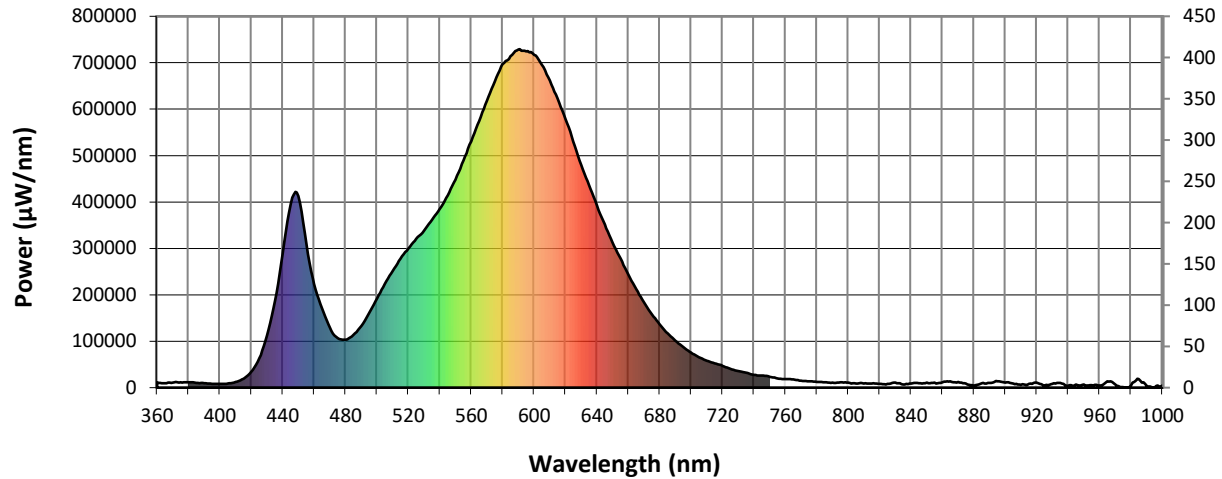
CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles



