



## **FUZE PENDANT™**

Photometric Test Report

40° Lens

69° Field Angle

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# TESTING PROCESS

## Introduction

Elation operates an optical testing laboratory at its Los Angeles, CA headquarters to provide accurate photometric data for its lighting products. The testing lab is both light and climate-controlled and contains a variety of precise lighting measurement systems. Fixtures are analyzed with the sophisticated [Viso Systems Lab Spion](#) equipment, which measures all light and color parameters by panning the light beam at a precise speed and from different angles through a calibrated, laser aligned light and color sensor. Test data is collected and summarized by the Viso Light Inspector software. This type of measurement system is referred to as a Goniophotometer.

The Viso software calculates all relevant types of measurements, from beam angles, candela to center light intensity at a variety of distances to the latest color quality measurements like TM30 or CQS as well as accurate color temperature. This wealth of data is then processed by an Elation specific template which is included in the photometric test report for various fixture conditions such as zoom angles and color correction filters.

The Viso software also creates IES (Illuminating Engineering Society) files for each test report. IES is an industry standard file format created for the easy electronic transfer of photometric test data, which is widely used by lighting manufacturers for photometric data distribution.

Additionally, fixtures are periodically rechecked for accuracy using various hand-held light meters including one or more of the devices listed below. This is done to ensure the test data contained in this report is as accurate as possible.

[Asenstek Lighting Passport](#)

[Konica Minolta T-10](#)

[Sekonic C700](#)

## Total Lumen Measurements

Lumens are measured using a Viso Systems Lab Spion. As a goniophotometer, the Viso calculates the field lumens of the fixture by taking multiple measurements across the light beam.

Many lumens figures provided for entertainment lighting fixtures are only the  $2\pi$  sphere values, some even emphasize the LED engine lumens. All Elation product photometric data is the actual light output from the fixture lens, never a theoretical value based on calculation or using the source lumens as the fixtures output. We advise to always compare total fixture lumens acquired with identical measurement systems when comparing lighting fixtures.

**Total Lumen Output: 10432 lm**

**Color Temperature: 6765 K**

**CRI: 72.3**

**TLCI: 80**

**TM30: 75.2**

**CQS: 84.3**

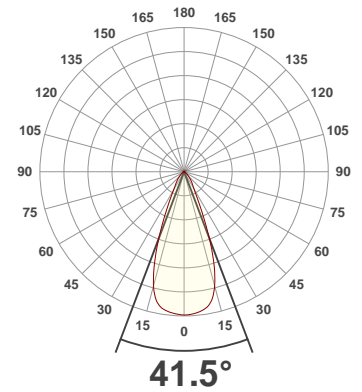
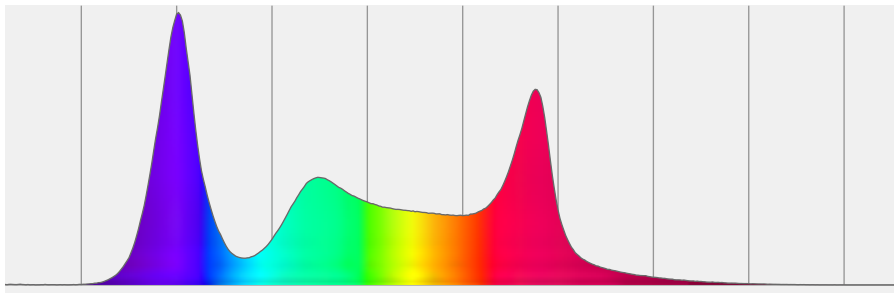
**Measurement Date: 3/11/2020**

**Voltage: 112 V, Current: 2.23 A**

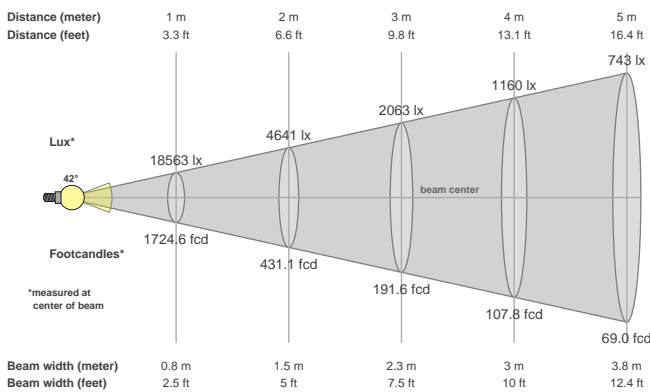
**Power: 246.2 W**

**Efficacy: 42 Lumen/Watt**

**Spectral distribution**  
Dominant Wavelength 360



**Beam details**



**Beam angles**

Beam angle 50%	Field angle 10%	Cutoff angle 2,5%
<b>41.5°</b>	<b>69.2°</b>	<b>102.5°</b>

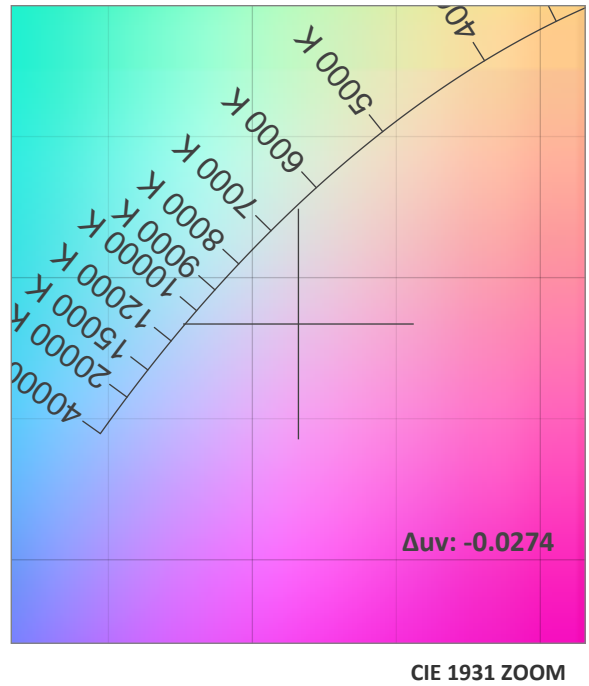
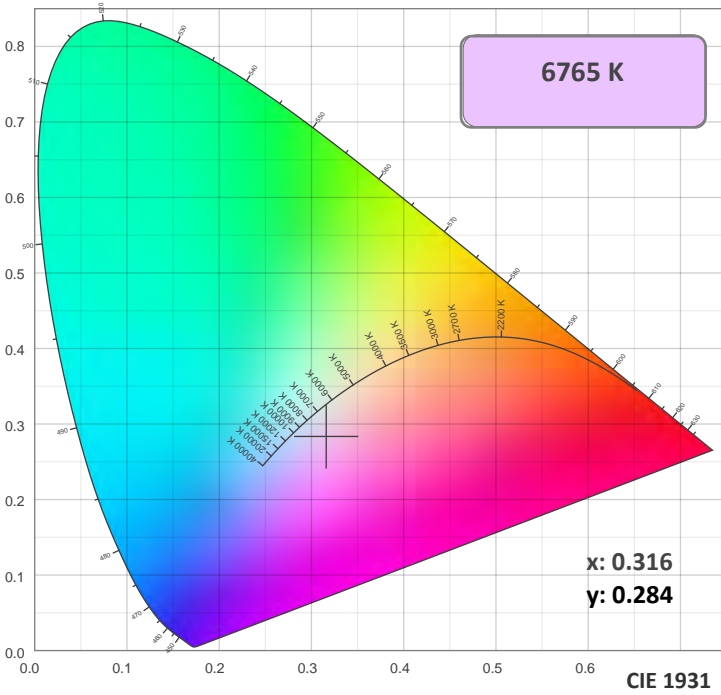
**Beam intensities**

Peak intensity	Int. ratio in 120° cone	Int. ratio in 90° cone
<b>18569 cd</b>	<b>99.1%</b>	<b>93.6%</b>

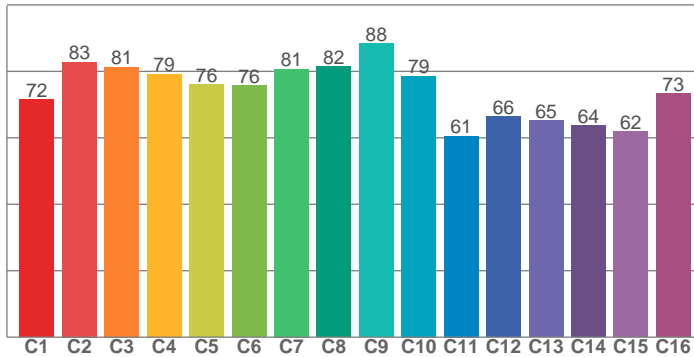
**Beam Intensities from 1-20m**

M	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
<b>FT</b>	3.3	6.6	9.8	13.1	16.4	19.7	23	26.2	29.5	32.8	36.1	39.4	42.7	45.9	49.2	52.5	55.8	59.1	62.3	65.6
<b>LX</b>	18563	4641	2063	1160	743	516	379	290	229	186	153	129	110	95	83	73	64	57	51	46
<b>FC</b>	1724.6	431.1	191.6	107.8	69	47.9	35.2	26.9	21.3	17.2	14.3	12	10.2	8.8	7.7	6.7	6	5.3	4.8	4.3

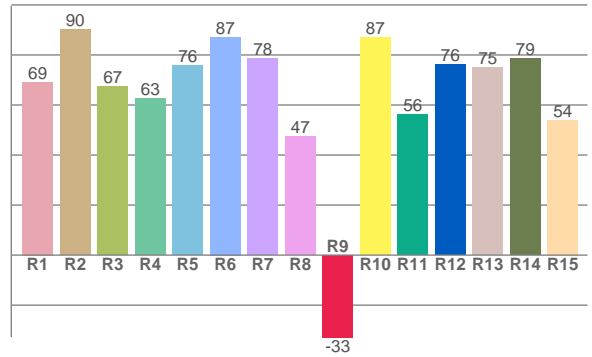
### Color Details



TM30: 75.2



CRI: 72.3 (R1-R8)



CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
69.2	90.2	67.4	62.7	75.7	87.2	78.5	47.5	-32.8	87.0	56.3	76.1	74.9	78.6	54.0

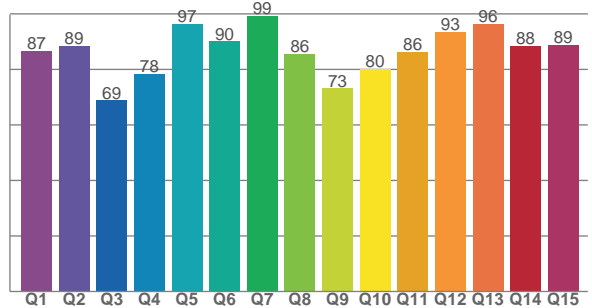
TM30 C Values, 16 binned values out of total of 99 C values

C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16
71.5	82.8	81.3	79.2	76.1	75.7	80.7	81.5	88.5	78.6	60.5	66.3	65.2	63.7	61.9	73.3

CQS Q Values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
86.6	88.5	68.8	78.4	96.5	90.1	99.2	85.7	73.2	80.2	86.3	93.5	96.3	88.5	88.8

CQS: 84.3



### Color Parameters

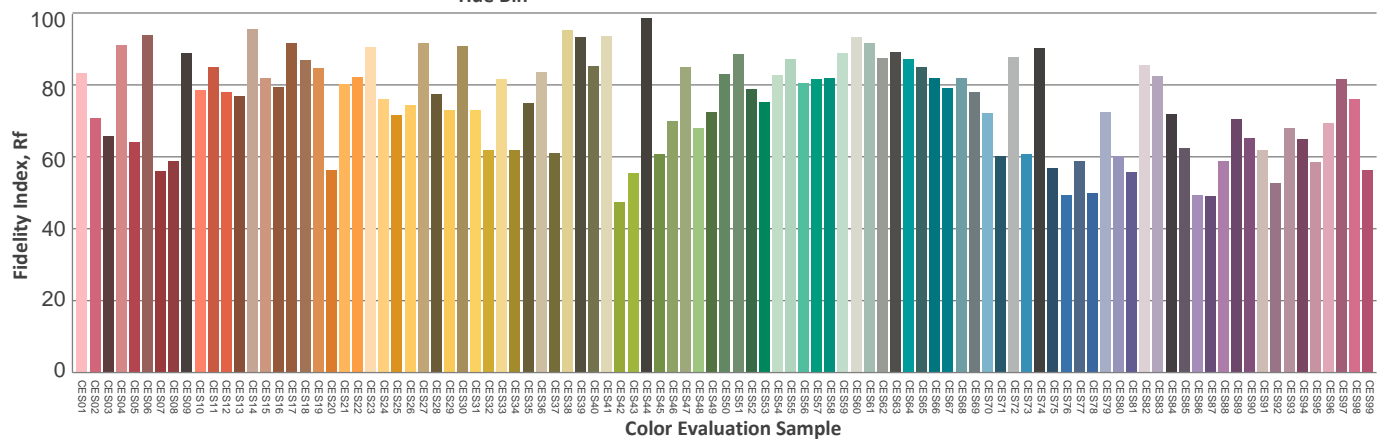
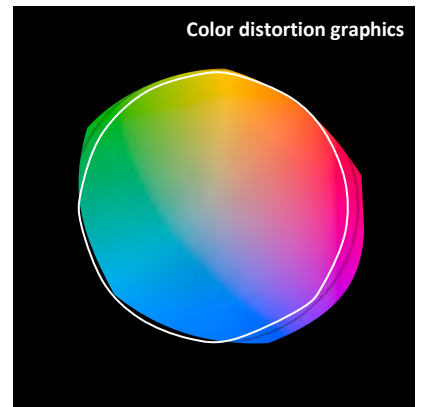
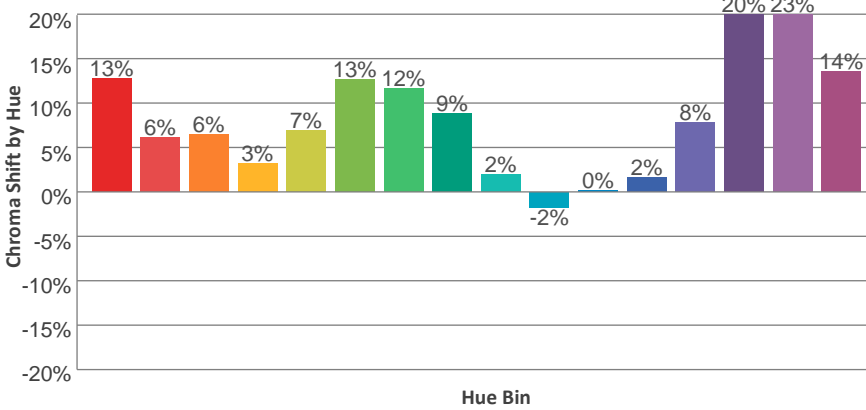
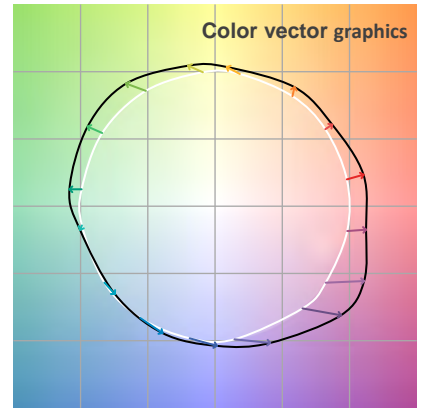
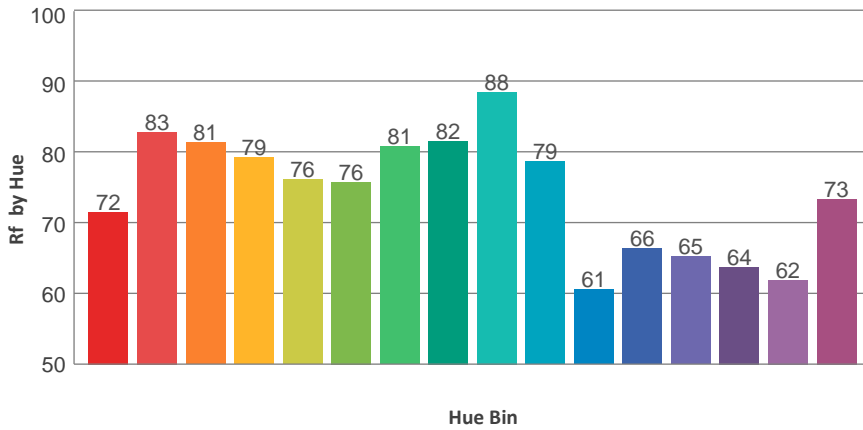
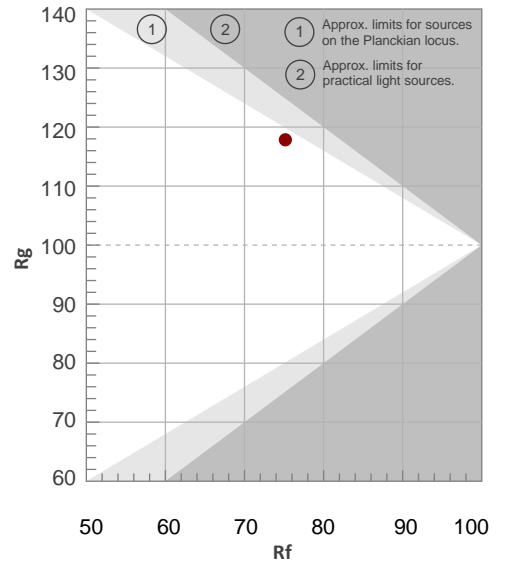
Color Temperature	Color Rendering Index	Red Component	Color Fidelity	Color Gamut	Color Quality Scale	Color Coordinate CIE 1931	Color Coordinate CIE 1931	Color Coordinate	Color Coordinate	Color Diviation from Black
CCT	CRI	CRI R9	TM30 Rf	TM30 Rg	CQS	x	y	u	v	Δuv
6765 K	72.3	-32.8	75.2	117.8	84.3	0.316	0.284	0.219	0.295	-0.0274

TM30 Details

**Rf 75.2**  
Fidelity Index Rf

**Rg 117.8**  
Gamut Index Rg

Hue Bin	R <sub>f</sub>	Graphic shifts (%)	
		Chroma	Hue
1	72	13%	1%
2	83	6%	0%
3	81	6%	2%
4	79	3%	11%
5	76	7%	10%
6	76	13%	9%
7	81	12%	2%
8	82	9%	2%
9	88	2%	3%
10	79	-2%	11%
11	61	0%	20%
12	66	2%	21%
13	65	8%	26%
14	64	20%	21%
15	62	23%	17%
16	73	14%	4%



**Total Lumen Output: 7559 lm**

**Color Temperature: 2650 K**

**CRI: 90.0**

**TLCI: 78**

**TM30: 87.1**

**CQS: 88.9**

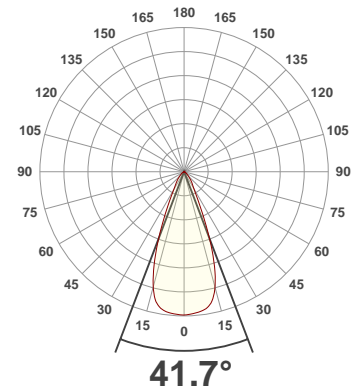
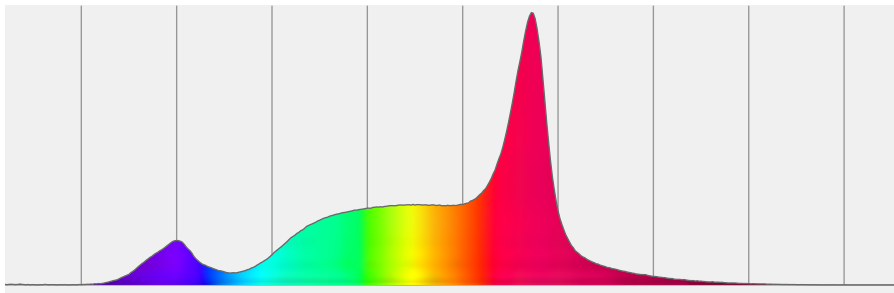
**Measurement Date: 3/11/2020**

**Voltage: 113 V, Current: 1.22 A**

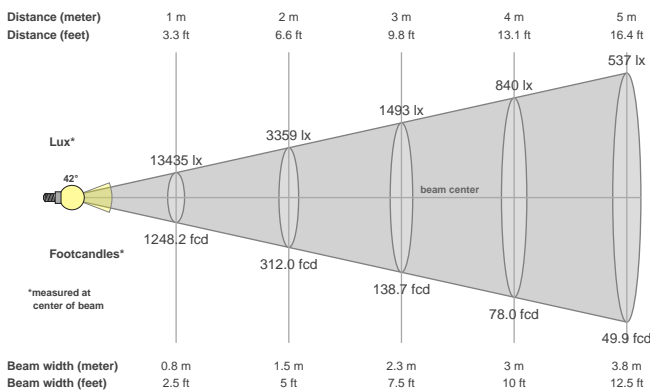
**Power: 134.3 W**

**Efficacy: 56 Lumen/Watt**

**Spectral distribution**  
Dominant Wavelength 586



**Beam details**



**Beam angles**

Beam angle 50%	Field angle 10%	Cutoff angle 2,5%
<b>41.7°</b>	<b>69°</b>	<b>101.8°</b>

