



## KL Fresnel 8 FC

Photometric Test Report

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# CONTENTS

Testing Process	4
Full On Zoom Out	5
Full On Zoom 50%	8
Full On Zoom In	11
2700K	14
3200K	17
4500K	20
5600K	23
6000K	26
6500K	29
Red	32
Green	33
Blue	34
Mint	35
Amber	36

# Testing Process

## 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  $2\pi$  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.

## Test Lab Equipment and Process

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 C700T](#)

**Total Lumen Output: 16505 lm**

**Color Temperature: 6927 K**

**CRI: 91.5**

**TLCI: 94**

**TM30: 88.2**

**CQS: 89.9**

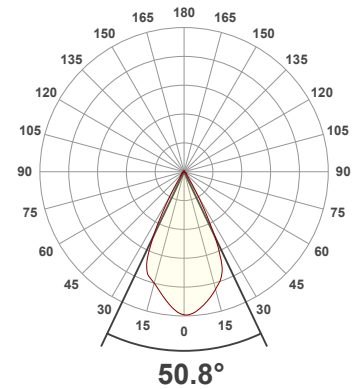
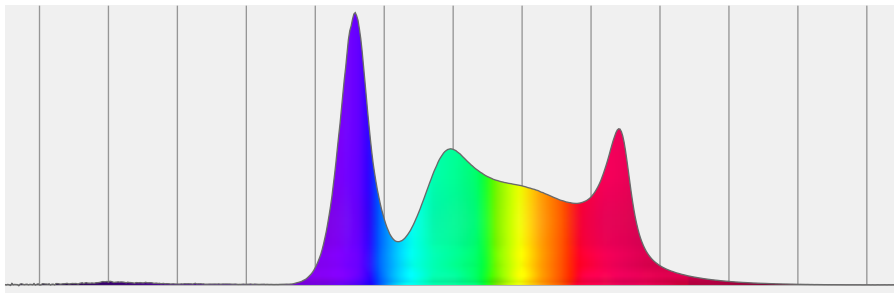
**Measurement Date: 3/29/2021**

**Voltage: 116 V, Current: 4.85 A**

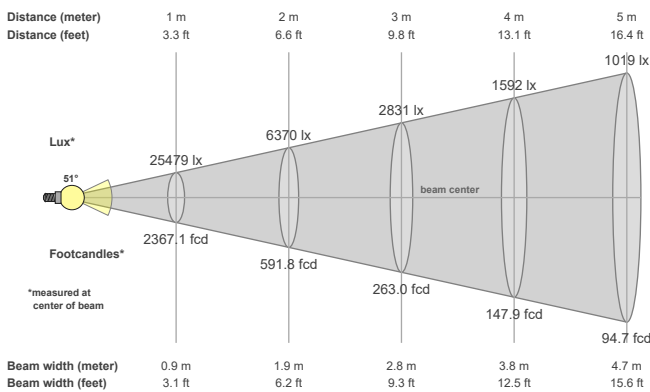
**Power: 560 W**

**Efficacy: 29 Lumen/Watt**

**Spectral distribution**  
Dominant Wavelength 360



**Beam details**



**Beam angles**

Beam angle 50%	Field angle 10%	Cutoff angle 2,5%
<b>50.8°</b>	<b>66.1°</b>	<b>88.2°</b>

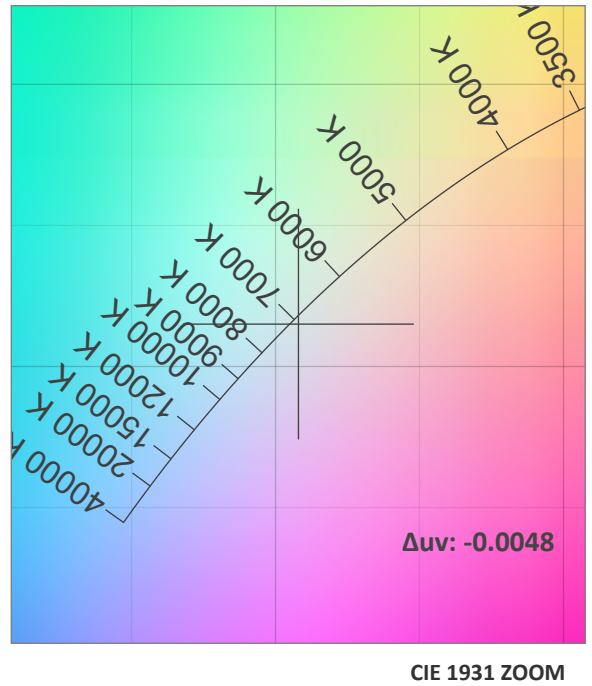
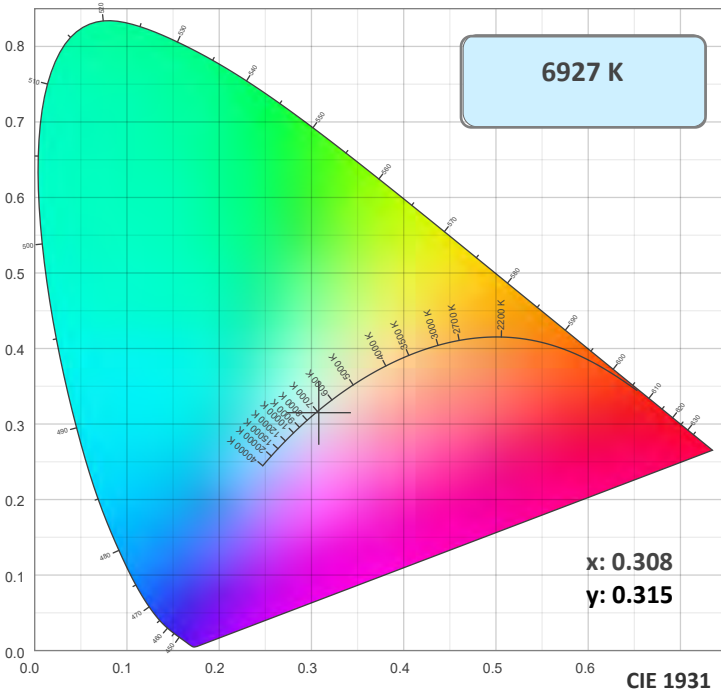
**Beam intensities**