Point lies inside the ANSI 3000K 4-step quadrangle

REPORT NUMBER: SP1-2401-297-3

**Photopic Flux vs. Wavelength**

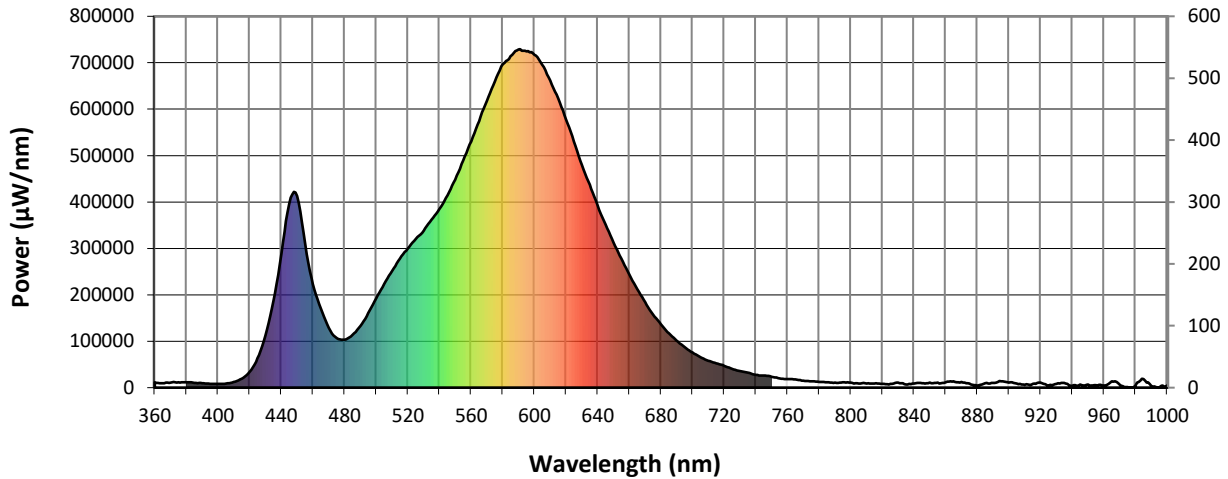


#####

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	11469	NR	490	133149	NR	620	578434	NR	750	23432	NR	880	4199	NR
365	9242	NR	495	160241	NR	625	530256	NR	755	19843	NR	885	9337	NR
370	11055	NR	500	192518	NR	630	479996	NR	760	18460	NR	890	10260	NR
375	11241	NR	505	222970	NR	635	436965	NR	765	17681	NR	895	13936	NR
380	11718	NR	510	251571	NR	640	392620	NR	770	15102	NR	900	10944	NR
385	10233	NR	515	277673	NR	645	351407	NR	775	13960	NR	905	8516	NR
390	9469	NR	520	299564	NR	650	311990	NR	780	11982	NR	910	6320	NR
395	8062	NR	525	320235	NR	655	278386	NR	785	11243	NR	915	8217	NR
400	7798	NR	530	338602	NR	660	243894	NR	790	10923	NR	920	10653	NR
405	8815	NR	535	361670	NR	665	212455	NR	795	11547	NR	925	4338	NR
410	12172	NR	540	385451	NR	670	183820	NR	800	11181	NR	930	8308	NR
415	19281	NR	545	414431	NR	675	157491	NR	805	9022	NR	935	9954	NR
420	34222	NR	550	448308	NR	680	136596	NR	810	8791	NR	940	4213	NR
425	63439	NR	555	489210	NR	685	116897	NR	815	8709	NR	945	6970	NR
430	112521	NR	560	529752	NR	690	101533	NR	820	8124	NR	950	6443	NR
435	186967	NR	565	574034	NR	695	87230	NR	825	7840	NR	955	5056	NR
440	288650	NR	570	617485	NR	700	75371	NR	830	10813	NR	960	4756	NR
445	394662	NR	575	659293	NR	705	65590	NR	835	6774	NR	965	13739	NR
450	412771	NR	580	696594	NR	710	57682	NR	840	8739	NR	970	7078	NR
455	310442	NR	585	714067	NR	715	52510	NR	845	9355	NR	975	1213	NR
460	223142	NR	590	728439	NR	720	46735	NR	850	10614	NR	980	4908	NR
465	170716	NR	595	724681	NR	725	40444	NR	855	10769	NR	985	18220	NR
470	128574	NR	600	716946	NR	730	35477	NR	860	11720	NR	990	3745	NR
475	106696	NR	605	695567	NR	735	32224	NR	865	13675	NR	995	159	NR
480	103334	NR	610	661571	NR	740	27536	NR	870	12199	NR	1000	4889	NR
485	113474	NR	615	622861	NR	745	26118	NR	875	8741	NR			