**Beam intensities**

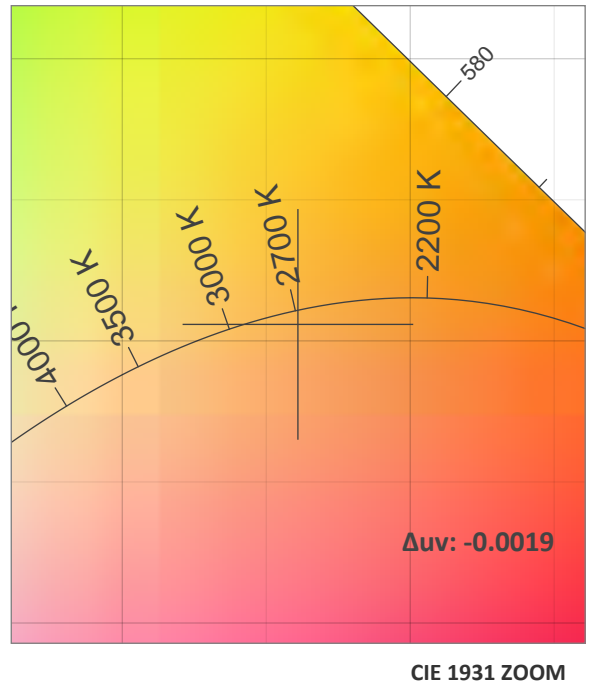
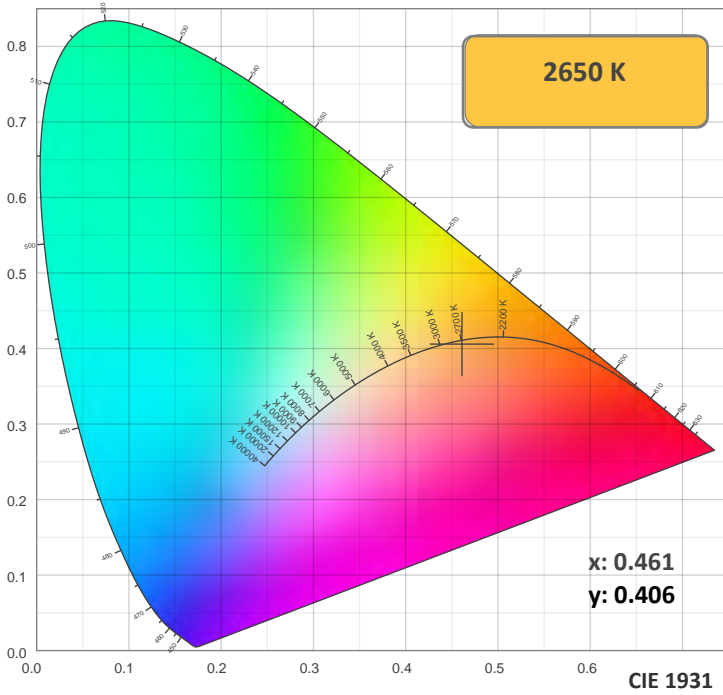
Peak intensity	Int. ratio in 120° cone	Int. ratio in 90° cone
<b>13442 cd</b>	<b>99.2%</b>	<b>93.9%</b>

**Beam Intensities from 1-20m**

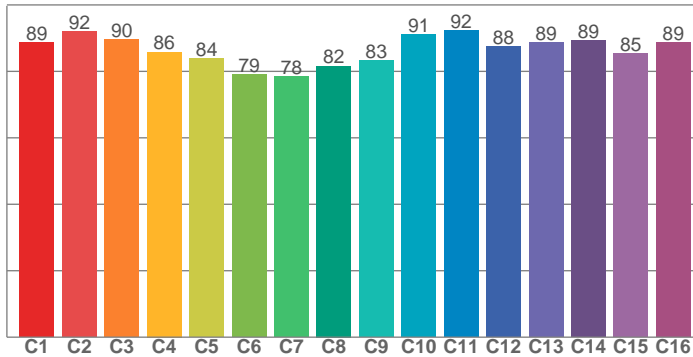
M	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
<b>FT</b>	3.3	6.6	9.8	13.1	16.4	19.7	23	26.2	29.5	32.8	36.1	39.4	42.7	45.9	49.2	52.5	55.8	59.1	62.3	65.6
<b>LX</b>	13435	3359	1493	840	537	373	274	210	166	134	111	93	79	69	60	52	46	41	37	34
<b>FC</b>	1248.2	312	138.7	78	49.9	34.7	25.5	19.5	15.4	12.5	10.3	8.7	7.4	6.4	5.5	4.9	4.3	3.9	3.5	3.1



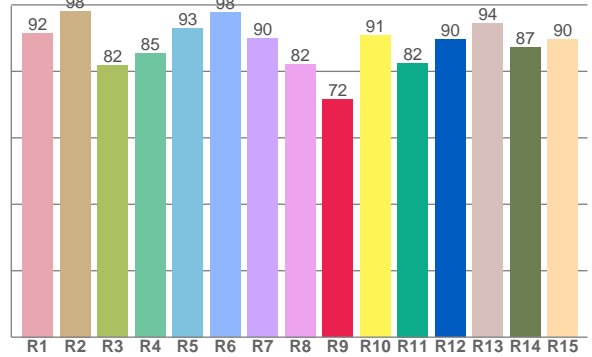
### Color Details



TM30: 87.1



CRI: 90.0 (R1-R8)



CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
91.6	98.1	81.8	85.3	93.0	97.8	90.0	82.2	71.5	90.8	82.5	89.5	94.4	87.2	89.6

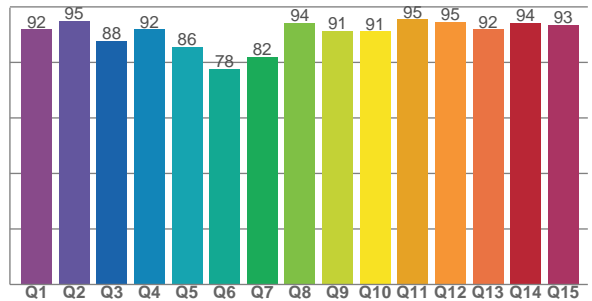
TM30 C Values, 16 binned values out of total of 99 C values

C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16
88.7	92.1	89.6	85.8	83.8	79.0	78.4	81.6	83.3	91.1	92.3	87.5	88.7	89.2	85.3	88.6

CQS Q Values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
91.9	95.0	87.9	91.9	85.5	77.6	81.9	94.3	91.3	91.2	95.5	94.6	91.9	94.1	93.4

CQS: 88.9



### Color Parameters

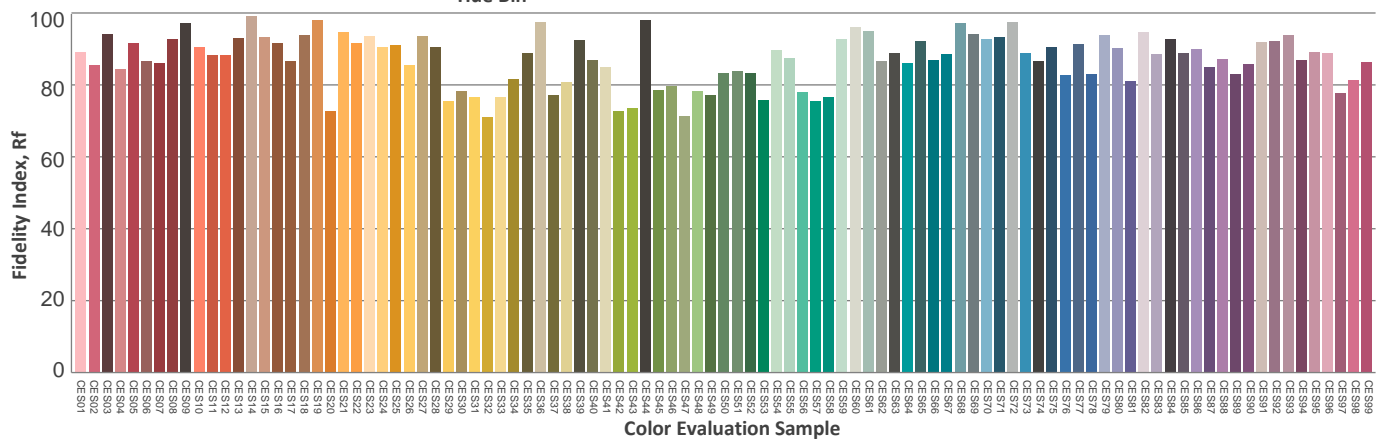
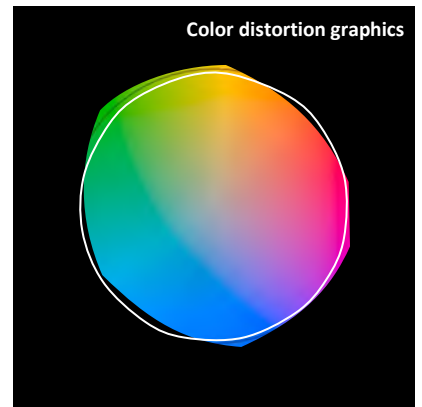
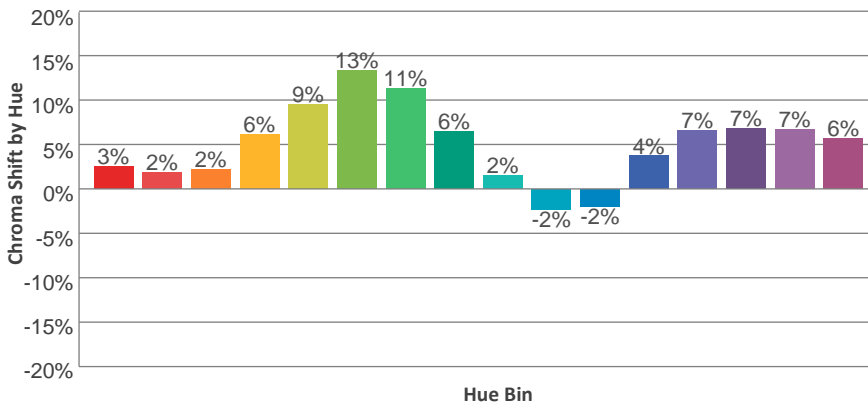
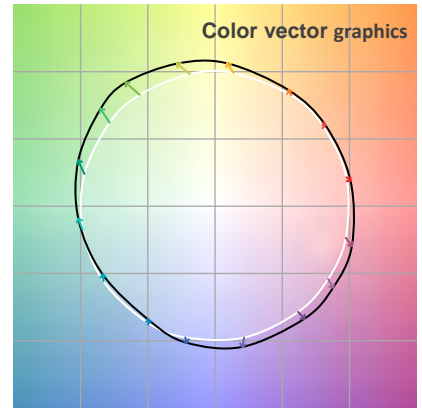
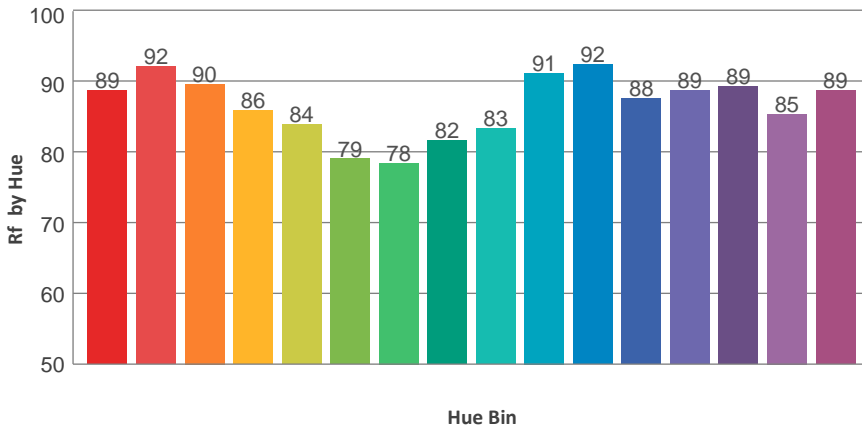
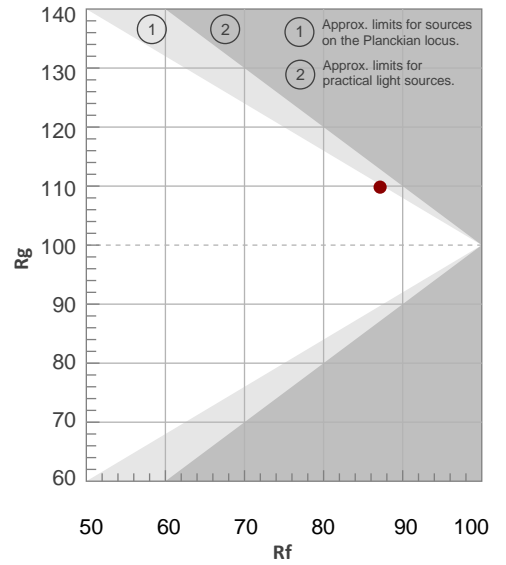
Color Temperature	Color Rendering Index	Red Component	Color Fidelity	Color Gamut	Color Quality Scale	Color Coordinate CIE 1931	Color Coordinate CIE 1931	Color Coordinate	Color Coordinate	Color Division from Black
CCT	CRI	CRI R9	TM30 Rf	TM30 Rg	CQS	x	y	u	v	Δuv
2650 K	90.0	71.5	87.1	109.8	88.9	0.461	0.406	0.265	0.350	-0.0019

TM30 Details

**Rf 87.1**  
Fidelity Index Rf

**Rg 109.8**  
Gamut Index Rg

Hue Bin	R <sub>f</sub>	Graphic shifts (%)	
		Chroma	Hue
1	89	3%	-3%
2	92	2%	-1%
3	90	2%	4%
4	86	6%	6%
5	84	9%	8%
6	79	13%	4%
7	78	11%	-5%
8	82	6%	-9%
9	83	2%	-9%
10	91	-2%	-4%
11	92	-2%	3%
12	88	4%	2%
13	89	7%	-2%
14	89	7%	1%
15	85	7%	-3%
16	89	6%	-5%



**Total Lumen Output: 8907 lm**

**Color Temperature: 3221 K**

**CRI: 88.7**

**TLCI: 82**

**TM30: 87.1**

**CQS: 90.3**

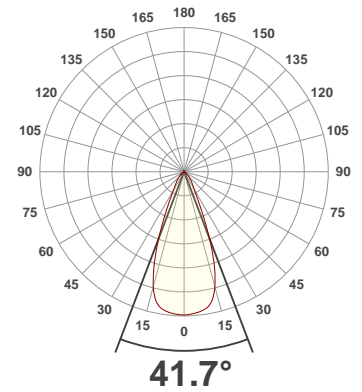
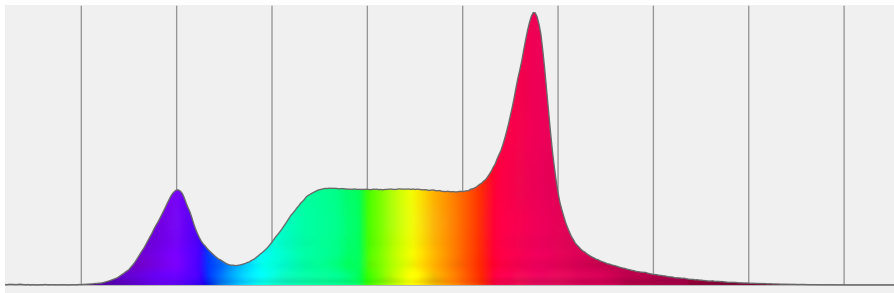
**Measurement Date: 3/11/2020**

**Voltage: 112 V, Current: 1.62 A**

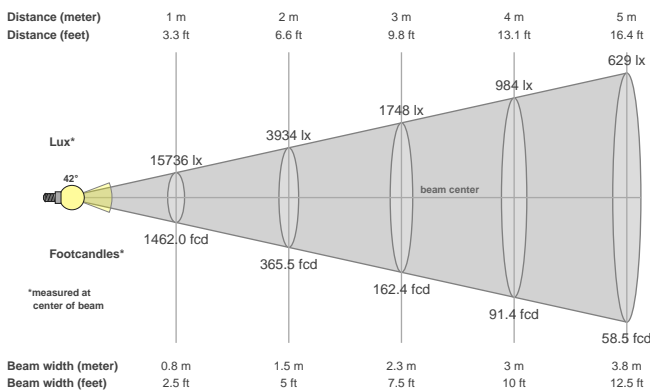
**Power: 177.3 W**

**Efficacy: 50 Lumen/Watt**

**Spectral distribution**  
Dominant Wavelength 585



**Beam details**



**Beam angles**

Beam angle 50%	Field angle 10%	Cutoff angle 2,5%
<b>41.7°</b>	<b>69.3°</b>	<b>103°</b>

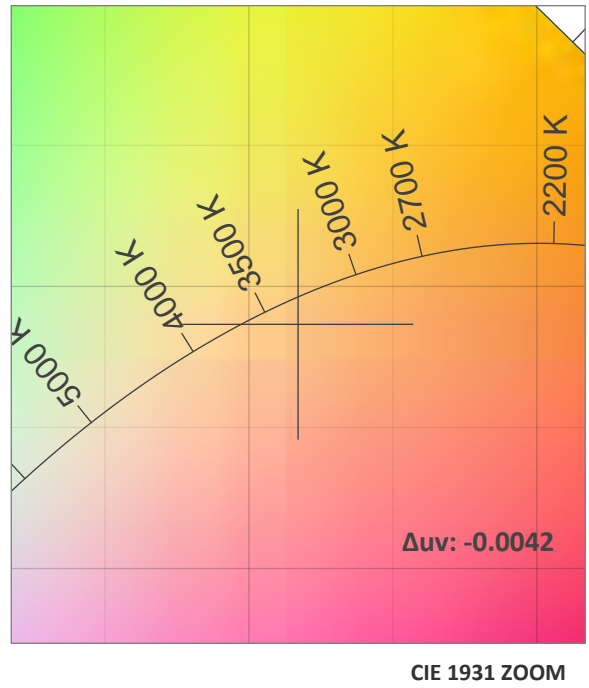
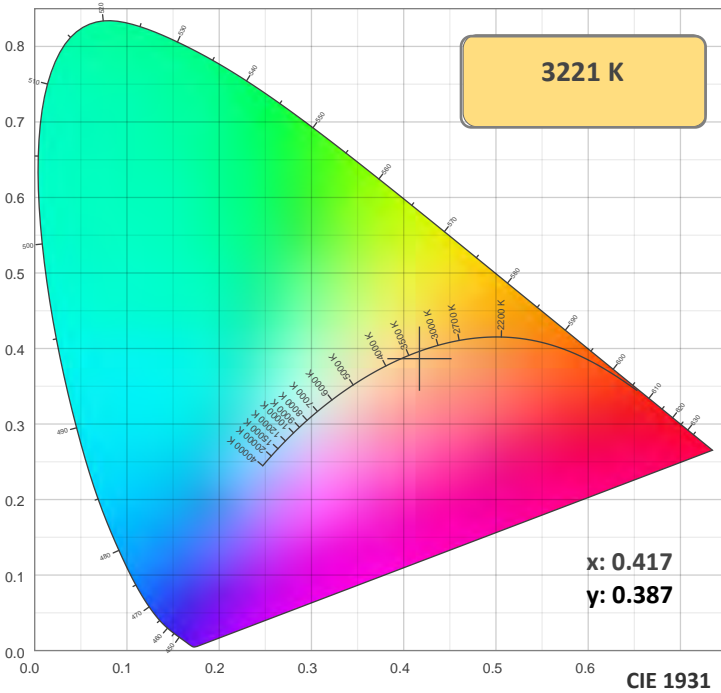
**Beam intensities**

Peak intensity	Int. ratio in 120° cone	Int. ratio in 90° cone
<b>15738 cd</b>	<b>99.0%</b>	<b>93.5%</b>

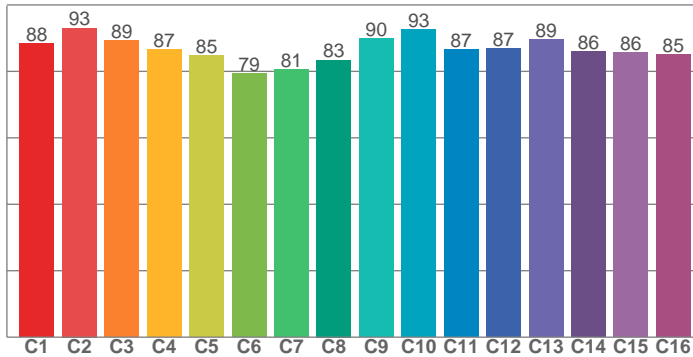
**Beam Intensities from 1-20m**

M	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
<b>FT</b>	3.3	6.6	9.8	13.1	16.4	19.7	23	26.2	29.5	32.8	36.1	39.4	42.7	45.9	49.2	52.5	55.8	59.1	62.3	65.6
<b>LX</b>	15736	3934	1748	984	629	437	321	246	194	157	130	109	93	80	70	61	54	49	44	39
<b>FC</b>	1462	365.5	162.4	91.4	58.5	40.6	29.8	22.8	18	14.6	12.1	10.2	8.7	7.5	6.5	5.7	5.1	4.5	4	3.7

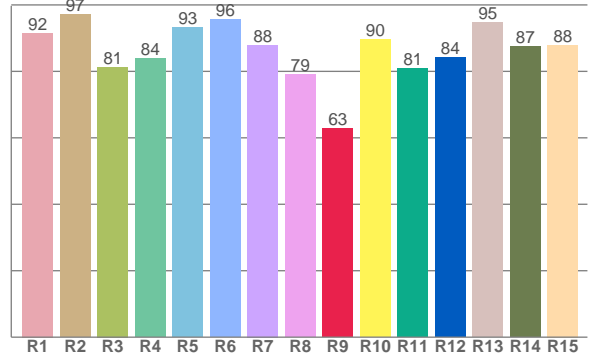
### Color Details



TM30: 87.1



CRI: 88.7 (R1-R8)



CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
91.6	97.1	81.3	83.9	93.2	95.7	88.0	79.1	62.7	89.6	80.9	84.3	94.7	87.5	87.9

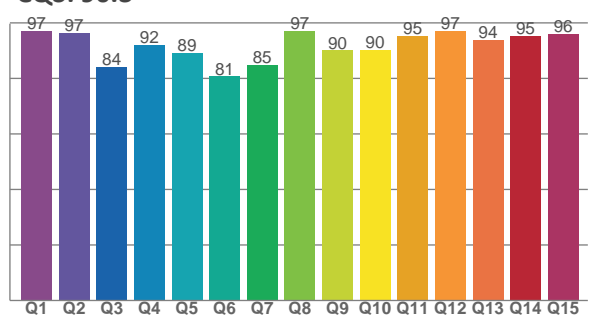
TM30 C Values, 16 binned values out of total of 99 C values

C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16
88.4	93.0	89.2	86.6	84.7	79.4	80.6	83.4	90.0	92.6	86.6	87.0	89.5	86.0	85.8	85.1

CQS Q Values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
97.2	96.5	84.1	92.1	89.3	80.7	84.9	97.2	90.1	90.3	95.4	97.0	93.8	95.2	95.9

CQS: 90.3



### Color Parameters

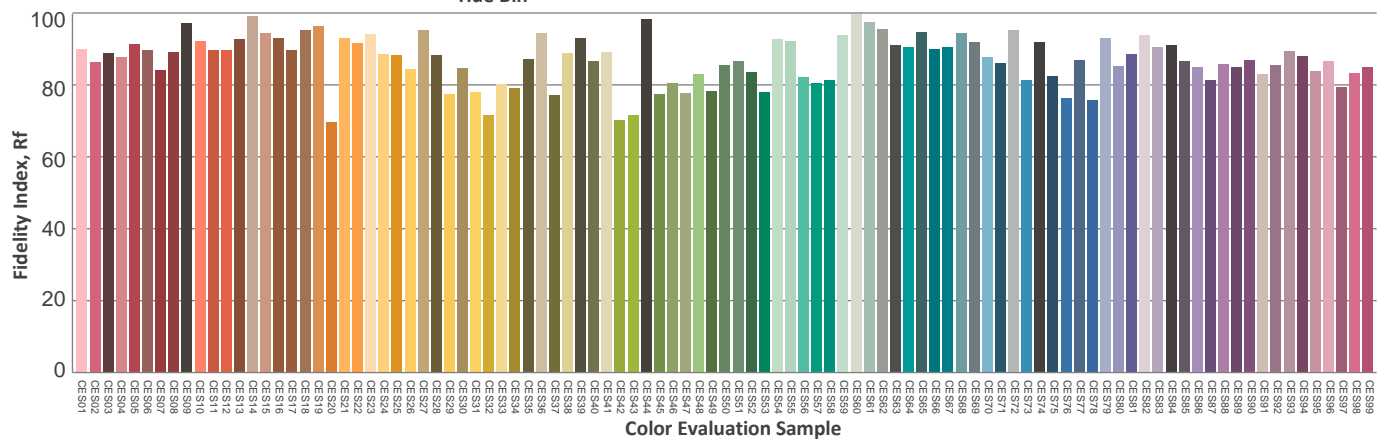
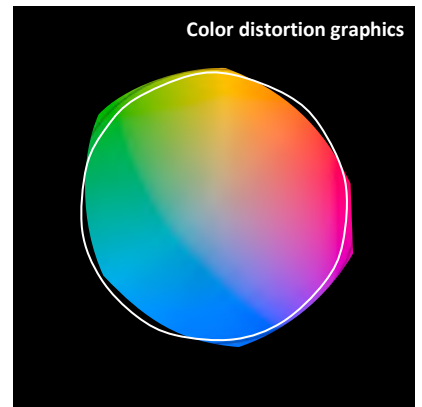
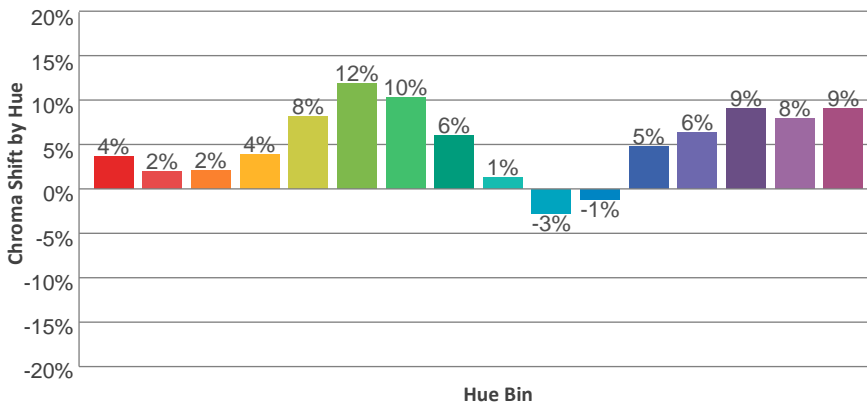
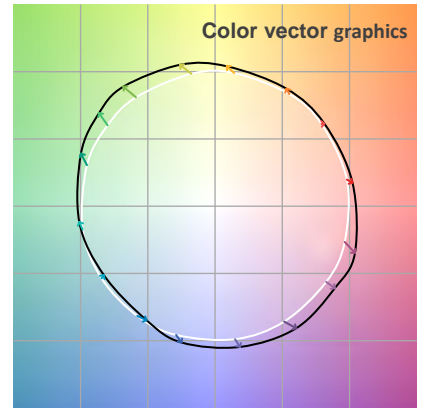
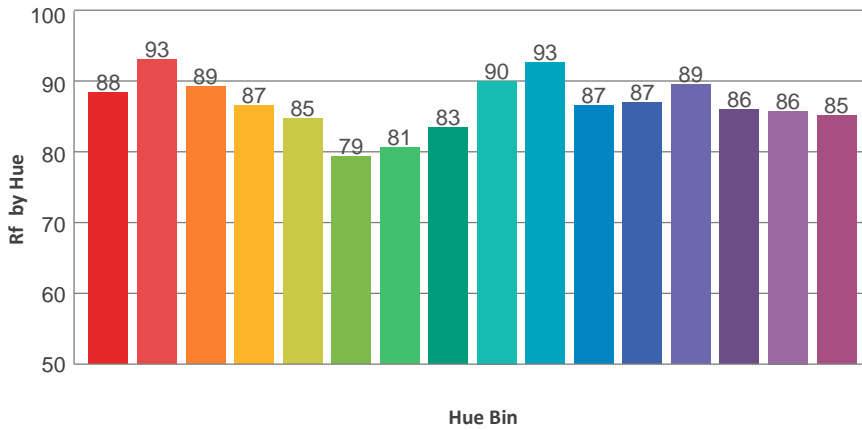
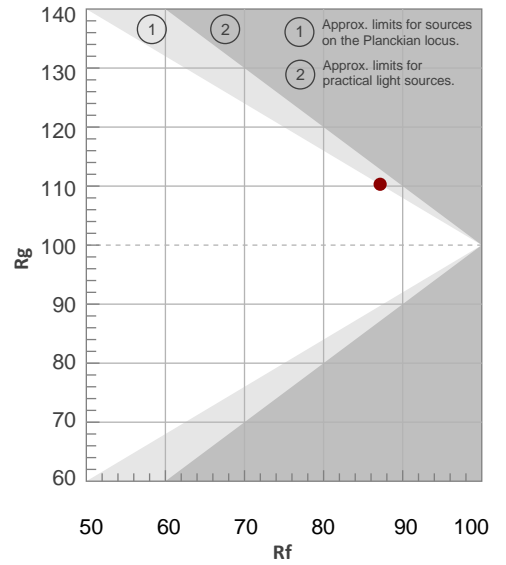
Color Temperature	Color Rendering Index	Red Component	Color Fidelity	Color Gamut	Color Quality Scale	Color Coordinate CIE 1931	Color Coordinate CIE 1931	Color Coordinate	Color Coordinate	Color Diviation from Black
CCT	CRI	CRI R9	TM30 Rf	TM30 Rg	CQS	x	y	u	v	Δuv
3221 K	88.7	62.7	87.1	110.3	90.3	0.417	0.387	0.245	0.341	-0.0042

TM30 Details

**Rf 87.1**  
Fidelity Index Rf

**Rg 110.3**  
Gamut Index Rg

Hue Bin	R <sub>f</sub>	Graphic shifts (%)	
		Chroma	Hue
1	88	4%	-3%
2	93	2%	-1%
3	89	2%	4%
4	87	4%	6%
5	85	8%	7%
6	79	12%	3%
7	81	10%	-4%
8	83	6%	-8%
9	90	1%	-6%
10	93	-3%	-1%
11	87	-1%	7%
12	87	5%	5%
13	89	6%	2%
14	86	9%	5%
15	86	8%	0%
16	85	9%	-6%



**Total Lumen Output: 9389 lm**

**Color Temperature: 4200 K**

**CRI: 88.3**

**TLCI: 83**

**TM30: 86.8**

**CQS: 90.9**

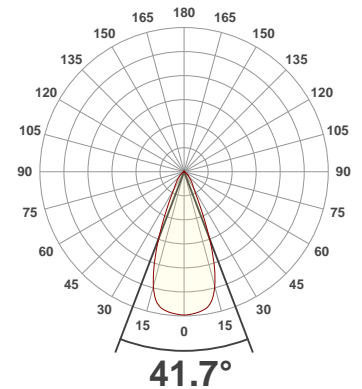
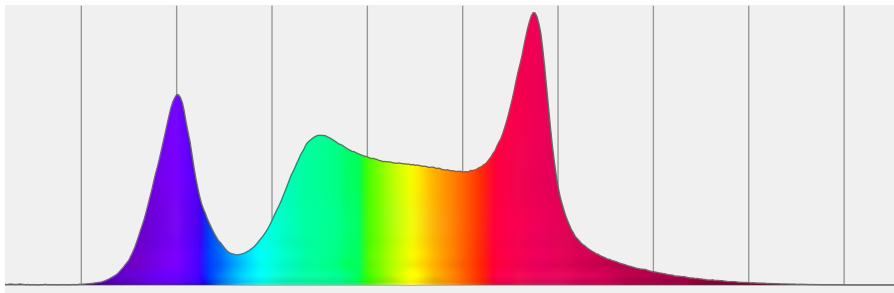
**Measurement Date: 3/11/2020**

**Voltage: 111 V, Current: 1.77 A**

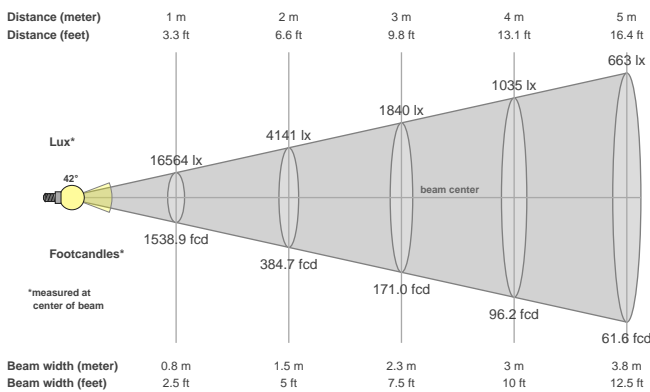
**Power: 192.9 W**

**Efficacy: 49 Lumen/Watt**

**Spectral distribution**  
Dominant Wavelength 583



**Beam details**



**Beam angles**

Beam angle 50%	Field angle 10%	Cutoff angle 2,5%
<b>41.7°</b>	<b>69.5°</b>	<b>103.4°</b>

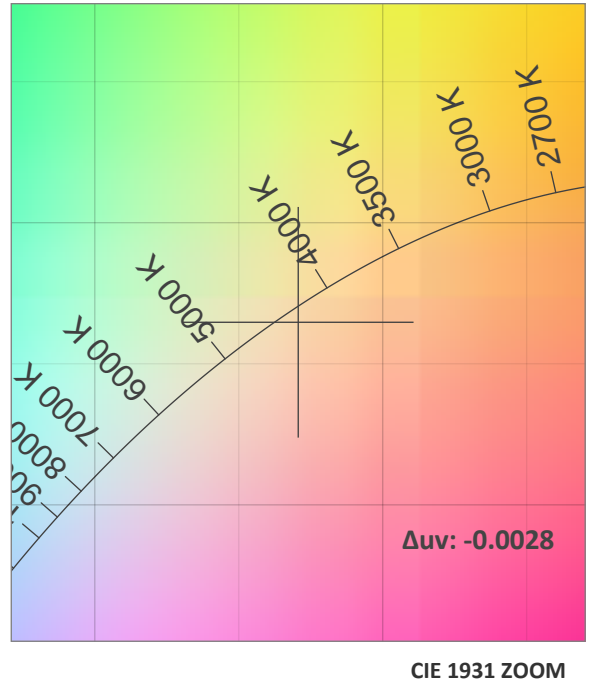
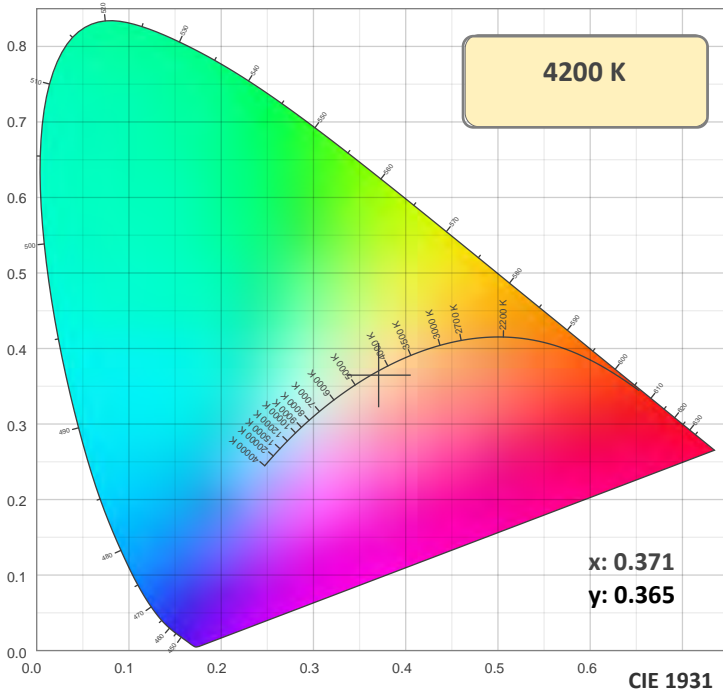
**Beam intensities**

Peak intensity	Int. ratio in 120° cone	Int. ratio in 90° cone
<b>16566 cd</b>	<b>99.0%</b>	<b>93.4%</b>

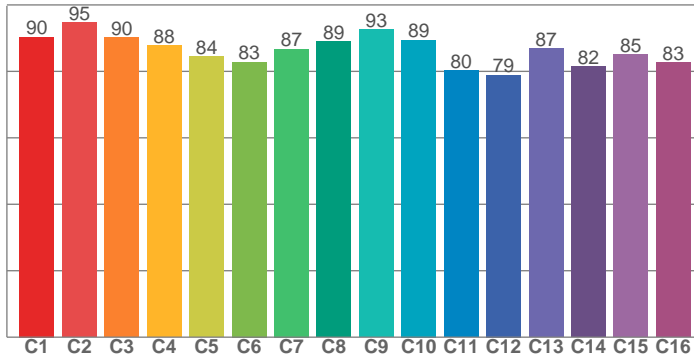
**Beam Intensities from 1-20m**

M	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
<b>FT</b>	3.3	6.6	9.8	13.1	16.4	19.7	23	26.2	29.5	32.8	36.1	39.4	42.7	45.9	49.2	52.5	55.8	59.1	62.3	65.6
<b>LX</b>	16564	4141	1840	1035	663	460	338	259	204	166	137	115	98	85	74	65	57	51	46	41
<b>FC</b>	1538.9	384.7	171	96.2	61.6	42.7	31.4	24	19	15.4	12.7	10.7	9.1	7.9	6.8	6	5.3	4.7	4.3	3.8

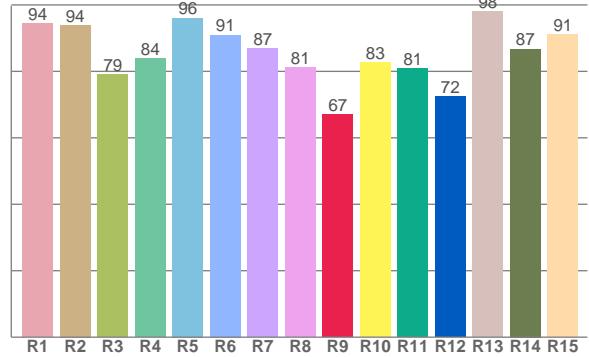
### Color Details



TM30: 86.8



CRI: 88.3 (R1-R8)



CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
94.5	94.0	79.1	83.9	96.1	91.0	86.8	81.2	66.9	82.6	80.8	72.4	97.9	86.8	91.0

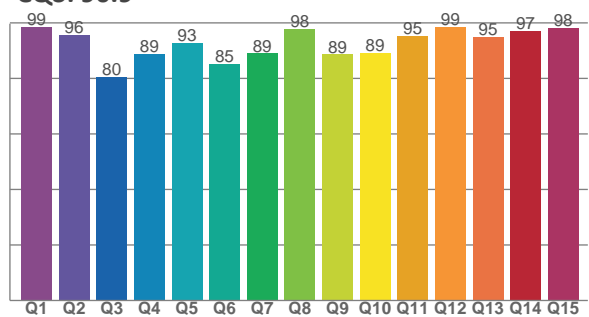
TM30 C Values, 16 binned values out of total of 99 C values

C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16
90.4	94.6	90.1	87.8	84.5	82.8	86.8	89.1	92.6	89.4	80.3	79.0	86.9	81.5	85.2	82.6

CQS Q Values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
98.5	95.8	80.4	88.9	92.7	85.2	89.0	98.0	88.6	89.2	95.2	98.5	94.9	97.1	98.2

CQS: 90.9



### Color Parameters

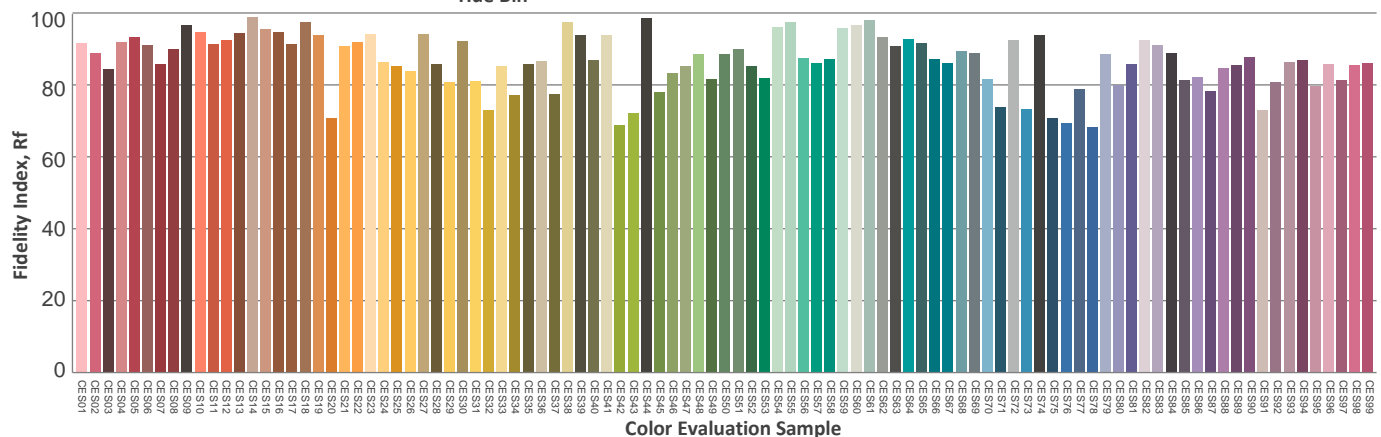
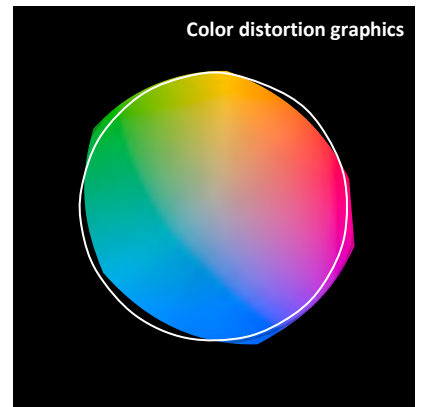
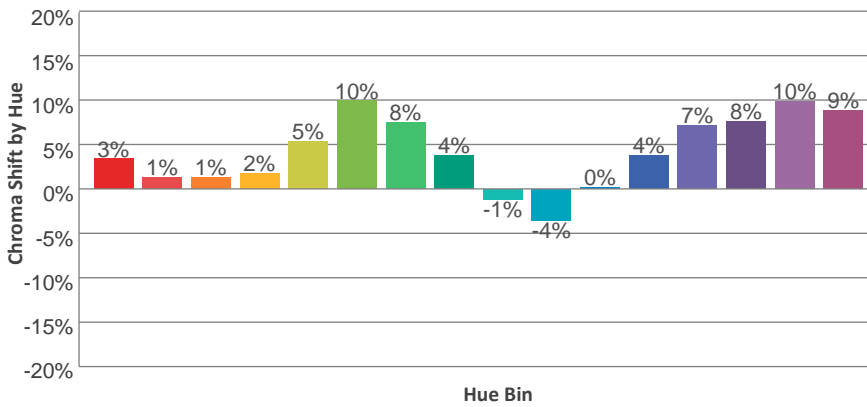
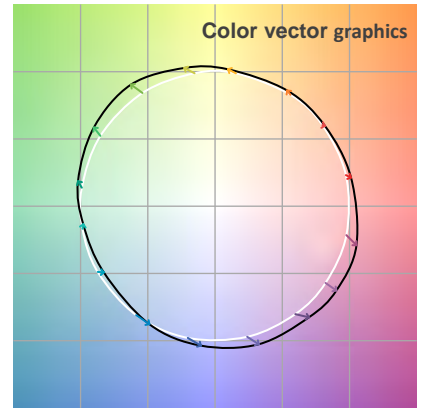
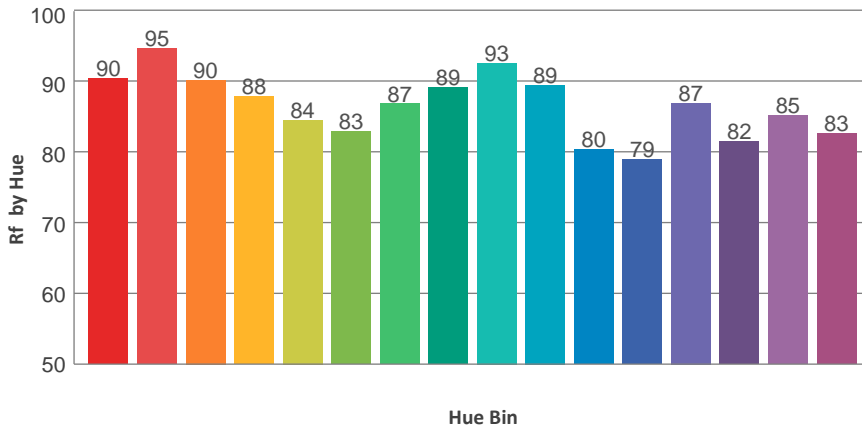
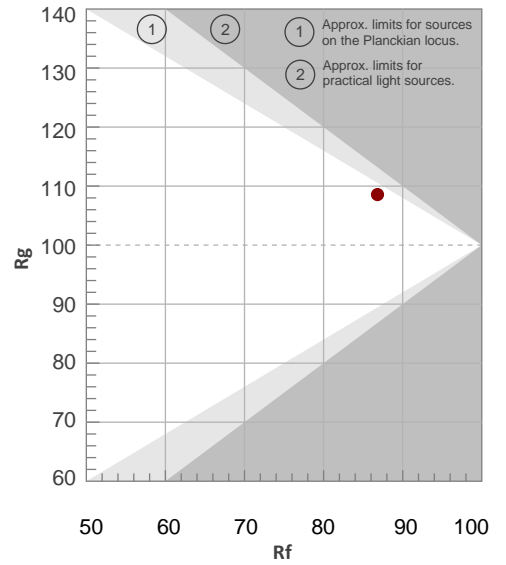
Color Temperature	Color Rendering Index	Red Component	Color Fidelity	Color Gamut	Color Quality Scale	Color Coordinate CIE 1931	Color Coordinate CIE 1931	Color Coordinate	Color Coordinate	Color Division from Black
CCT	CRI	CRI R9	TM30 Rf	TM30 Rg	CQS	x	y	u	v	Δuv
4200 K	88.3	66.9	86.8	108.6	90.9	0.371	0.365	0.223	0.330	-0.0028