REPORT NUMBER: SP1-2401-297-3

Scotopic Flux vs. Wavelength



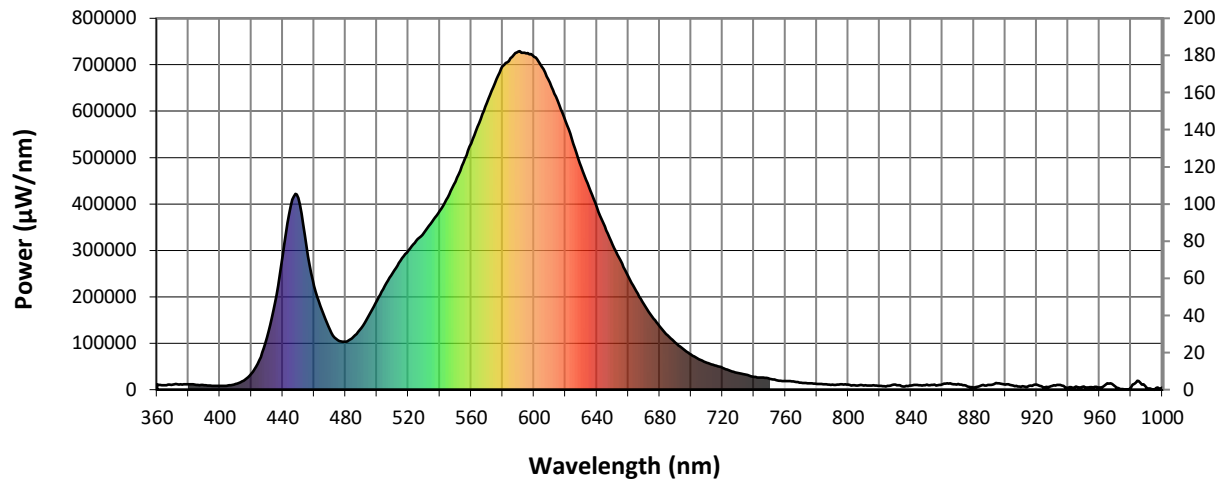
Scotopic Lumens: 45261.1 S/P: 1.29

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	11469	NR	490	133149	NR	620	578434	NR	750	23432	NR	880	4199	NR
365	9242	NR	495	160241	NR	625	530256	NR	755	19843	NR	885	9337	NR
370	11055	NR	500	192518	NR	630	479996	NR	760	18460	NR	890	10260	NR
375	11241	NR	505	222970	NR	635	436965	NR	765	17681	NR	895	13936	NR
380	11718	NR	510	251571	NR	640	392620	NR	770	15102	NR	900	10944	NR
385	10233	NR	515	277673	NR	645	351407	NR	775	13960	NR	905	8516	NR
390	9469	NR	520	299564	NR	650	311990	NR	780	11982	NR	910	6320	NR
395	8062	NR	525	320235	NR	655	278386	NR	785	11243	NR	915	8217	NR
400	7798	NR	530	338602	NR	660	243894	NR	790	10923	NR	920	10653	NR
405	8815	NR	535	361670	NR	665	212455	NR	795	11547	NR	925	4338	NR
410	12172	NR	540	385451	NR	670	183820	NR	800	11181	NR	930	8308	NR
415	19281	NR	545	414431	NR	675	157491	NR	805	9022	NR	935	9954	NR
420	34222	NR	550	448308	NR	680	136596	NR	810	8791	NR	940	4213	NR
425	63439	NR	555	489210	NR	685	116897	NR	815	8709	NR	945	6970	NR
430	112521	NR	560	529752	NR	690	101533	NR	820	8124	NR	950	6443	NR
435	186967	NR	565	574034	NR	695	87230	NR	825	7840	NR	955	5056	NR
440	288650	NR	570	617485	NR	700	75371	NR	830	10813	NR	960	4756	NR
445	394662	NR	575	659293	NR	705	65590	NR	835	6774	NR	965	13739	NR
450	412771	NR	580	696594	NR	710	57682	NR	840	8739	NR	970	7078	NR
455	310442	NR	585	714067	NR	715	52510	NR	845	9355	NR	975	1213	NR
460	223142	NR	590	728439	NR	720	46735	NR	850	10614	NR	980	4908	NR
465	170716	NR	595	724681	NR	725	40444	NR	855	10769	NR	985	18220	NR
470	128574	NR	600	716946	NR	730	35477	NR	860	11720	NR	990	3745	NR
475	106696	NR	605	695567	NR	735	32224	NR	865	13675	NR	995	159	NR
480	103334	NR	610	661571	NR	740	27536	NR	870	12199	NR	1000	4889	NR
485	113474	NR	615	622861	NR	745	26118	NR	875	8741	NR			