TM30 Details

**Rf 86.8**  
Fidelity Index Rf

**Rg 108.6**  
Gamut Index Rg

Hue Bin	R <sub>f</sub>	Graphic shifts (%)	
		Chroma	Hue
1	90	3%	-3%
2	95	1%	-2%
3	90	1%	4%
4	88	2%	6%
5	84	5%	7%
6	83	10%	4%
7	87	8%	-2%
8	89	4%	-4%
9	93	-1%	-3%
10	89	-4%	3%
11	80	0%	12%
12	79	4%	11%
13	87	7%	7%
14	82	8%	7%
15	85	10%	0%
16	83	9%	-6%





Total Lumen Output: 9679 lm

Color Temperature: 4510 K

CRI: 87.9

TLCI: 81

TM30: 86.3

CQS: 90.2

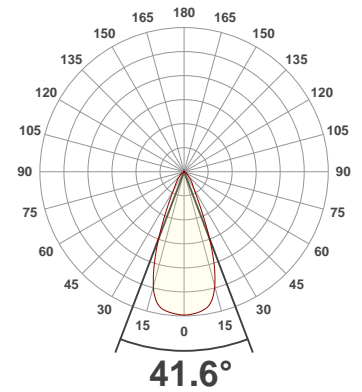
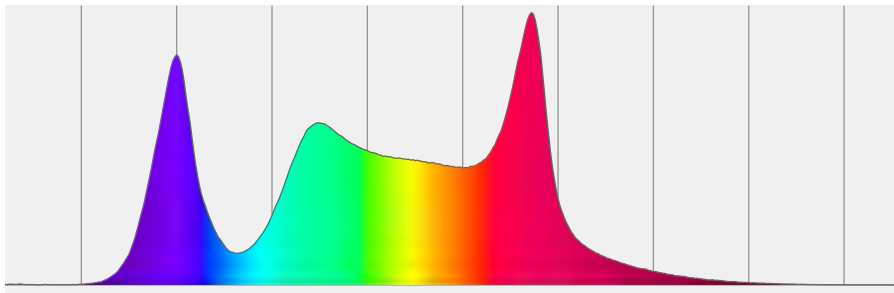
Measurement Date: 3/11/2020

Voltage: 112 V, Current: 1.83 A

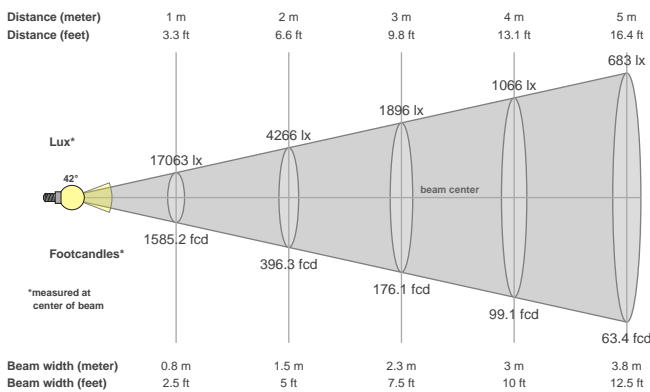
Power: 201.3 W

Efficacy: 48 Lumen/Watt

**Spectral distribution**  
Dominant Wavelength 585



**Beam details**



**Beam angles**

Beam angle 50%	Field angle 10%	Cutoff angle 2,5%
<b>41.6°</b>	<b>69.5°</b>	<b>103.6°</b>

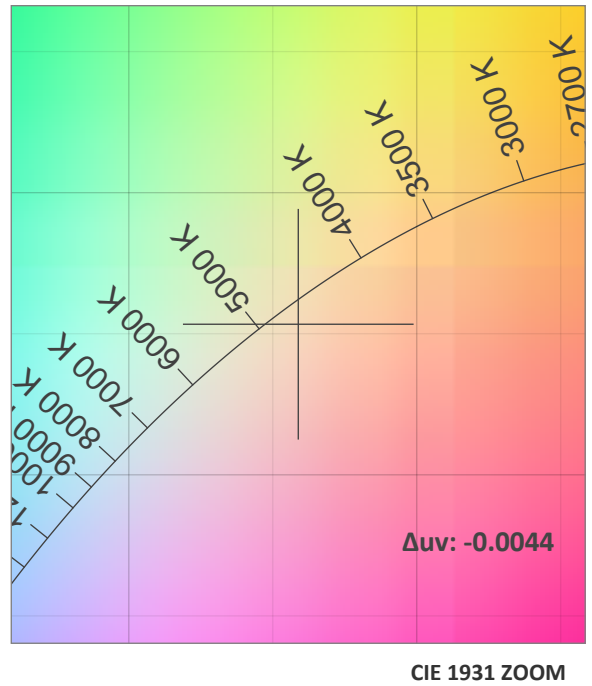
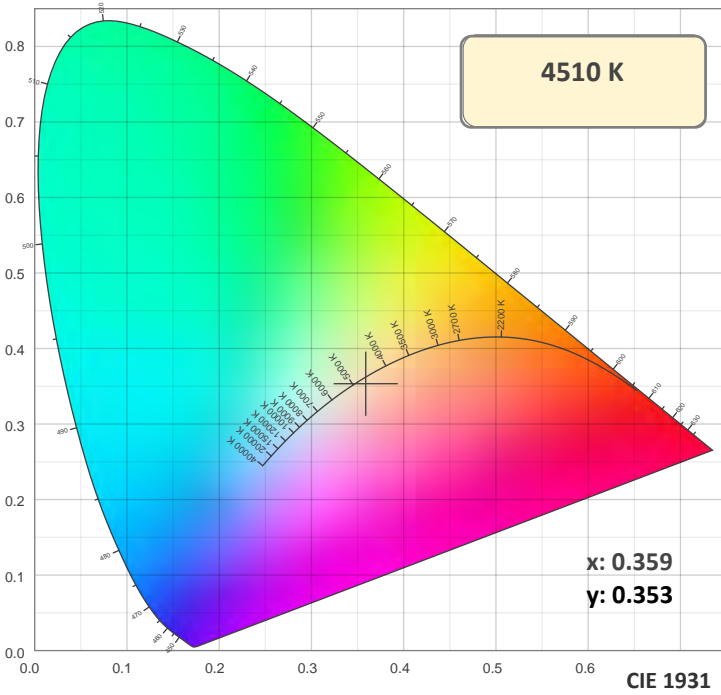
**Beam intensities**

Peak intensity	Int. ratio in 120° cone	Int. ratio in 90° cone
<b>17071 cd</b>	<b>98.9%</b>	<b>93.3%</b>

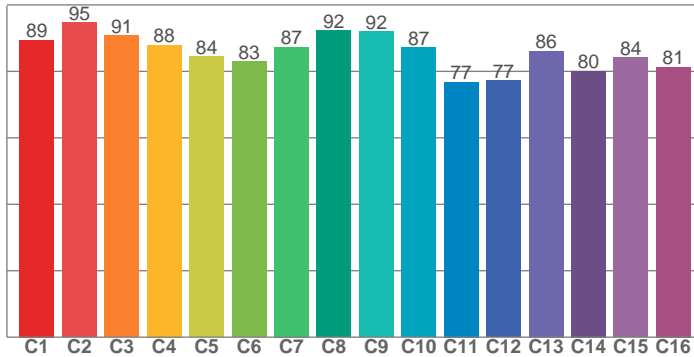
**Beam Intensities from 1-20m**

M	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
<b>FT</b>	3.3	6.6	9.8	13.1	16.4	19.7	23	26.2	29.5	32.8	36.1	39.4	42.7	45.9	49.2	52.5	55.8	59.1	62.3	65.6
<b>LX</b>	17063	4266	1896	1066	683	474	348	267	211	171	141	118	101	87	76	67	59	53	47	43
<b>FC</b>	1585.2	396.3	176.1	99.1	63.4	44	32.4	24.8	19.6	15.9	13.1	11	9.4	8.1	7	6.2	5.5	4.9	4.4	4

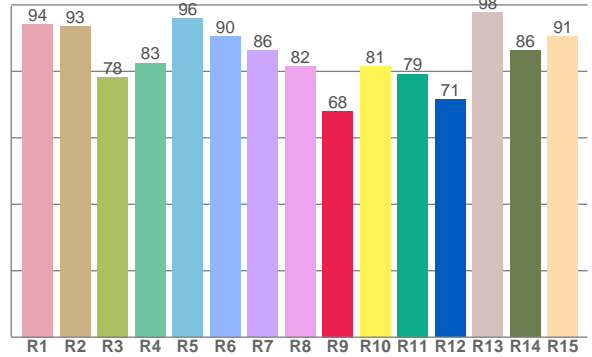
### Color Details



**TM30: 86.3**



**CRI: 87.9 (R1-R8)**



**CRI R values, only R1-R8 are used to calculate final CRI value**

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
94.3	93.5	78.3	82.6	95.9	90.4	86.3	81.6	68.1	81.5	79.2	71.5	97.8	86.3	90.6

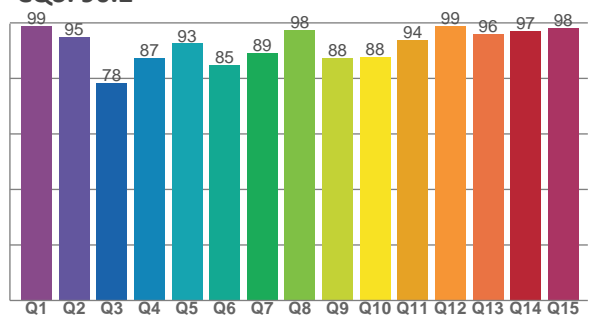
**TM30 C Values, 16 binned values out of total of 99 C values**

C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16
89.5	94.6	90.8	87.9	84.4	83.0	87.3	92.4	92.1	87.1	76.8	77.2	86.1	80.1	84.2	81.3

**CQS Q Values**

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
99.0	94.9	78.4	87.3	92.6	85.0	89.2	97.6	87.5	87.6	93.7	98.9	96.0	97.1	98.2

**CQS: 90.2**



**Color Parameters**

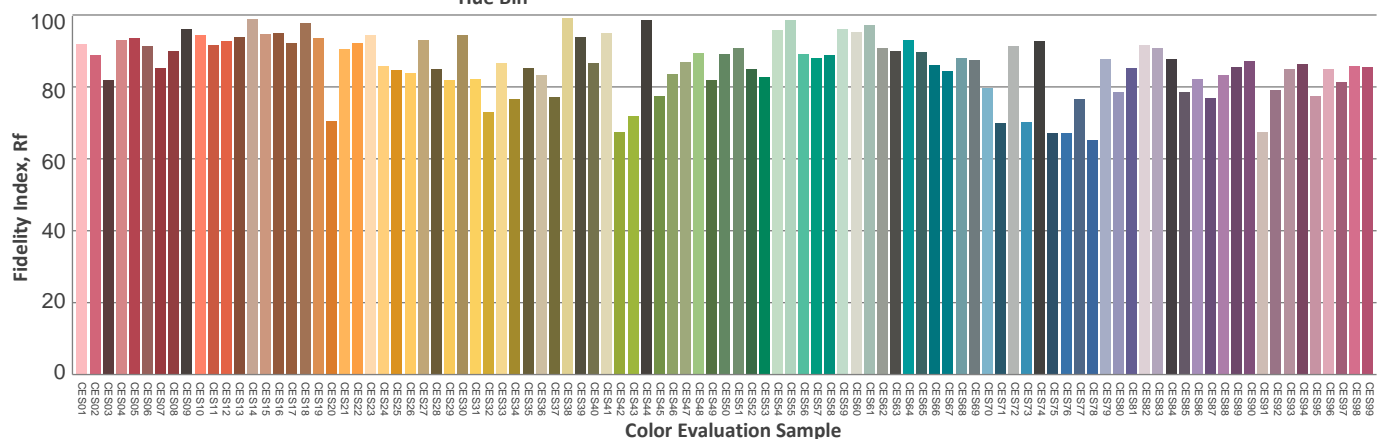
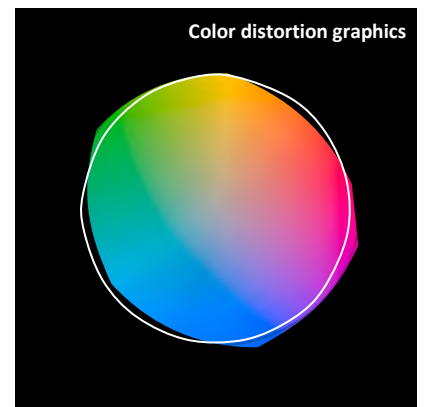
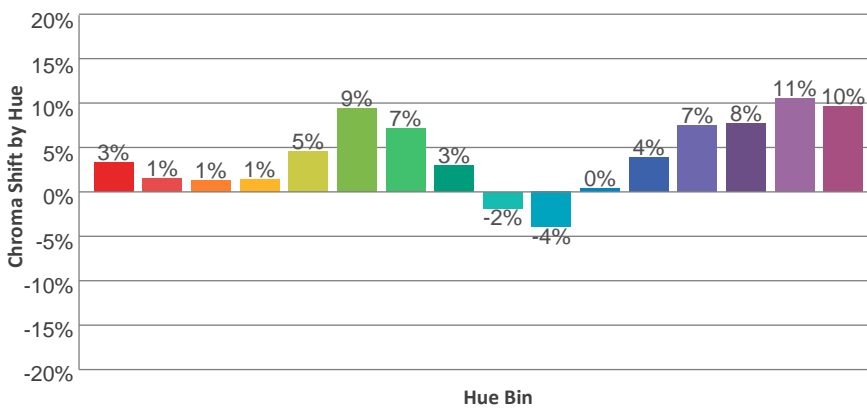
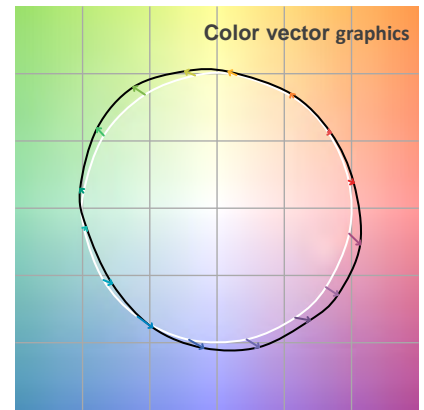
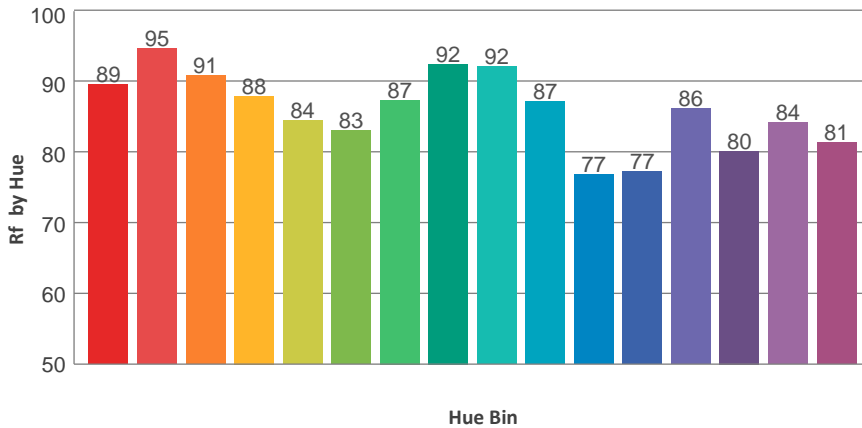
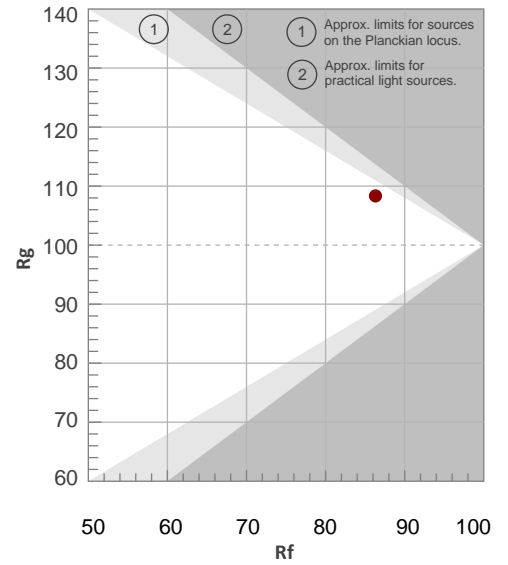
Color Temperature	Color Rendering Index	Red Component	Color Fidelity	Color Gamut	Color Quality Scale	Color Coordinate CIE 1931	Color Coordinate CIE 1931	Color Coordinate	Color Coordinate	Color Diviation from Black
CCT	CRI	CRI R9	TM30 Rf	TM30 Rg	CQS	x	y	u	v	Δuv
4510 K	87.9	68.1	86.3	108.3	90.2	0.359	0.353	0.220	0.325	-0.0044

TM30 Details

**Rf 86.3**  
Fidelity Index Rf

**Rg 108.3**  
Gamut Index Rg

Hue Bin	R <sub>f</sub>	Graphic shifts (%)	
		Chroma	Hue
1	89	3%	-2%
2	95	1%	-2%
3	91	1%	3%
4	88	1%	6%
5	84	5%	7%
6	83	9%	4%
7	87	7%	-2%
8	92	3%	-2%
9	92	-2%	-2%
10	87	-4%	6%
11	77	0%	14%
12	77	4%	12%
13	86	7%	8%
14	80	8%	8%
15	84	11%	0%
16	81	10%	-6%



**Total Lumen Output: 9535 lm**

**Color Temperature: 5072 K**

**CRI: 88.3**

**TLCI: 83**

**TM30: 85.6**

**CQS: 88.5**

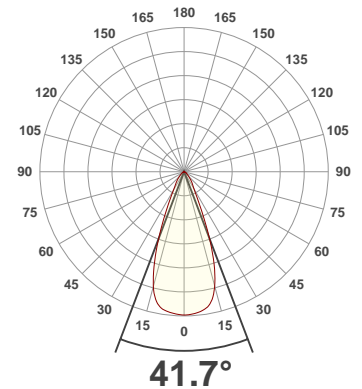
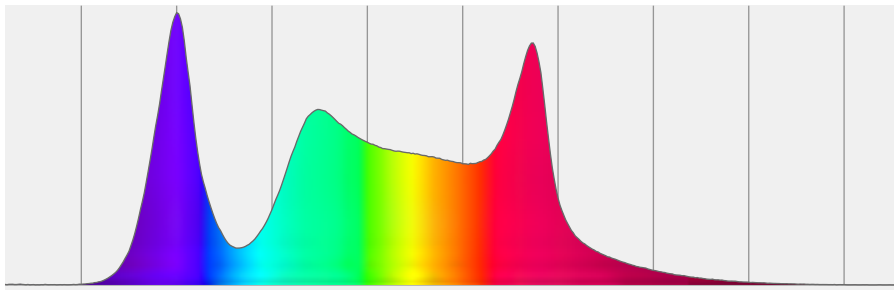
**Measurement Date: 3/11/2020**

**Voltage: 112 V, Current: 1.79 A**

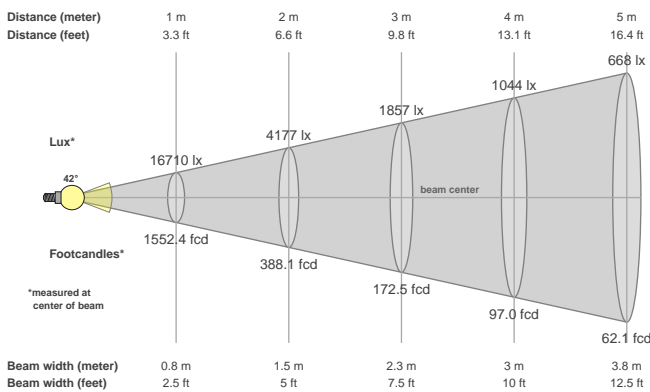
**Power: 197.1 W**

**Efficacy: 48 Lumen/Watt**

**Spectral distribution**  
Dominant Wavelength 586



**Beam details**



**Beam angles**

Beam angle 50%	Field angle 10%	Cutoff angle 2,5%
<b>41.7°</b>	<b>69.8°</b>	<b>104.4°</b>

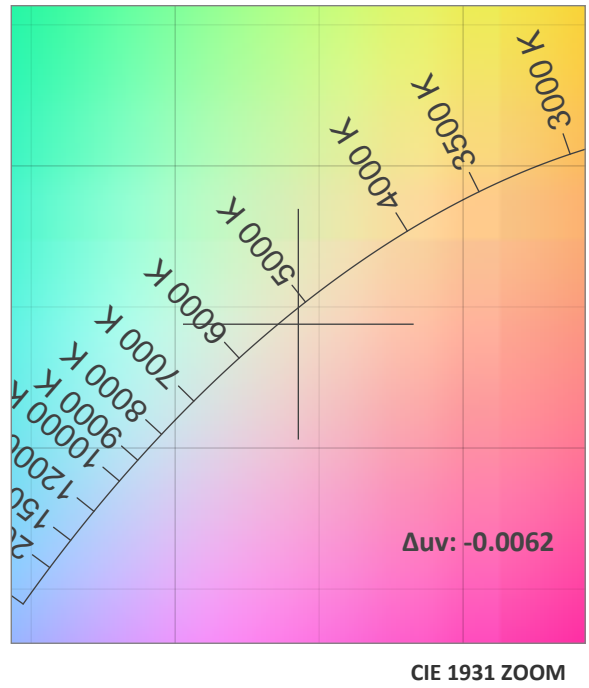
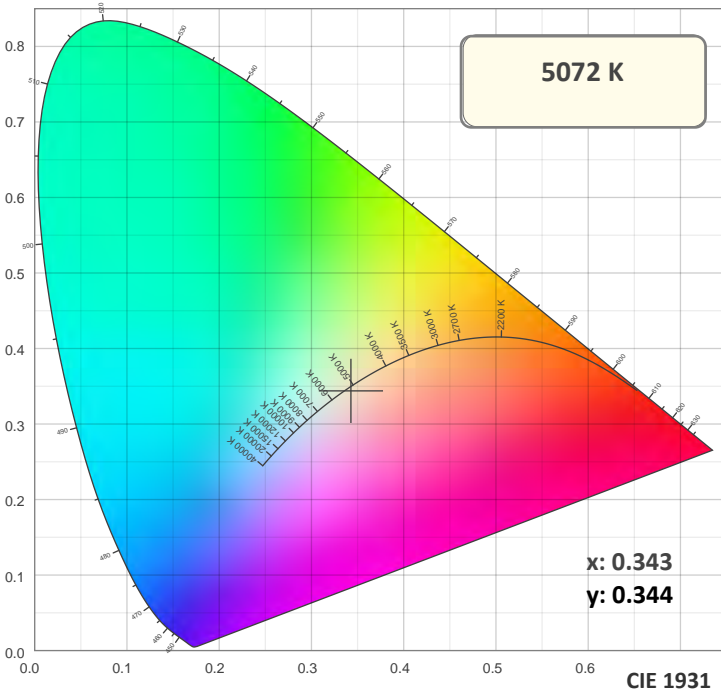
**Beam intensities**

Peak intensity	Int. ratio in 120° cone	Int. ratio in 90° cone
<b>16719 cd</b>	<b>98.7%</b>	<b>92.9%</b>

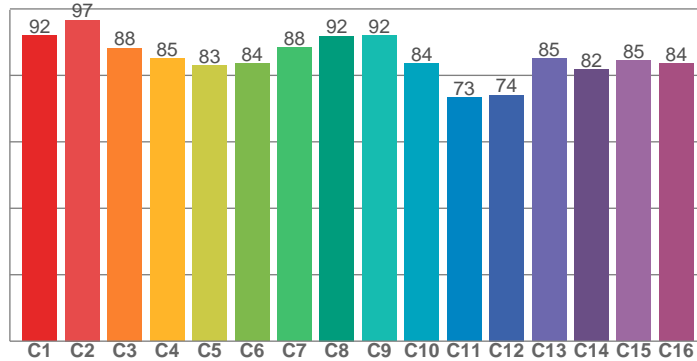
**Beam Intensities from 1-20m**

M	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
<b>FT</b>	3.3	6.6	9.8	13.1	16.4	19.7	23	26.2	29.5	32.8	36.1	39.4	42.7	45.9	49.2	52.5	55.8	59.1	62.3	65.6
<b>LX</b>	16710	4177	1857	1044	668	464	341	261	206	167	138	116	99	85	74	65	58	52	46	42
<b>FC</b>	1552.4	388.1	172.5	97	62.1	43.1	31.7	24.3	19.2	15.5	12.8	10.8	9.2	7.9	6.9	6.1	5.4	4.8	4.3	3.9

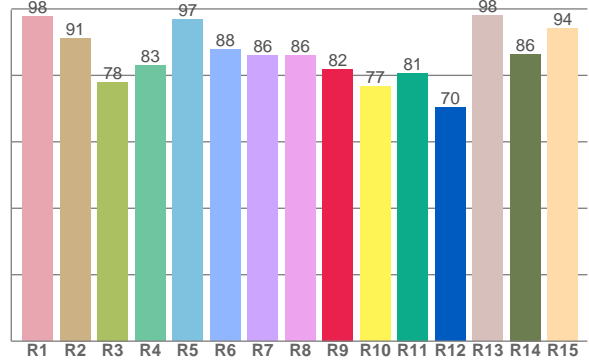
### Color Details



**TM30: 85.6**



**CRI: 88.3 (R1-R8)**



**CRI R values, only R1-R8 are used to calculate final CRI value**

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
97.7	91.2	78.0	82.9	96.8	87.8	86.0	85.9	81.9	76.7	80.7	70.3	97.9	86.4	94.2

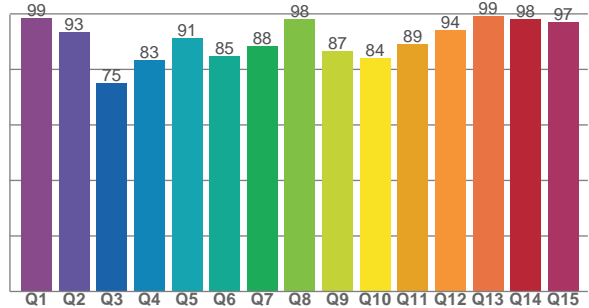
**TM30 C Values, 16 binned values out of total of 99 C values**

C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16
92.0	96.7	88.2	85.2	83.0	83.5	88.4	91.8	92.1	83.6	73.3	74.1	85.0	81.8	84.5	83.5

**CQS Q Values**

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
98.5	93.4	75.1	83.3	91.3	85.0	88.4	98.1	86.6	84.1	89.1	94.2	99.3	98.3	97.0

**CQS: 88.5**



**Color Parameters**

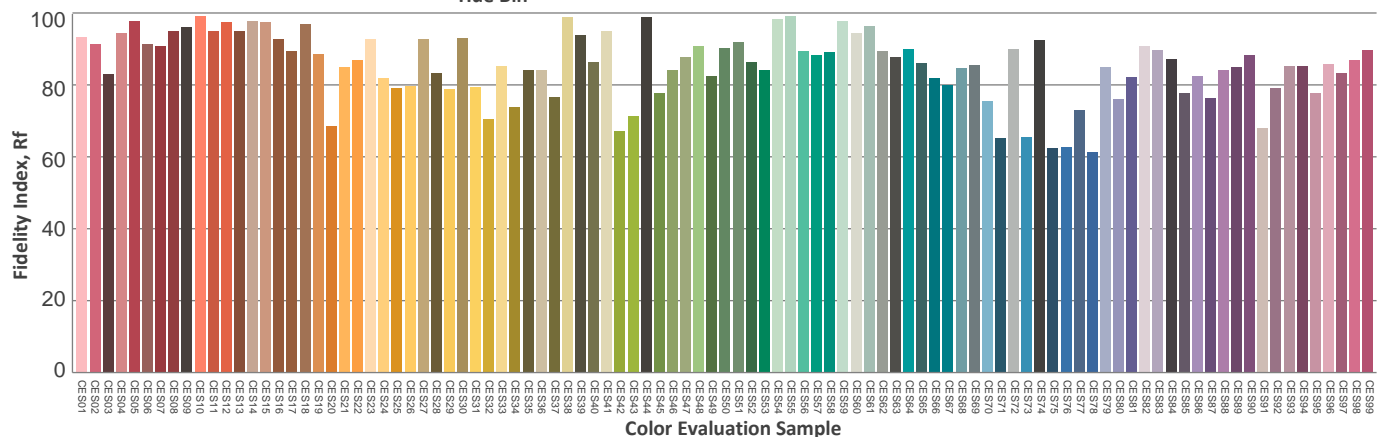
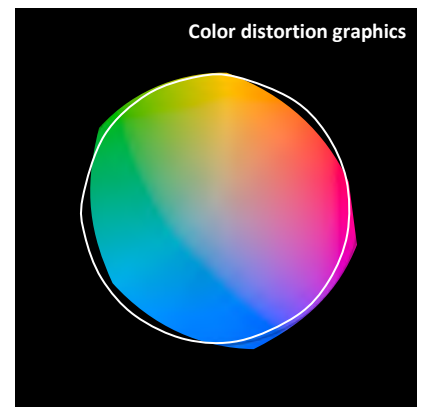
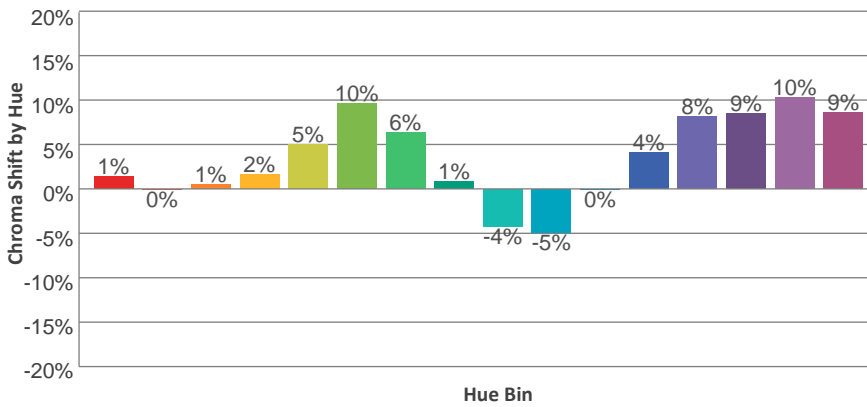
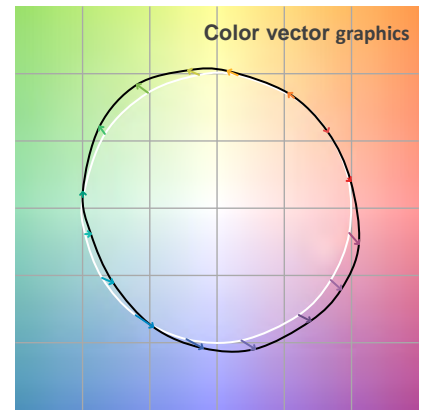
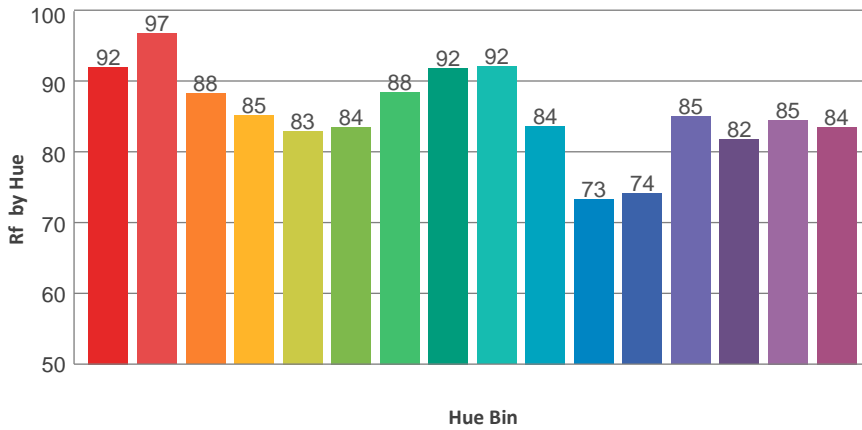
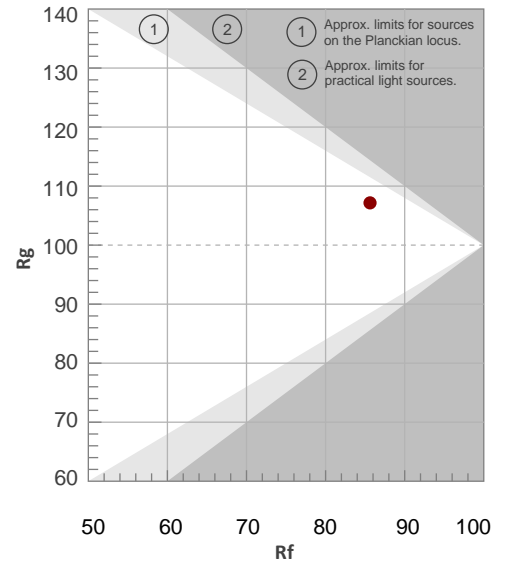
Color Temperature	Color Rendering Index	Red Component	Color Fidelity	Color Gamut	Color Quality Scale	Color Coordinate CIE 1931	Color Coordinate CIE 1931	Color Coordinate	Color Coordinate	Color Diviation from Black
CCT	CRI	CRI R9	TM30 Rf	TM30 Rg	CQS	x	y	u	v	Δuv
5072 K	88.3	81.9	85.6	107.2	88.5	0.343	0.344	0.213	0.320	-0.0062

TM30 Details

**Rf 85.6**  
Fidelity Index Rf

**Rg 107.2**  
Gamut Index Rg

Hue Bin	R <sub>f</sub>	Graphic shifts (%)	
		Chroma	Hue
1	92	1%	-2%
2	97	0%	0%
3	88	1%	5%
4	85	2%	8%
5	83	5%	7%
6	84	10%	4%
7	88	6%	-2%
8	92	1%	-4%
9	92	-4%	1%
10	84	-5%	7%
11	73	0%	16%
12	74	4%	13%
13	85	8%	9%
14	82	9%	5%
15	85	10%	-1%
16	84	9%	-7%



**Total Lumen Output: 9250 lm**

**Color Temperature: 5607 K**

**CRI: 87.9**

**TLCI: 85**

**TM30: 84.5**

**CQS: 88.6**

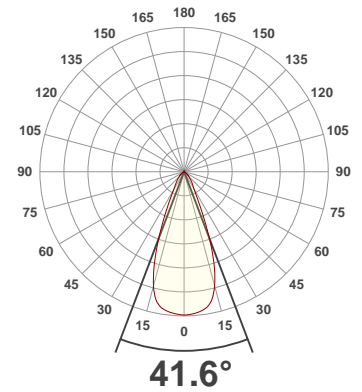
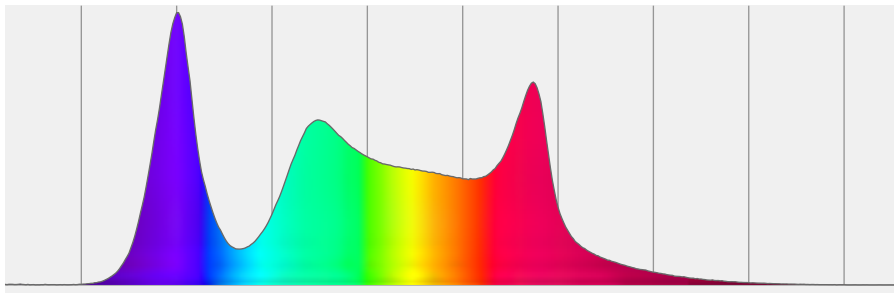
**Measurement Date: 3/11/2020**

**Voltage: 112 V, Current: 1.78 A**

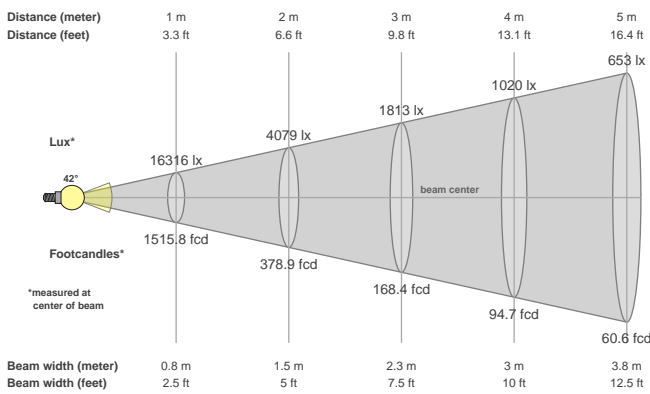
**Power: 195.9 W**

**Efficacy: 47 Lumen/Watt**

**Spectral distribution**  
Dominant Wavelength 593



**Beam details**



**Beam angles**

Beam angle 50%	Field angle 10%	Cutoff angle 2,5%
<b>41.6°</b>	<b>69.6°</b>	<b>103.8°</b>

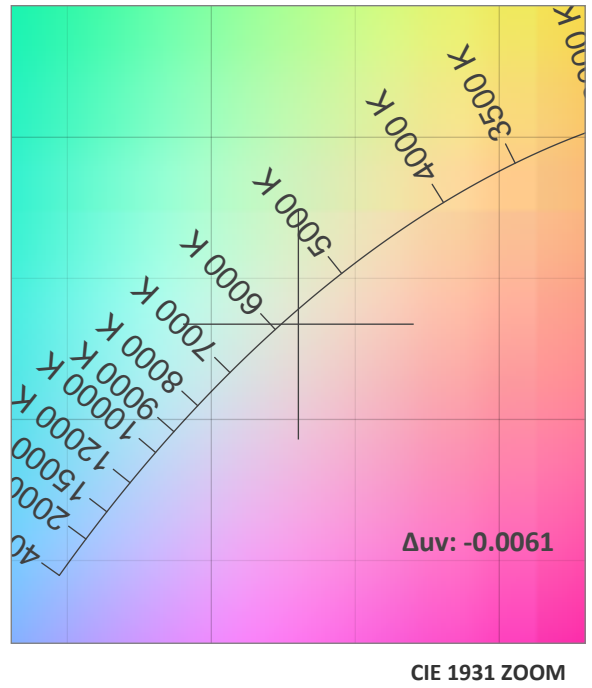
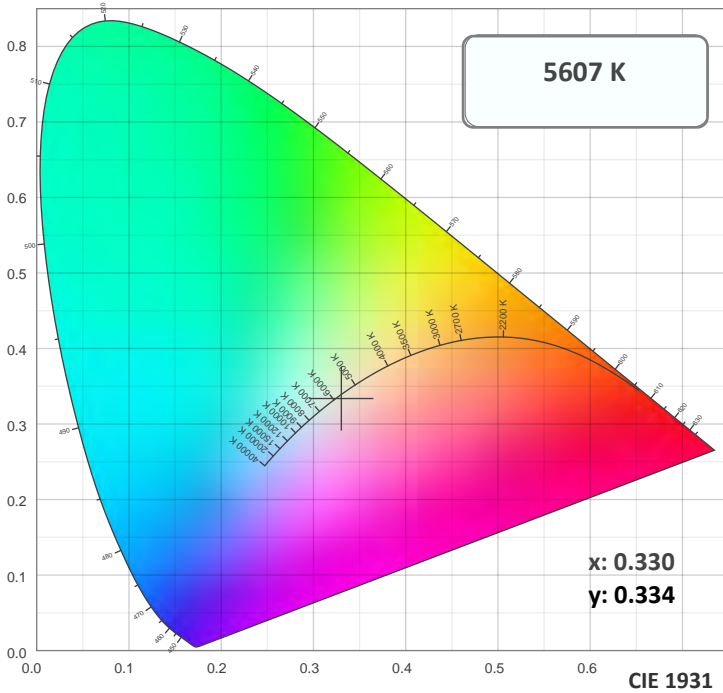
**Beam intensities**

Peak intensity	Int. ratio in 120° cone	Int. ratio in 90° cone
<b>16317 cd</b>	<b>98.9%</b>	<b>93.2%</b>