REPORT NUMBER: SP1-2401-297-3

**Melanopic Flux vs. Wavelength**



**Melanopic Lumens: 16889.5 M/P: 0.48**

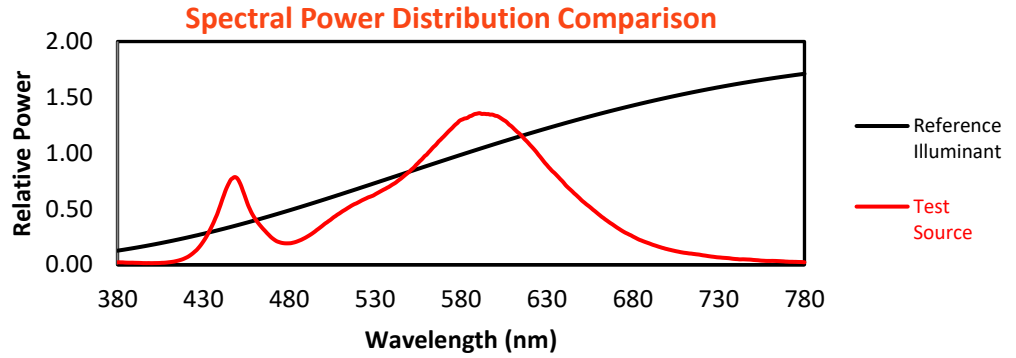
λ (nm)	Power (µW/nm)	Lumens (φ/nm)	λ (nm)	Power (µW/nm)	Lumens (φ/nm)	λ (nm)	Power (µW/nm)	Lumens (φ/nm)	λ (nm)	Power (µW/nm)	Lumens (φ/nm)	λ (nm)	Power (µW/nm)	Lumens (φ/nm)
360	11469	NR	490	133149	NR	620	578434	NR	750	23432	NR	880	4199	NR
365	9242	NR	495	160241	NR	625	530256	NR	755	19843	NR	885	9337	NR
370	11055	NR	500	192518	NR	630	479996	NR	760	18460	NR	890	10260	NR
375	11241	NR	505	222970	NR	635	436965	NR	765	17681	NR	895	13936	NR
380	11718	NR	510	251571	NR	640	392620	NR	770	15102	NR	900	10944	NR
385	10233	NR	515	277673	NR	645	351407	NR	775	13960	NR	905	8516	NR
390	9469	NR	520	299564	NR	650	311990	NR	780	11982	NR	910	6320	NR
395	8062	NR	525	320235	NR	655	278386	NR	785	11243	NR	915	8217	NR
400	7798	NR	530	338602	NR	660	243894	NR	790	10923	NR	920	10653	NR
405	8815	NR	535	361670	NR	665	212455	NR	795	11547	NR	925	4338	NR
410	12172	NR	540	385451	NR	670	183820	NR	800	11181	NR	930	8308	NR
415	19281	NR	545	414431	NR	675	157491	NR	805	9022	NR	935	9954	NR
420	34222	NR	550	448308	NR	680	136596	NR	810	8791	NR	940	4213	NR
425	63439	NR	555	489210	NR	685	116897	NR	815	8709	NR	945	6970	NR
430	112521	NR	560	529752	NR	690	101533	NR	820	8124	NR	950	6443	NR
435	186967	NR	565	574034	NR	695	87230	NR	825	7840	NR	955	5056	NR
440	288650	NR	570	617485	NR	700	75371	NR	830	10813	NR	960	4756	NR
445	394662	NR	575	659293	NR	705	65590	NR	835	6774	NR	965	13739	NR
450	412771	NR	580	696594	NR	710	57682	NR	840	8739	NR	970	7078	NR
455	310442	NR	585	714067	NR	715	52510	NR	845	9355	NR	975	1213	NR
460	223142	NR	590	728439	NR	720	46735	NR	850	10614	NR	980	4908	NR
465	170716	NR	595	724681	NR	725	40444	NR	855	10769	NR	985	18220	NR
470	128574	NR	600	716946	NR	730	35477	NR	860	11720	NR	990	3745	NR
475	106696	NR	605	695567	NR	735	32224	NR	865	13675	NR	995	159	NR
480	103334	NR	610	661571	NR	740	27536	NR	870	12199	NR	1000	4889	NR
485	113474	NR	615	622861	NR	745	26118	NR	875	8741	NR			