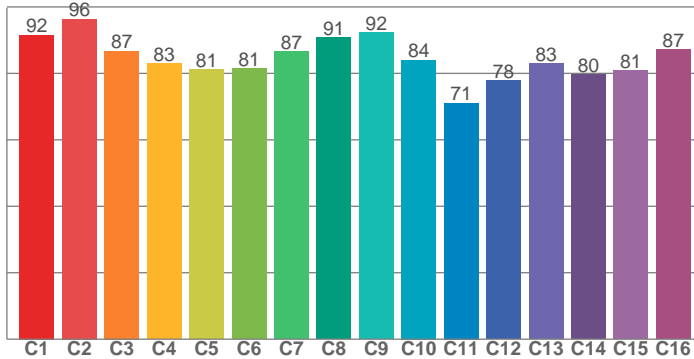
**Beam Intensities from 1-20m**

M	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
<b>FT</b>	3.3	6.6	9.8	13.1	16.4	19.7	23	26.2	29.5	32.8	36.1	39.4	42.7	45.9	49.2	52.5	55.8	59.1	62.3	65.6
<b>LX</b>	16316	4079	1813	1020	653	453	333	255	201	163	135	113	97	83	73	64	56	50	45	41
<b>FC</b>	1515.8	378.9	168.4	94.7	60.6	42.1	30.9	23.7	18.7	15.2	12.5	10.5	9	7.7	6.7	5.9	5.2	4.7	4.2	3.8

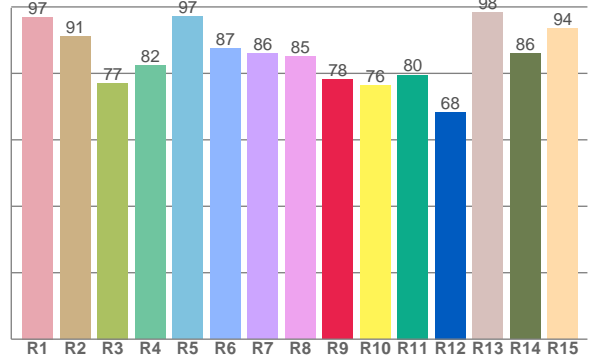
### Color Details



#### TM30: 84.5



#### CRI: 87.9 (R1-R8)



#### CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
97.0	91.1	77.1	82.4	97.2	87.4	85.9	85.0	78.1	76.3	79.5	68.3	98.3	86.0	93.6

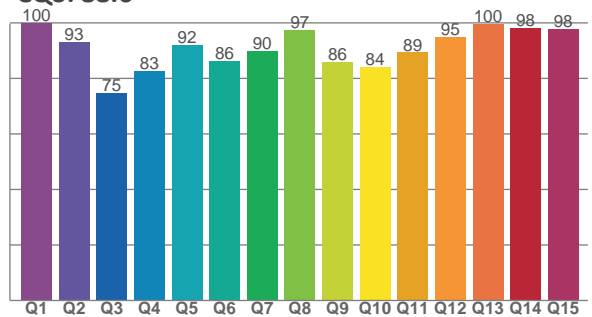
#### TM30 C Values, 16 binned values out of total of 99 C values

C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16
91.5	96.3	86.7	83.0	81.1	81.4	86.5	90.9	92.2	84.1	71.1	77.9	83.0	79.7	80.8	87.2

#### CQS Q Values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
99.9	93.2	74.9	82.7	92.1	86.4	89.9	97.4	85.8	84.0	89.4	94.8	99.5	98.1	97.9

#### CQS: 88.6



### Color Parameters

Color Temperature	Color Rendering Index	Red Component	Color Fidelity	Color Gamut	Color Quality Scale	Color Coordinate CIE 1931	Color Coordinate CIE 1931	Color Coordinate	Color Coordinate	Color Diviation from Black
CCT	CRI	CRI R9	TM30 Rf	TM30 Rg	CQS	x	y	u	v	Δuv
5607 K	87.9	78.1	84.5	108.2	88.6	0.330	0.334	0.208	0.316	-0.0061

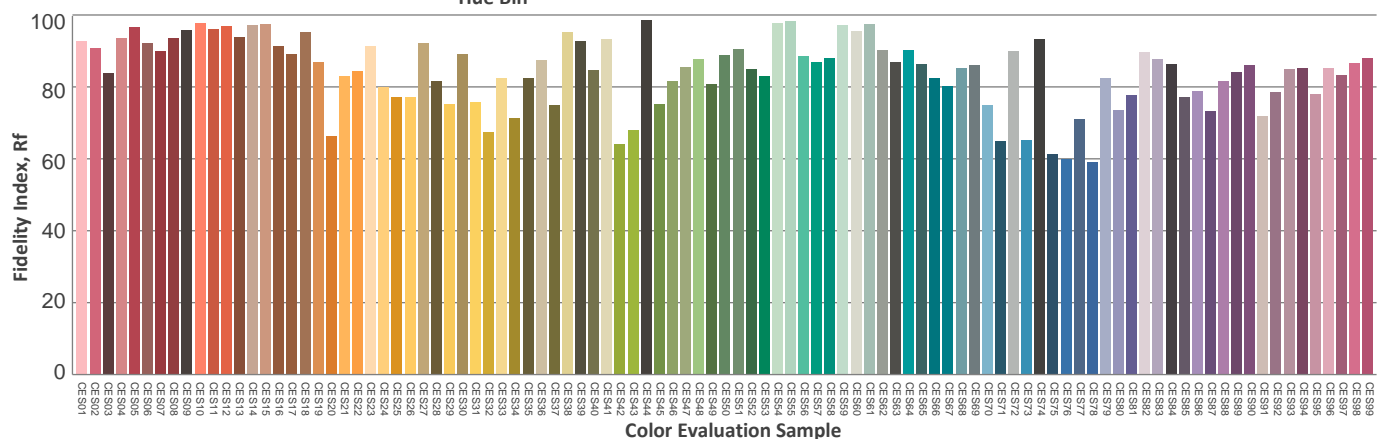
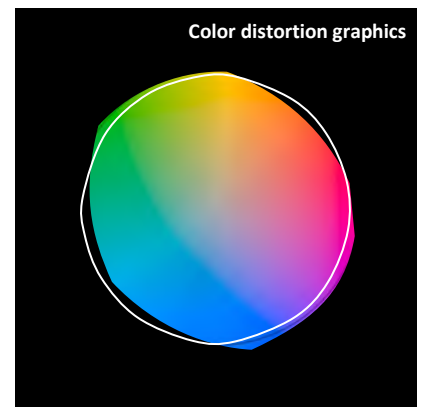
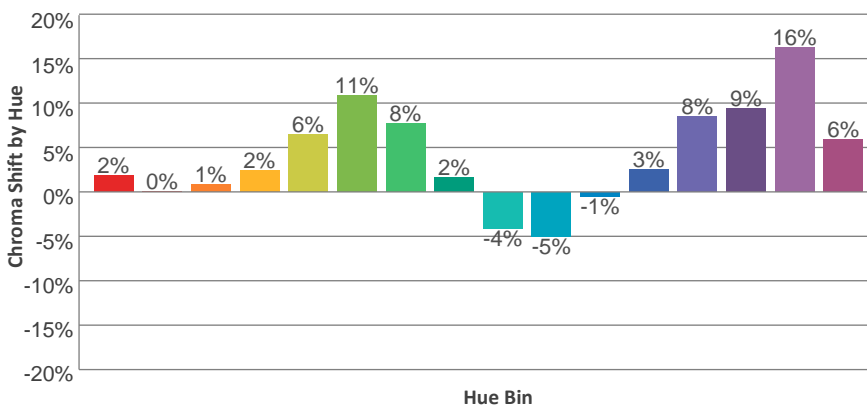
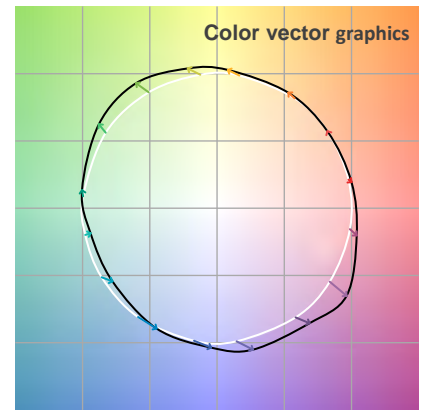
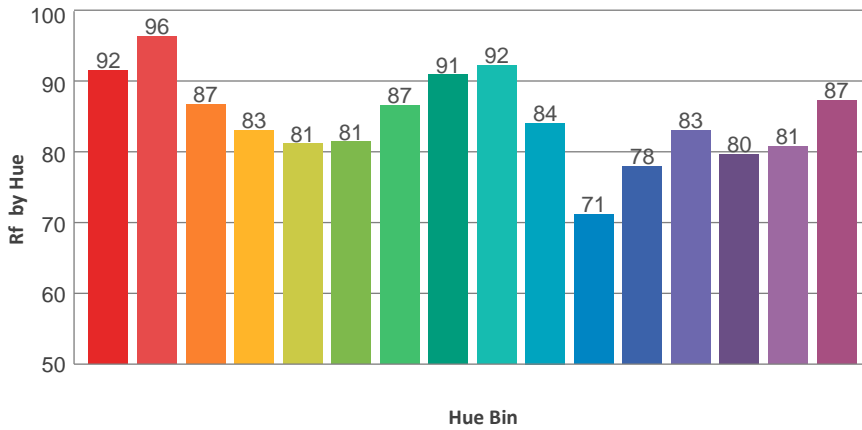
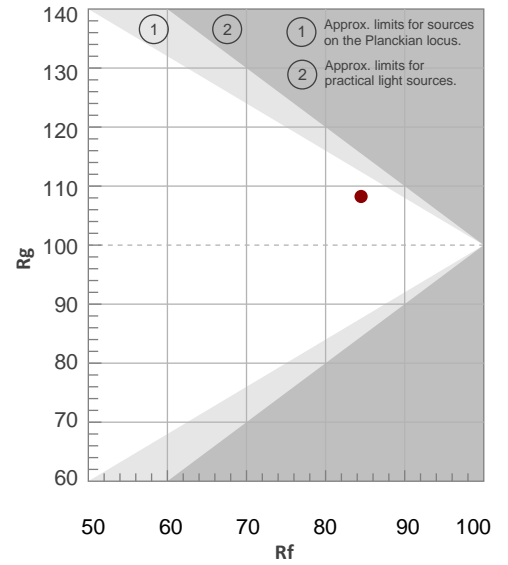


TM30 Details

**Rf 84.5**  
Fidelity Index Rf

**Rg 108.2**  
Gamut Index Rg

Hue Bin	R <sub>f</sub>	Graphic shifts (%)	
		Chroma	Hue
1	92	2%	-2%
2	96	0%	0%
3	87	1%	6%
4	83	2%	9%
5	81	6%	8%
6	81	11%	4%
7	87	8%	-2%
8	91	2%	-4%
9	92	-4%	0%
10	84	-5%	7%
11	71	-1%	16%
12	78	3%	13%
13	83	8%	11%
14	80	9%	6%
15	81	16%	-2%
16	87	6%	-3%



**Total Lumen Output: 9131 lm**

**Color Temperature: 5924 K**

**CRI: 88.0**

**TLCI: 86**

**TM30: 84.6**

**CQS: 88.7**

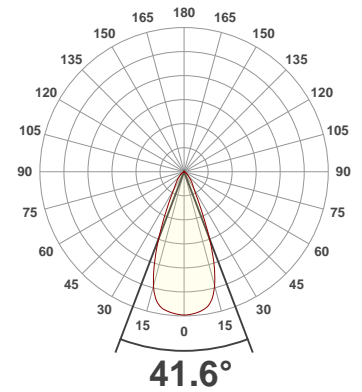
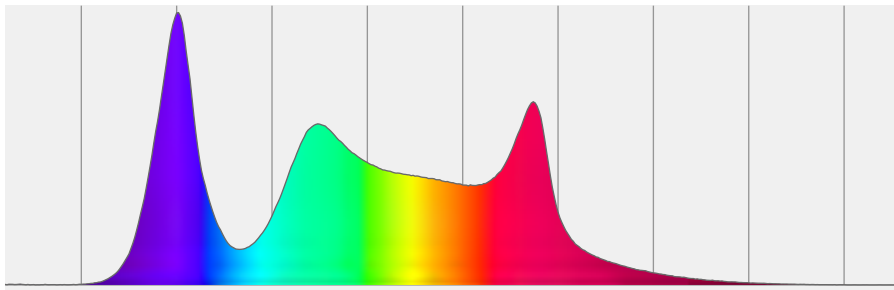
**Measurement Date: 3/11/2020**

**Voltage: 112 V, Current: 1.77 A**

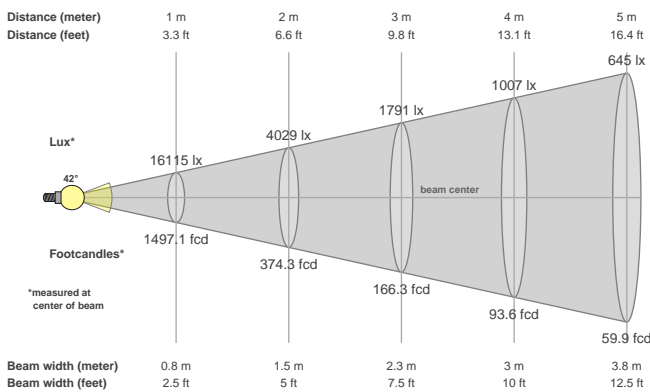
**Power: 195.2 W**

**Efficacy: 47 Lumen/Watt**

**Spectral distribution**  
Dominant Wavelength 607



**Beam details**



**Beam angles**

Beam angle 50%	Field angle 10%	Cutoff angle 2,5%
<b>41.6°</b>	<b>69.6°</b>	<b>103.8°</b>

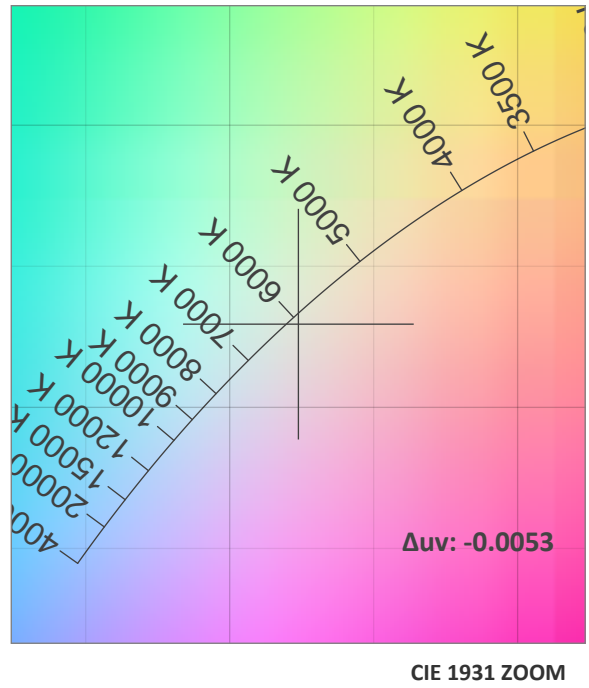
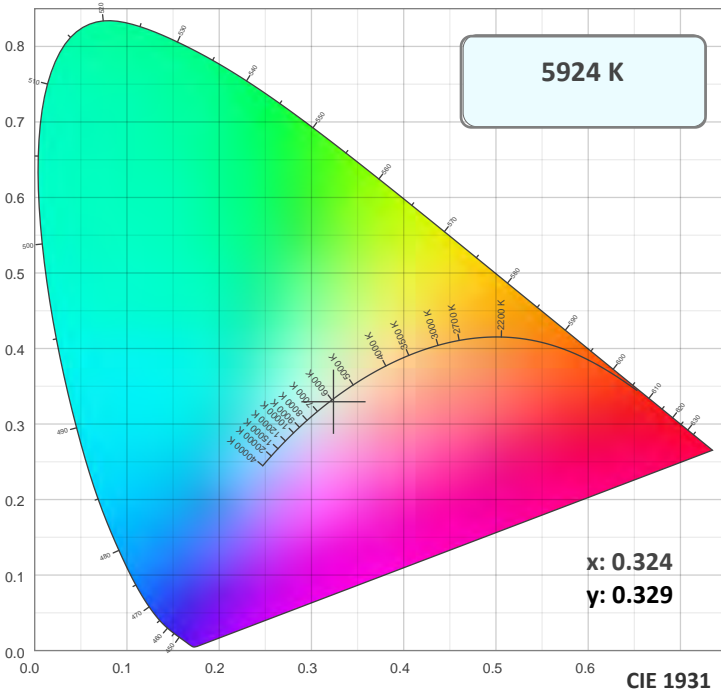
**Beam intensities**

Peak intensity	Int. ratio in 120° cone	Int. ratio in 90° cone
<b>16123 cd</b>	<b>98.9%</b>	<b>93.2%</b>

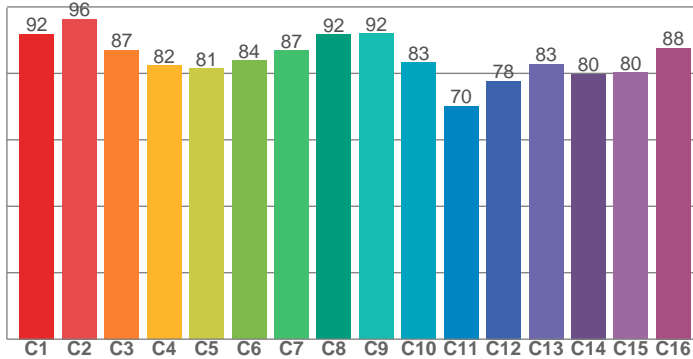
**Beam Intensities from 1-20m**

M	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
<b>FT</b>	3.3	6.6	9.8	13.1	16.4	19.7	23	26.2	29.5	32.8	36.1	39.4	42.7	45.9	49.2	52.5	55.8	59.1	62.3	65.6
<b>LX</b>	16115	4029	1791	1007	645	448	329	252	199	161	133	112	95	82	72	63	56	50	45	40
<b>FC</b>	1497.1	374.3	166.3	93.6	59.9	41.6	30.6	23.4	18.5	15	12.4	10.4	8.9	7.6	6.7	5.8	5.2	4.6	4.1	3.7

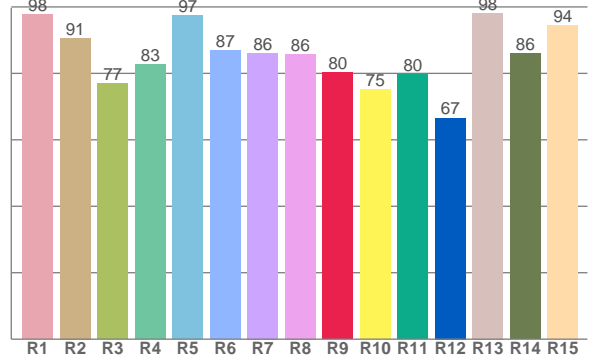
### Color Details



**TM30: 84.6**



**CRI: 88.0 (R1-R8)**



**CRI R values, only R1-R8 are used to calculate final CRI value**

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
97.6	90.6	76.9	82.7	97.3	86.8	86.1	85.8	80.2	75.2	79.7	66.6	98.2	86.0	94.5

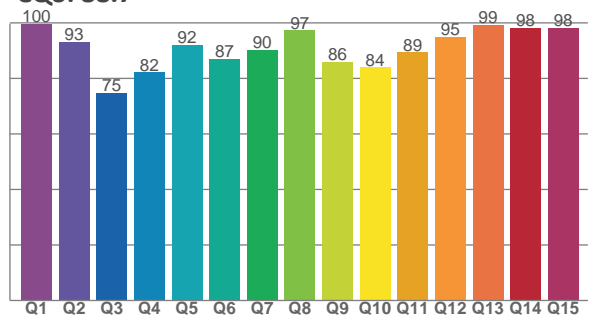
**TM30 C Values, 16 binned values out of total of 99 C values**

C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16
91.8	96.4	87.1	82.4	81.4	83.9	86.9	91.6	91.9	83.2	70.2	77.7	82.9	79.9	80.3	87.6

**CQS Q Values**

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
99.7	93.3	74.9	82.2	92.1	87.1	90.3	97.3	85.8	83.9	89.3	94.8	99.3	98.3	98.1