REPORT NUMBER: SP1-2401-297-3

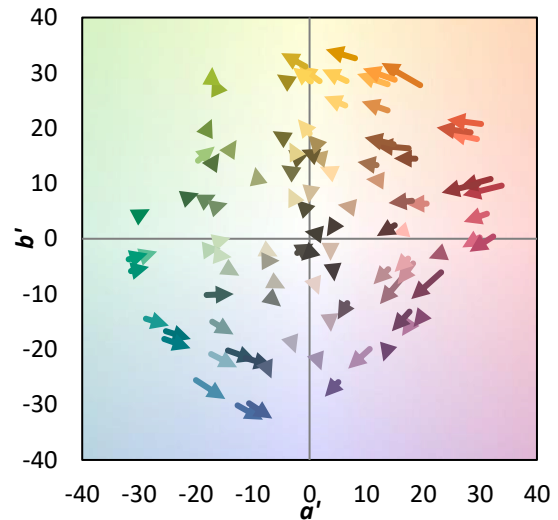
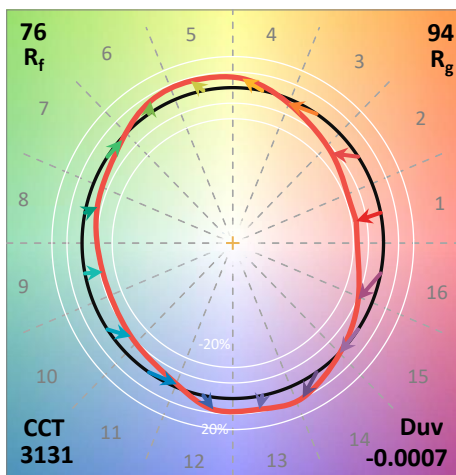
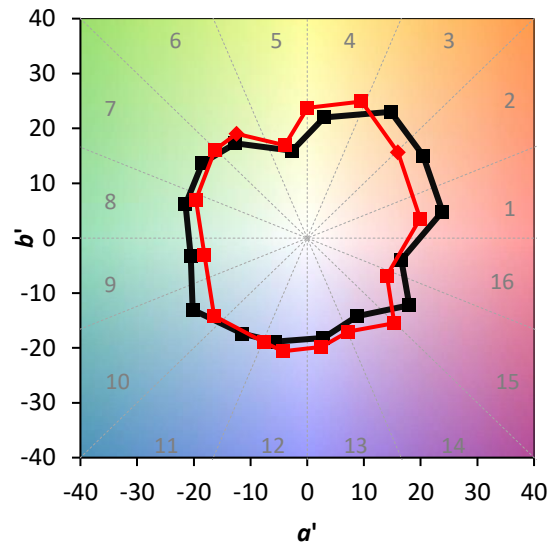
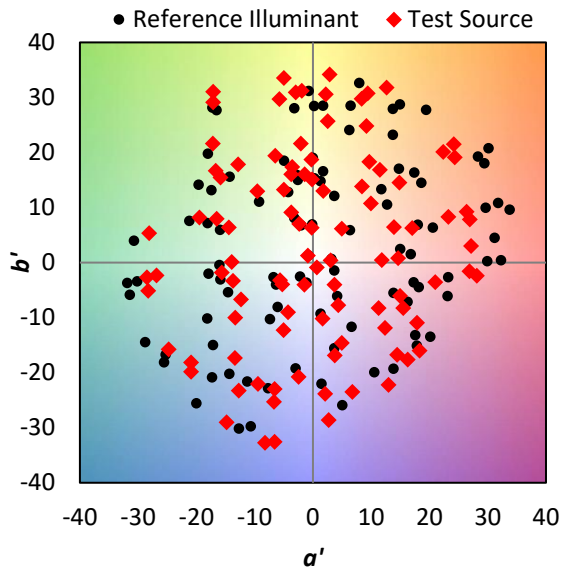
TM-30-18

**Summary**

$R_f = 76.2$   
 $R_g = 93.8$   
 CIE  $R_a = 72.3$   
 $R_g = -36.4$



**Color Vector Graphics**

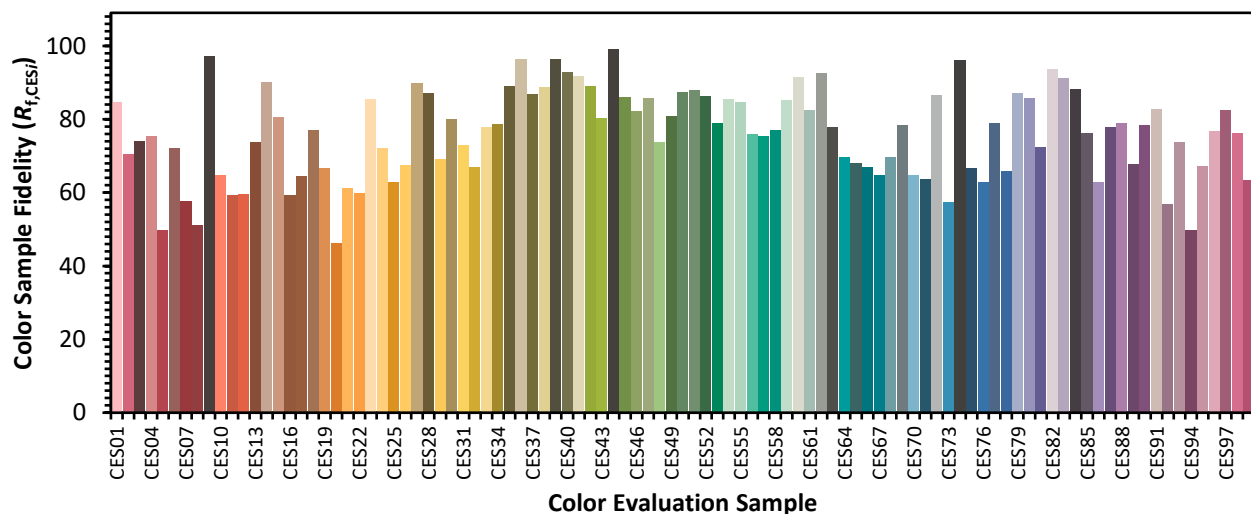


REPORT NUMBER: SP1-2401-297-3

TM-30-18

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

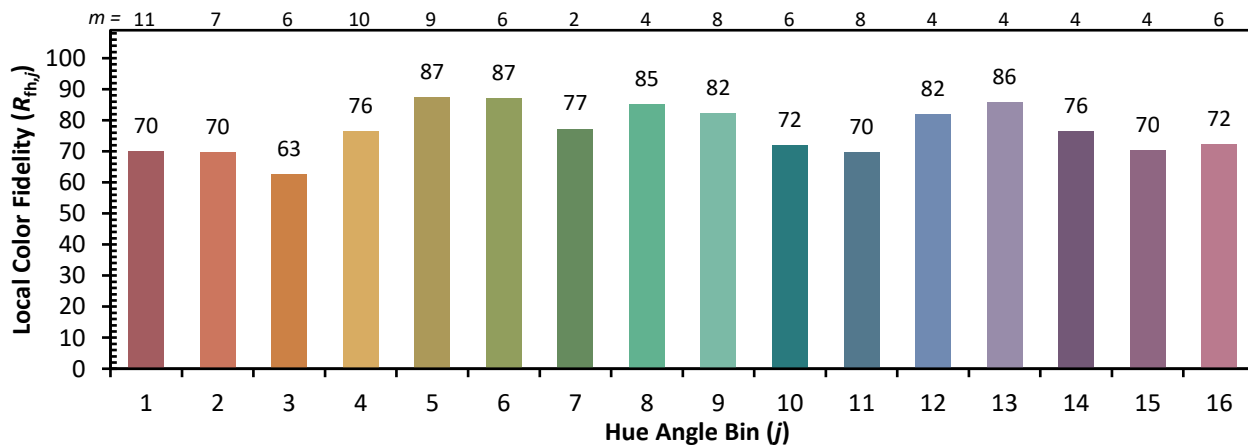
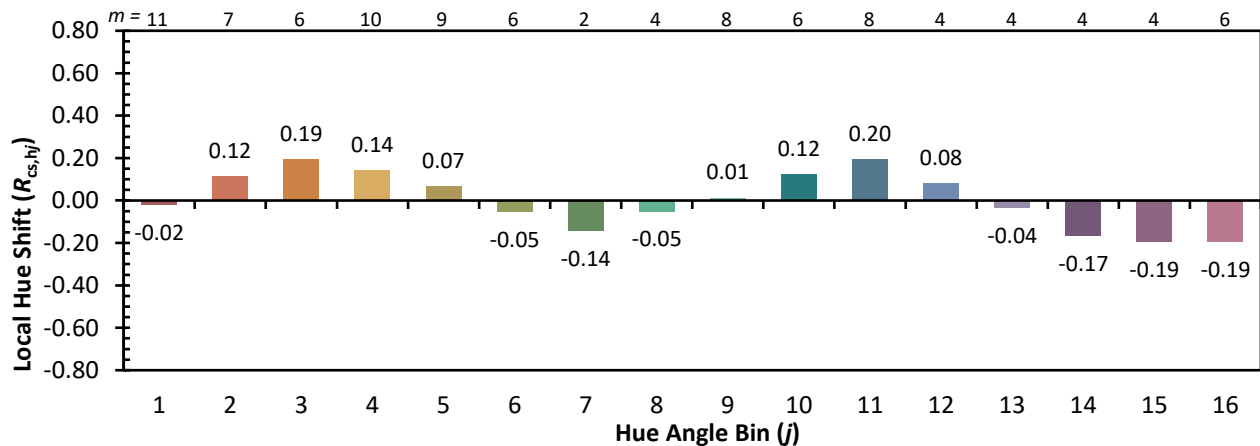
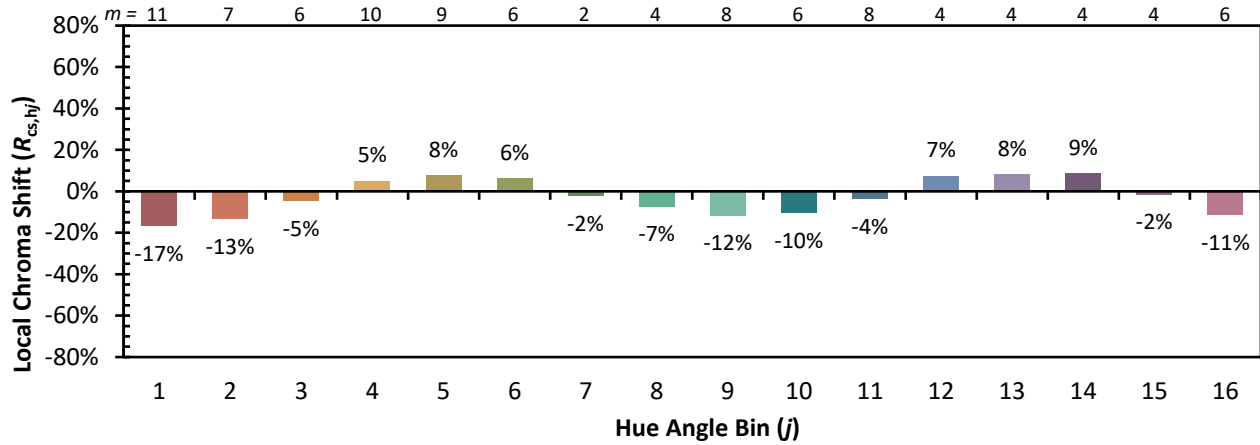
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CES03 = 31	CES28 = 87	CES53 = 79	CES78 = 66
CES04 = 71	CES29 = 69	CES54 = 85	CES79 = 87
CES05 = 49	CES30 = 80	CES55 = 85	CES80 = 86
CES06 = 51	CES31 = 73	CES56 = 76	CES81 = 72
CES07 = 41	CES32 = 67	CES57 = 75	CES82 = 94
CES08 = 40	CES33 = 78	CES58 = 77	CES83 = 91
CES09 = 29	CES34 = 79	CES59 = 85	CES84 = 88
CES10 = 76	CES35 = 89	CES60 = 92	CES85 = 76
CES11 = 59	CES36 = 96	CES61 = 83	CES86 = 63
CES12 = 65	CES37 = 87	CES62 = 92	CES87 = 78
CES13 = 43	CES38 = 89	CES63 = 78	CES88 = 79
CES14 = 74	CES39 = 96	CES64 = 70	CES89 = 68
CES15 = 71	CES40 = 93	CES65 = 68	CES90 = 78
CES16 = 47	CES41 = 92	CES66 = 67	CES91 = 83
CES17 = 50	CES42 = 89	CES67 = 65	CES92 = 57
CES18 = 56	CES43 = 80	CES68 = 70	CES93 = 74
CES19 = 73	CES44 = 99	CES69 = 79	CES94 = 50
CES20 = 66	CES45 = 86	CES70 = 65	CES95 = 67
CES21 = 87	CES46 = 82	CES71 = 64	CES96 = 77
CES22 = 79	CES47 = 86	CES72 = 87	CES97 = 83
CES23 = 92	CES48 = 74	CES73 = 57	CES98 = 76
CES24 = 91	CES49 = 81	CES74 = 96	CES99 = 63
CES25 = 72	CES50 = 87	CES75 = 67	