**CQS: 88.7**



**Color Parameters**

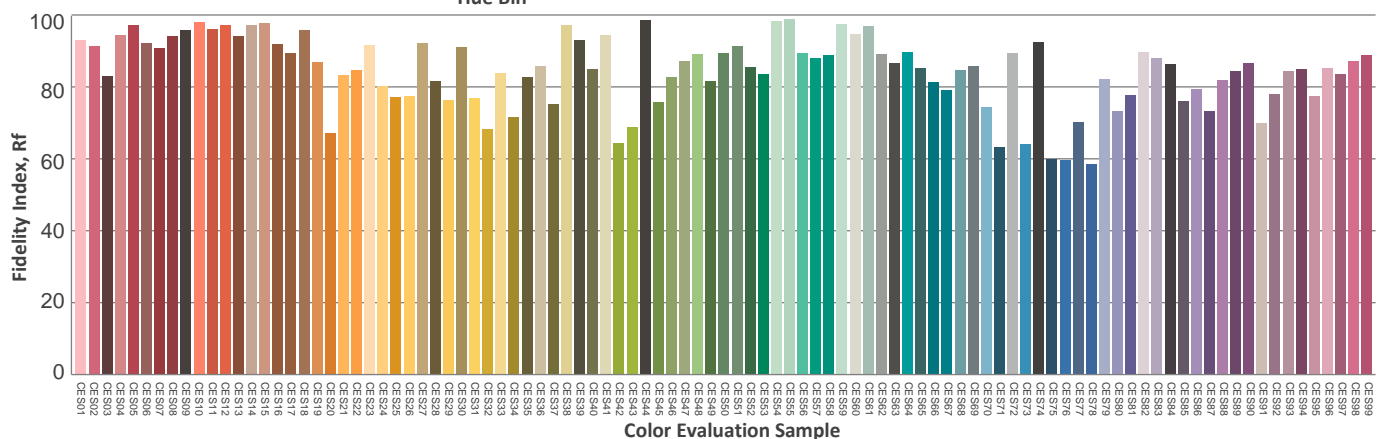
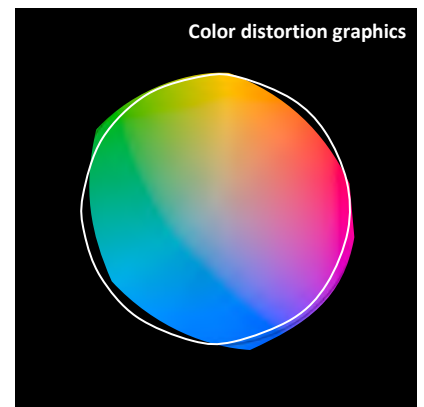
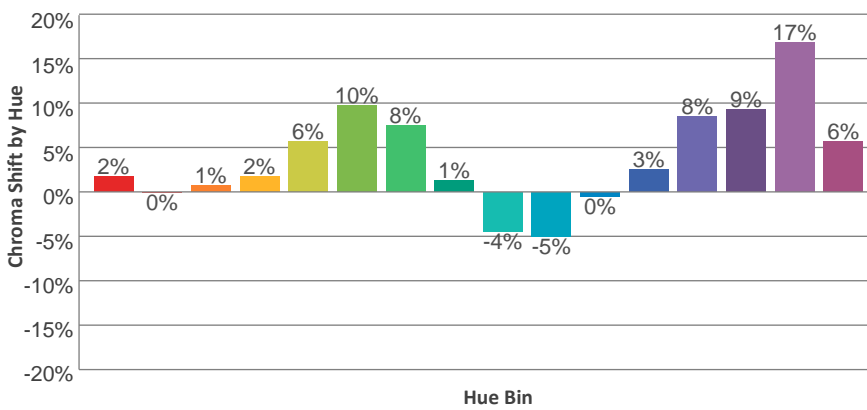
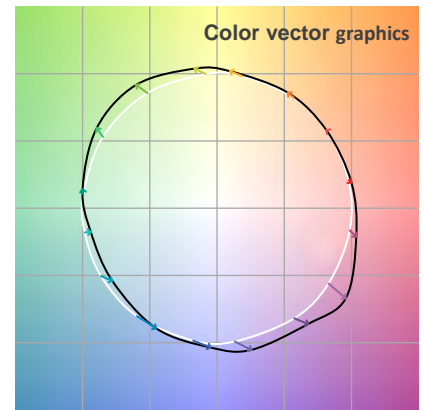
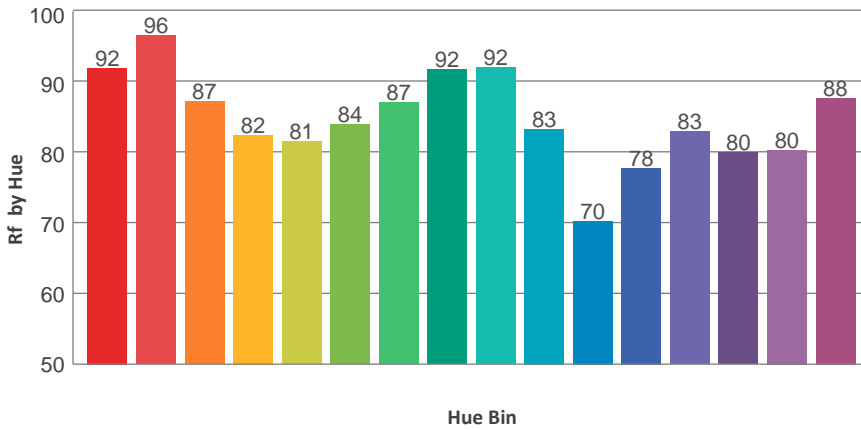
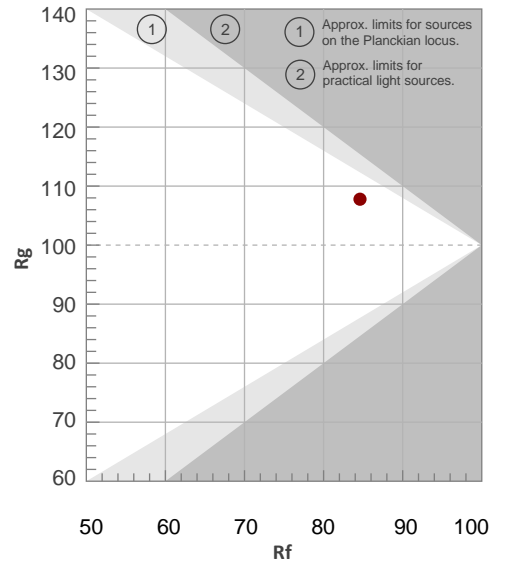
Color Temperature	Color Rendering Index	Red Component	Color Fidelity	Color Gamut	Color Quality Scale	Color Coordinate CIE 1931	Color Coordinate CIE 1931	Color Coordinate	Color Coordinate	Color Diviation from Black
CCT	CRI	CRI R9	TM30 Rf	TM30 Rg	CQS	x	y	u	v	Δuv
5924 K	88.0	80.2	84.6	107.8	88.7	0.324	0.329	0.205	0.313	-0.0053

TM30 Details

**Rf 84.6**  
Fidelity Index Rf

**Rg 107.8**  
Gamut Index Rg

Hue Bin	R <sub>f</sub>	Graphic shifts (%)	
		Chroma	Hue
1	92	2%	-2%
2	96	0%	0%
3	87	1%	6%
4	82	2%	9%
5	81	6%	7%
6	84	10%	4%
7	87	8%	-3%
8	92	1%	-4%
9	92	-4%	0%
10	83	-5%	8%
11	70	0%	17%
12	78	3%	14%
13	83	8%	11%
14	80	9%	6%
15	80	17%	-2%
16	88	6%	-3%



**Total Lumen Output: 8952 lm**

**Color Temperature: 6477 K**

**CRI: 88.0**

**TLCI: 87**

**TM30: 84.3**

**CQS: 88.3**

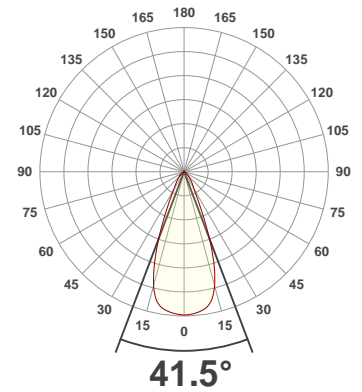
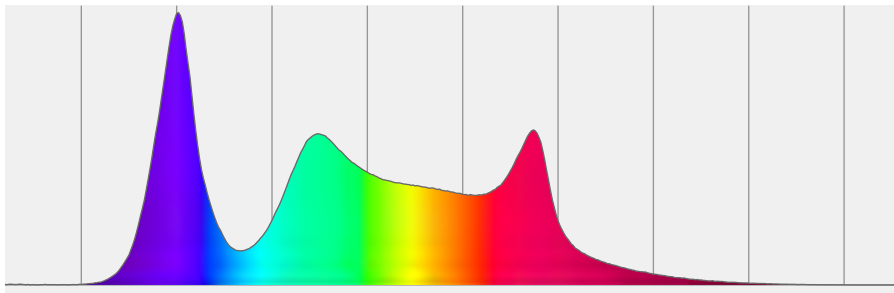
**Measurement Date: 3/11/2020**

**Voltage: 111 V, Current: 1.78 A**

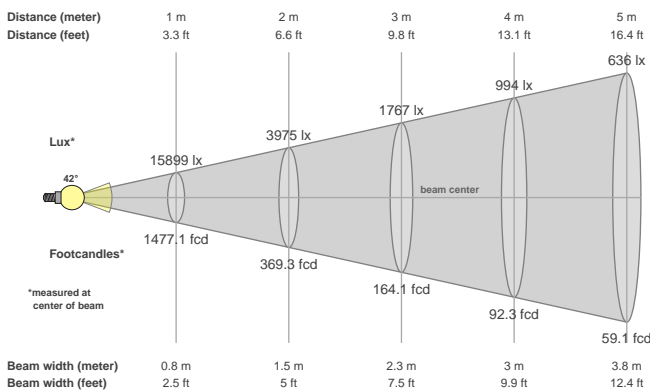
**Power: 194.9 W**

**Efficacy: 46 Lumen/Watt**

**Spectral distribution**  
Dominant Wavelength 360



**Beam details**



**Beam angles**

Beam angle 50%	Field angle 10%	Cutoff angle 2,5%
<b>41.5°</b>	<b>69.4°</b>	<b>103.1°</b>

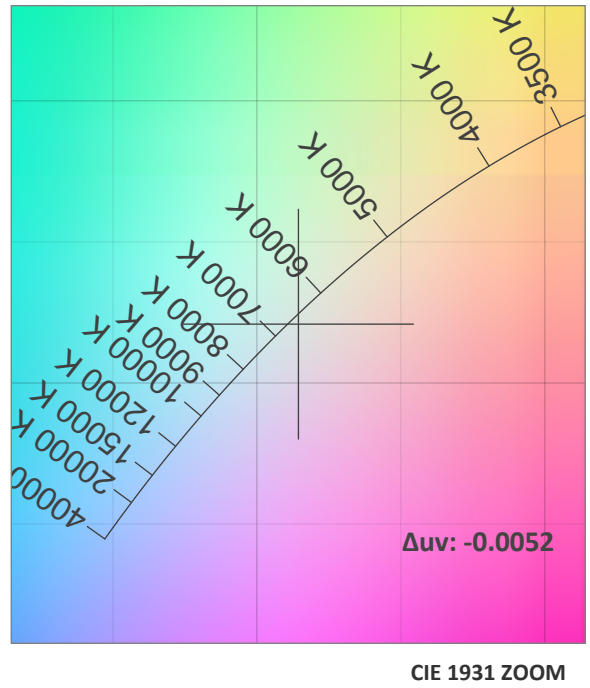
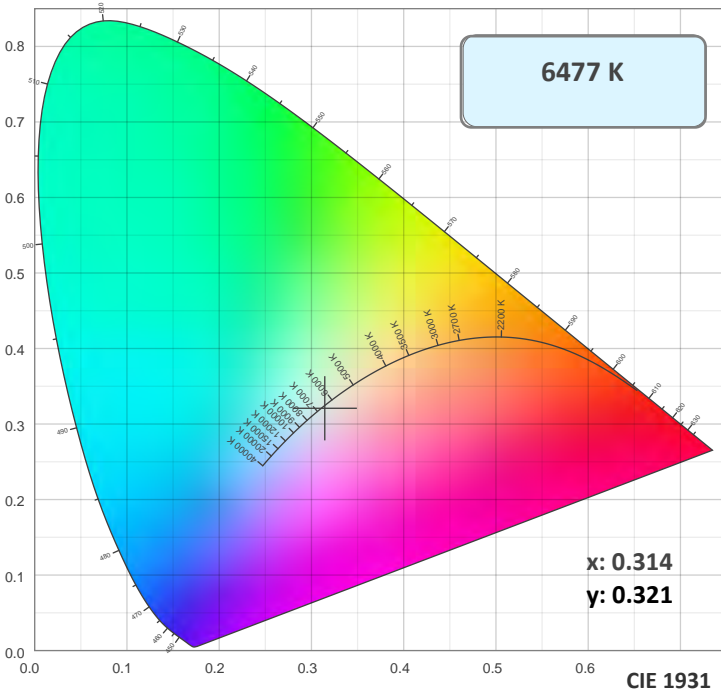
**Beam intensities**

Peak intensity	Int. ratio in 120° cone	Int. ratio in 90° cone
<b>15902 cd</b>	<b>99.0%</b>	<b>93.5%</b>

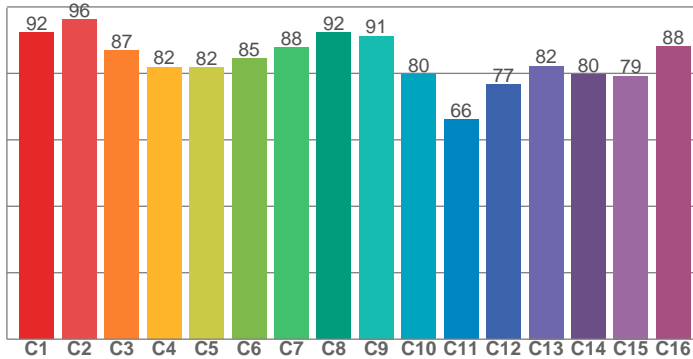
**Beam Intensities from 1-20m**

M	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
<b>FT</b>	3.3	6.6	9.8	13.1	16.4	19.7	23	26.2	29.5	32.8	36.1	39.4	42.7	45.9	49.2	52.5	55.8	59.1	62.3	65.6
<b>LX</b>	15899	3975	1767	994	636	442	324	248	196	159	131	110	94	81	71	62	55	49	44	40
<b>FC</b>	1477.1	369.3	164.1	92.3	59.1	41	30.1	23.1	18.2	14.8	12.2	10.3	8.7	7.5	6.6	5.8	5.1	4.6	4.1	3.7

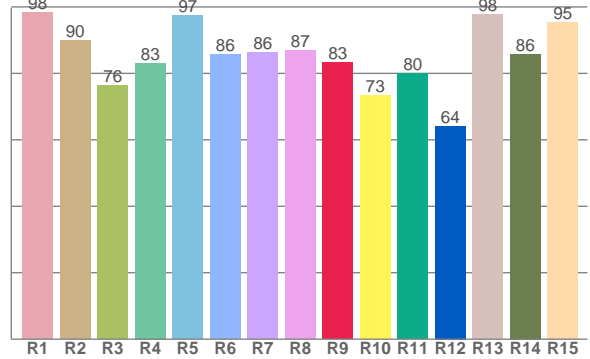
### Color Details



#### TM30: 84.3



#### CRI: 88.0 (R1-R8)



#### CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
98.4	89.9	76.3	83.1	97.4	85.8	86.3	86.9	83.3	73.4	79.9	64.1	97.7	85.8	95.5

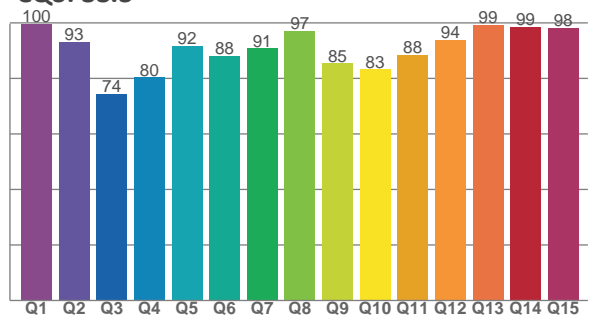
#### TM30 C Values, 16 binned values out of total of 99 C values

C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16
92.2	96.2	86.8	81.9	81.7	84.5	87.9	92.3	91.3	79.6	66.0	76.7	82.2	79.7	79.2	88.1

#### CQS Q Values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
99.6	93.2	74.3	80.4	91.6	88.2	90.8	97.2	85.4	83.2	88.3	93.9	99.3	98.5	98.3

#### CQS: 88.3



### Color Parameters

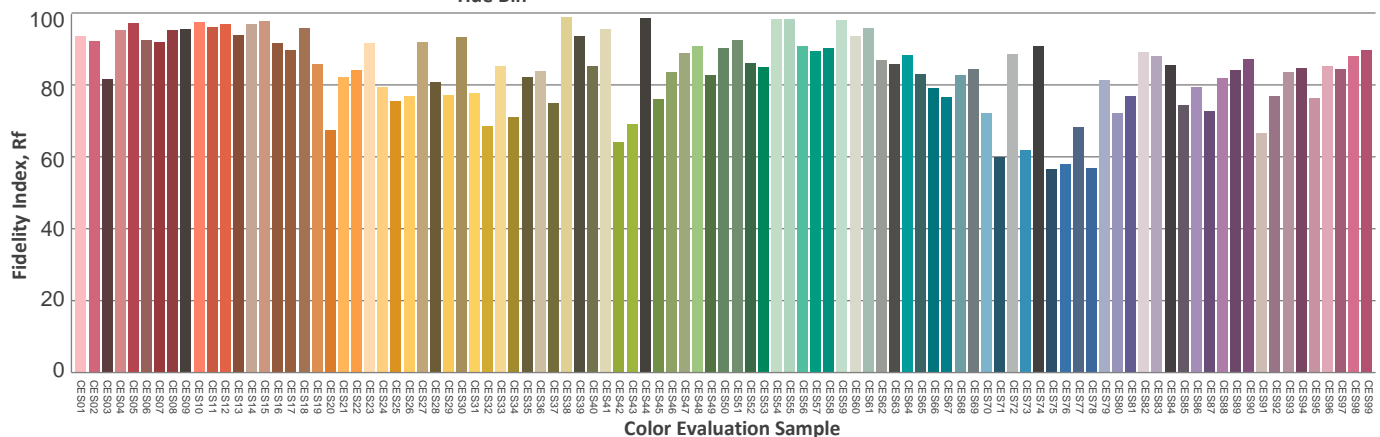
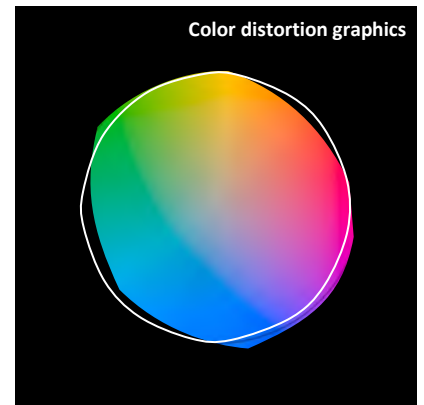
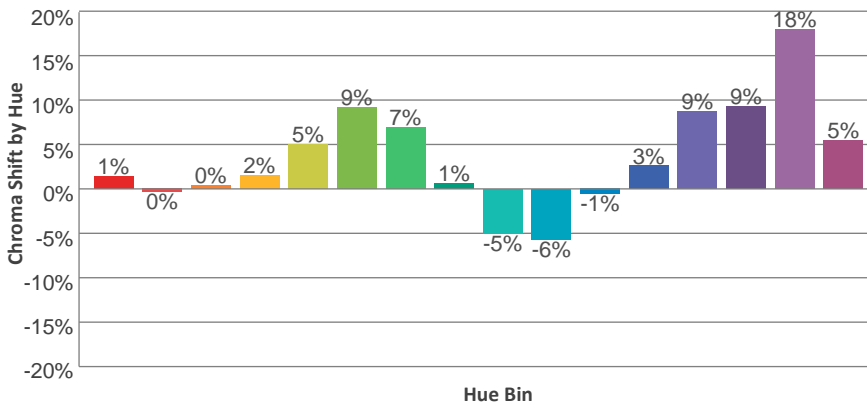
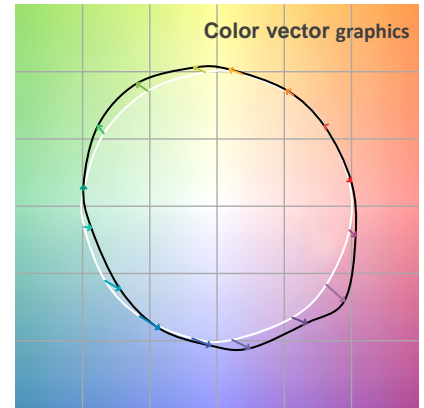
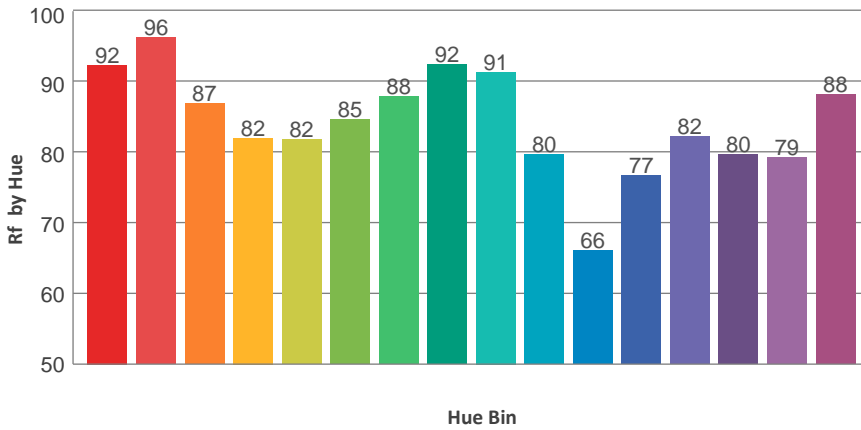
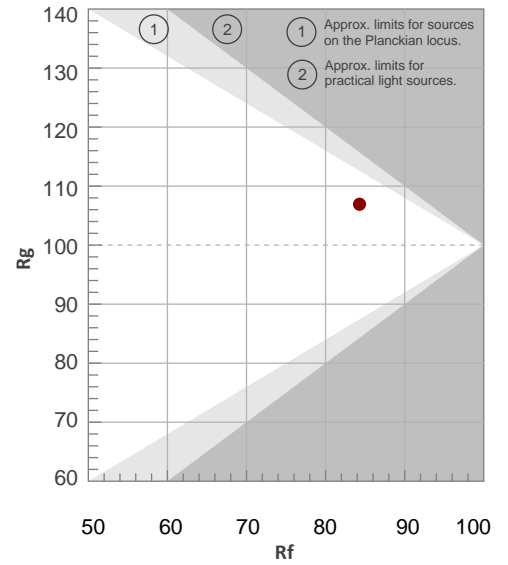
Color Temperature	Color Rendering Index	Red Component	Color Fidelity	Color Gamut	Color Quality Scale	Color Coordinate CIE 1931	Color Coordinate CIE 1931	Color Coordinate	Color Coordinate	Color Diviation from Black
CCT	CRI	CRI R9	TM30 Rf	TM30 Rg	CQS	x	y	u	v	Δuv
6477 K	88.0	83.3	84.3	106.9	88.3	0.314	0.321	0.202	0.309	-0.0052

TM30 Details

**Rf 84.3**  
Fidelity Index Rf

**Rg 106.9**  
Gamut Index Rg

Hue Bin	R <sub>f</sub>	Graphic shifts (%)	
		Chroma	Hue
1	92	1%	-2%
2	96	0%	1%
3	87	0%	6%
4	82	2%	10%
5	82	5%	7%
6	85	9%	4%
7	88	7%	-3%
8	92	1%	-3%
9	91	-5%	2%
10	80	-6%	11%
11	66	-1%	17%
12	77	3%	14%
13	82	9%	11%
14	80	9%	6%
15	79	18%	-3%
16	88	5%	-3%



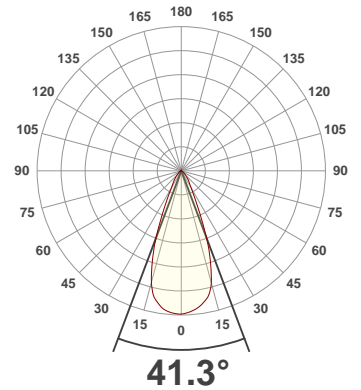
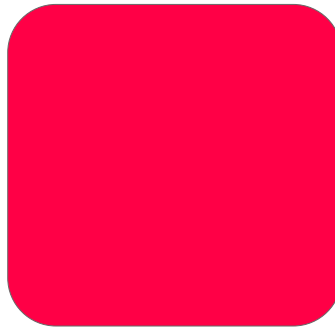
**Total Lumen Output: 1216 lm**

**Voltage: 115 V, Current: 0.368 A**

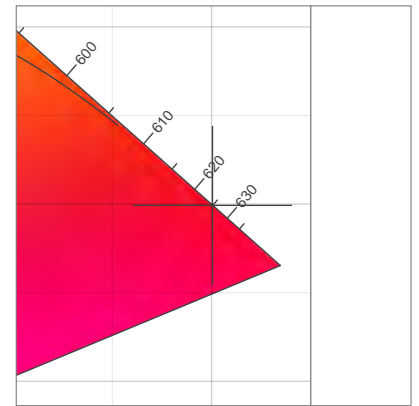
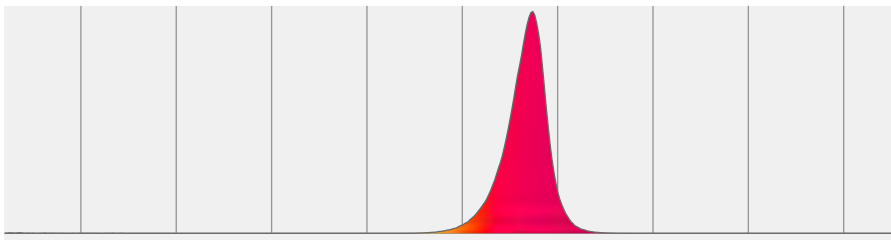
**Power: 35.8 W**

**Efficacy: 34 Lumen/Watt**

**Measurement Date: 3/11/2020**

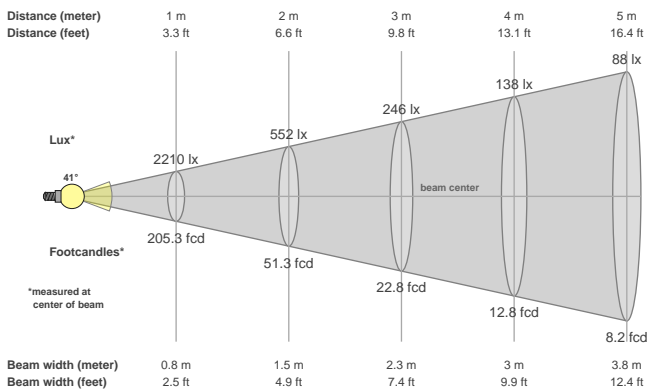


### Spectral distribution



Dominant Wavelength	Color coordinate cie 1931	Color coordinate cie 1931	Color coordinate	Color coordinate
nm	x	y	u	v
625	0.700	0.299	0.540	0.346

### Beam details



### Beam angles

Beam angle 50%	Field angle 10%	Cutoff angle 2,5%
41.3°	68.3°	101°

### Beam intensities

Peak intensity	Int. ratio in 120° cone	Int. ratio in 90° cone
2211 cd	98.8%	93.6%

### Beam Intensities from 1-20m

M	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
FT	3.3	6.6	9.8	13.1	16.4	19.7	23	26.2	29.5	32.8	36.1	39.4	42.7	45.9	49.2	52.5	55.8	59.1	62.3	65.6
LX	2210	552	246	138	88	61	45	35	27	22	18	15	13	11	10	9	8	7	6	6
FC	205.3	51.3	22.8	12.8	8.2	5.7	4.2	3.2	2.5	2.1	1.7	1.4	1.2	1	0.9	0.8	0.7	0.6	0.6	0.5



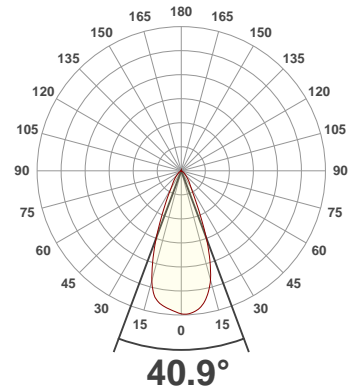
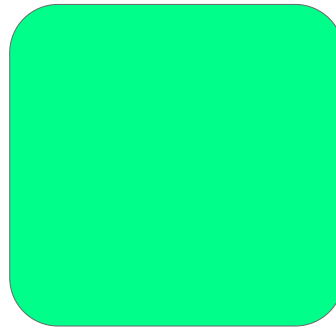
**Total Lumen Output: 1882 lm**

**Voltage: 114 V, Current: 0.453 A**

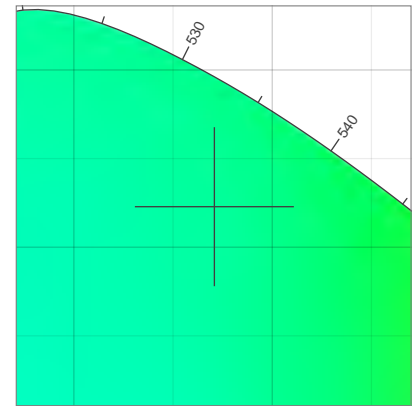
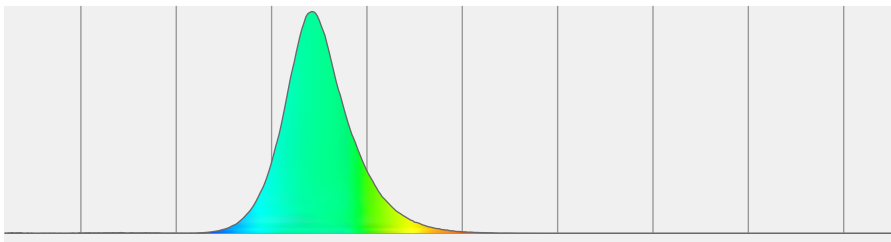
**Power: 46.8 W**

**Efficacy: 40 Lumen/Watt**

**Measurement Date: 3/11/2020**

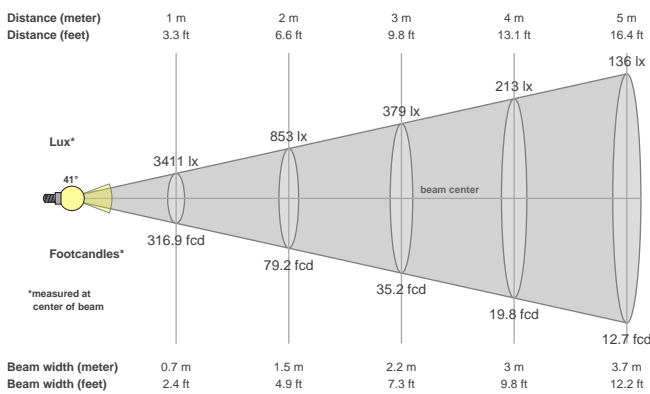


### Spectral distribution



Dominant Wavelength	Color coordinate cie 1931	Color coordinate cie 1931	Color coordinate	Color coordinate
nm	x	y	u	v
528	0.171	0.723	0.060	0.383

### Beam details



### Beam angles

Beam angle 50%	Field angle 10%	Cutoff angle 2,5%
40.9°	69.3°	102°

### Beam intensities

Peak intensity	Int. ratio in 120° cone	Int. ratio in 90° cone
3418 cd	98.8%	93.3%

### Beam Intensities from 1-20m

M	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
FT	3.3	6.6	9.8	13.1	16.4	19.7	23	26.2	29.5	32.8	36.1	39.4	42.7	45.9	49.2	52.5	55.8	59.1	62.3	65.6
LX	3411	853	379	213	136	95	70	53	42	34	28	24	20	17	15	13	12	11	9	9
FC	316.9	79.2	35.2	19.8	12.7	8.8	6.5	5	3.9	3.2	2.6	2.2	1.9	1.6	1.4	1.2	1.1	1	0.9	0.8

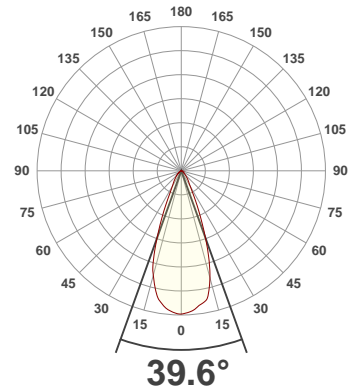
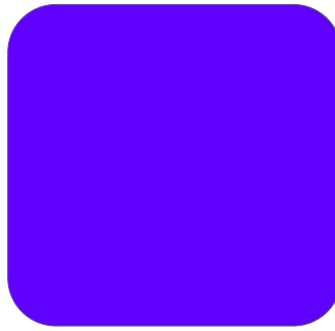
**Total Lumen Output: 370 lm**

**Voltage: 114 V, Current: 0.425 A**

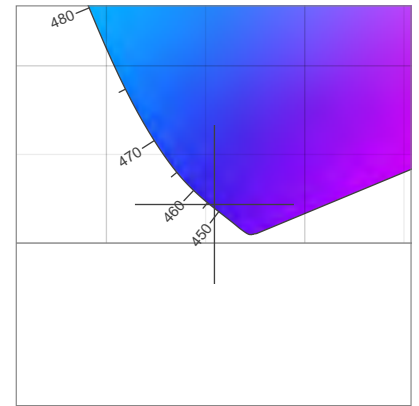
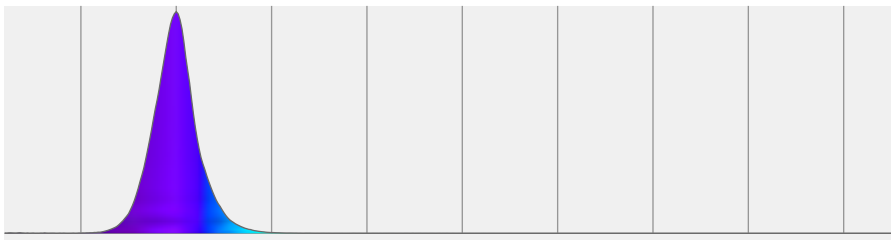
**Power: 43.0 W**

**Efficacy: 9 Lumen/Watt**

**Measurement Date: 3/11/2020**

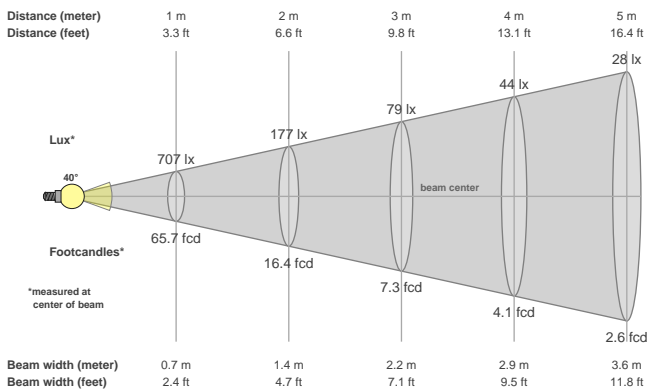


### Spectral distribution



Dominant Wavelength	Color coordinate cie 1931	Color coordinate cie 1931	Color coordinate	Color coordinate
nm	x	y	u	v
453	0.154	0.022	0.209	0.044

### Beam details



### Beam angles

Beam angle 50%	Field angle 10%	Cutoff angle 2,5%
39.6°	65.8°	100.5°

### Beam intensities

Peak intensity	Int. ratio in 120° cone	Int. ratio in 90° cone
708 cd	98.2%	92.8%

### Beam Intensities from 1-20m

M	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
FT	3.3	6.6	9.8	13.1	16.4	19.7	23	26.2	29.5	32.8	36.1	39.4	42.7	45.9	49.2	52.5	55.8	59.1	62.3	65.6
LX	707	177	79	44	28	20	14	11	9	7	6	5	4	4	3	3	2	2	2	2
FC	65.7	16.4	7.3	4.1	2.6	1.8	1.3	1	0.8	0.7	0.5	0.5	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.2

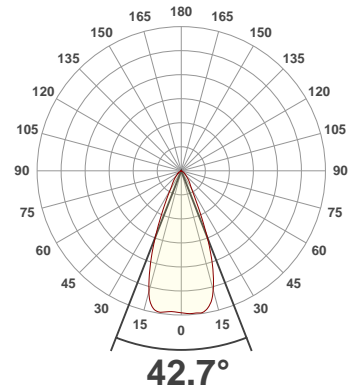
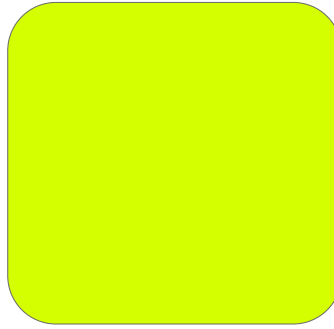
**Total Lumen Output: 3180 lm**

**Voltage: 114 V, Current: 0.481 A**

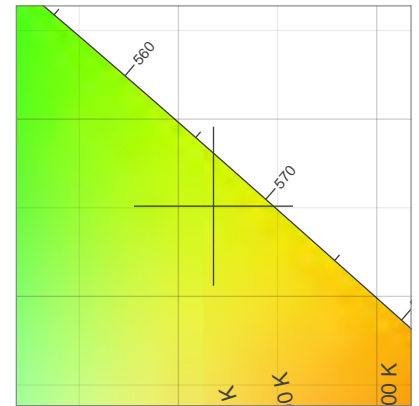
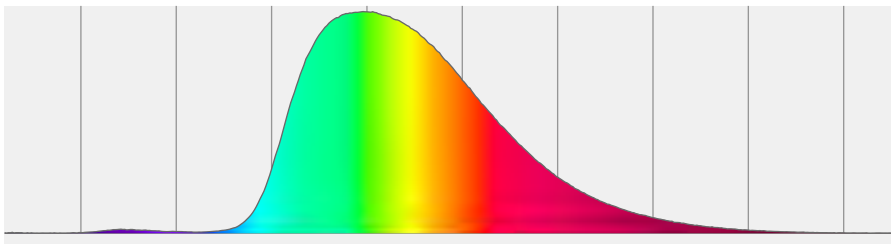
**Power: 50.4 W**

**Efficacy: 63 Lumen/Watt**

**Measurement Date: 3/11/2020**

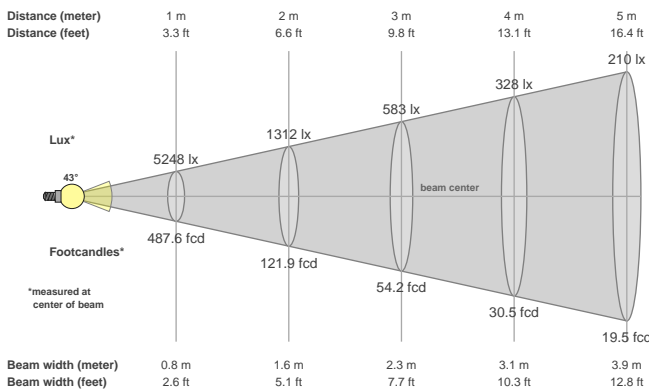


### Spectral distribution



Dominant Wavelength	Color coordinate cie 1931	Color coordinate cie 1931	Color coordinate	Color coordinate
nm	x	y	u	v
568	0.418	0.551	0.190	0.377

### Beam details



### Beam angles

Beam angle 50%	Field angle 10%	Cutoff angle 2,5%
42.7°	71°	105.9°

### Beam intensities

Peak intensity	Int. ratio in 120° cone	Int. ratio in 90° cone
5296 cd	98.4%	92.5%

### Beam Intensities from 1-20m

M	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
FT	3.3	6.6	9.8	13.1	16.4	19.7	23	26.2	29.5	32.8	36.1	39.4	42.7	45.9	49.2	52.5	55.8	59.1	62.3	65.6
LX	5248	1312	583	328	210	146	107	82	65	52	43	36	31	27	23	21	18	16	15	13
FC	487.6	121.9	54.2	30.5	19.5	13.5	10	7.6	6	4.9	4	3.4	2.9	2.5	2.2	1.9	1.7	1.5	1.4	1.2

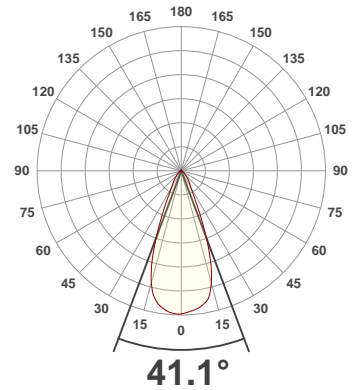
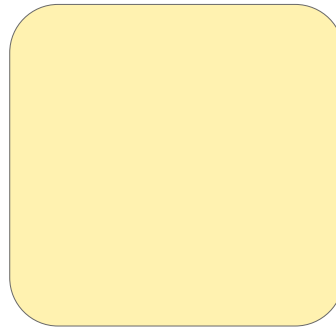
**Total Lumen Output: 4311 lm**

**Voltage: 113 V, Current: 0.767 A**

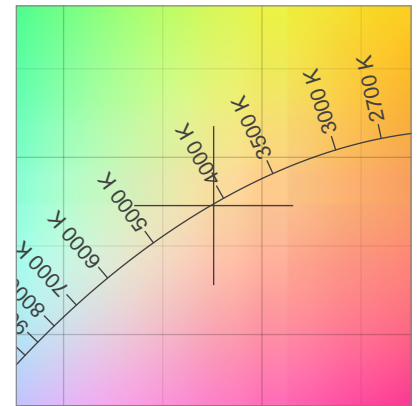
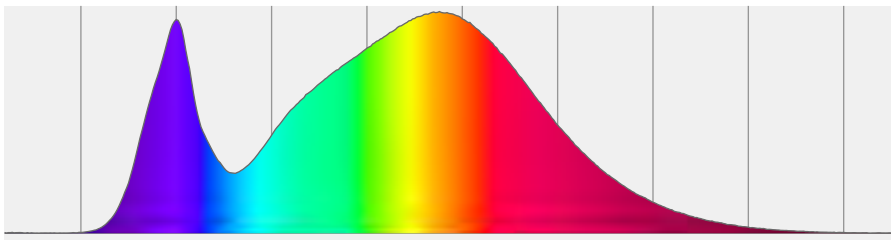
**Power: 84.1 W**

**Efficacy: 51 Lumen/Watt**

**Measurement Date: 3/11/2020**

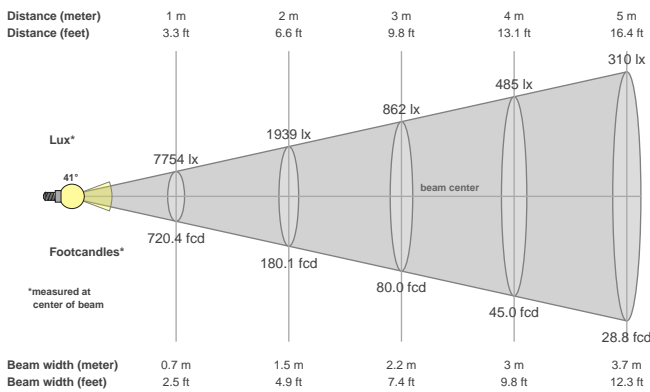


**Spectral distribution**



Dominant Wavelength	Color coordinate cie 1931	Color coordinate cie 1931	Color coordinate	Color coordinate
nm	x	y	u	v
582	0.376	0.373	0.224	0.333

**Beam details**



**Beam angles**

Beam angle 50%	Field angle 10%	Cutoff angle 2,5%
41.1°	68.6°	104°

**Beam intensities**

Peak intensity	Int. ratio in 120° cone	Int. ratio in 90° cone
7768 cd	98.6%	92.8%

**Beam Intensities from 1-20m**

M	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
FT	3.3	6.6	9.8	13.1	16.4	19.7	23	26.2	29.5	32.8	36.1	39.4	42.7	45.9	49.2	52.5	55.8	59.1	62.3	65.6
LX	7754	1939	862	485	310	215	158	121	96	78	64	54	46	40	34	30	27	24	21	19
FC	720.4	180.1	80	45	28.8	20	14.7	11.3	8.9	7.2	6	5	4.3	3.7	3.2	2.8	2.5	2.2	2	1.8