REPORT NUMBER: SP1-2401-297-3

TM-30-18

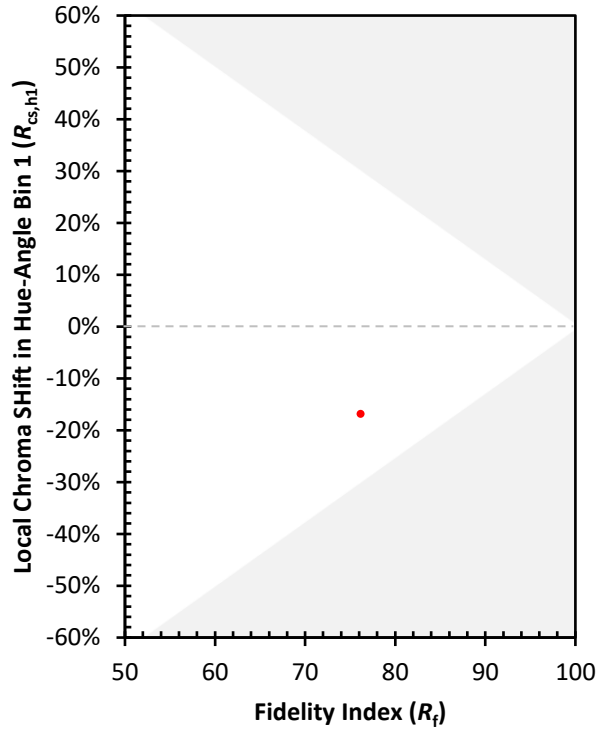
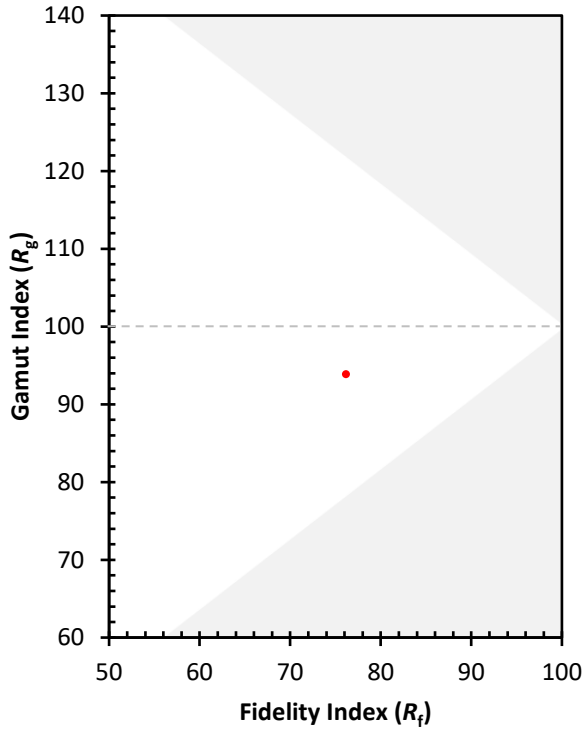
Color Rendition by Hue-Angle Bin



REPORT NUMBER: SP1-2401-297-3

TM-30-18

Measure Comparisons



(END OF REPORT)