Peak intensity	Int. ratio in 120° cone	Int. ratio in 90° cone
<b>25590 cd</b>	<b>97.7%</b>	<b>94.4%</b>

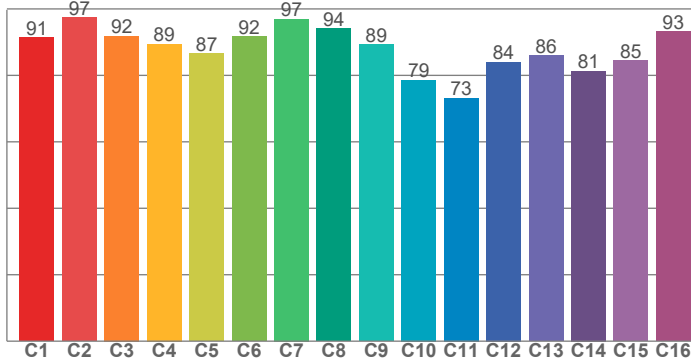
**Beam Intensities from 1-20m**

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>	25479	6370	2831	1592	1019	708	520	398	315	255	211	177	151	130	113	100	88	79	71	64
<b>FC</b>	2367.1	591.8	263	147.9	94.7	65.8	48.3	37	29.2	23.7	19.6	16.4	14	12.1	10.5	9.2	8.2	7.3	6.6	5.9

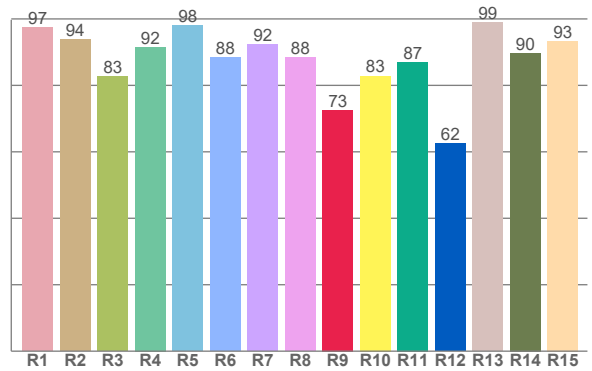
### Color Details



#### TM30: 88.2



#### CRI: 91.5 (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
97.4	93.8	82.6	91.5	97.9	88.3	92.4	88.3	72.6	82.8	87.0	62.4	99.0	89.7	93.3

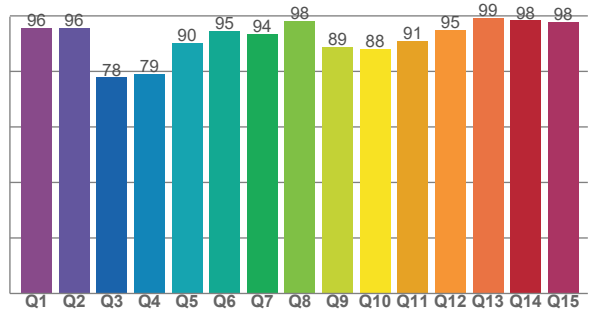
#### TM30 C Values, 16 binned values out of total of 99 C values

C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16
91.3	97.5	91.9	89.4	86.6	91.7	97.0	94.0	89.3	78.6	73.2	84.0	85.9	81.3	84.6	93.3

#### CQS Q Values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
95.8	95.7	77.8	79.1	90.2	94.6	93.6	98.3	88.8	88.1	90.9	94.9	99.2	98.4	97.7

#### CQS: 89.9



### Color Parameters

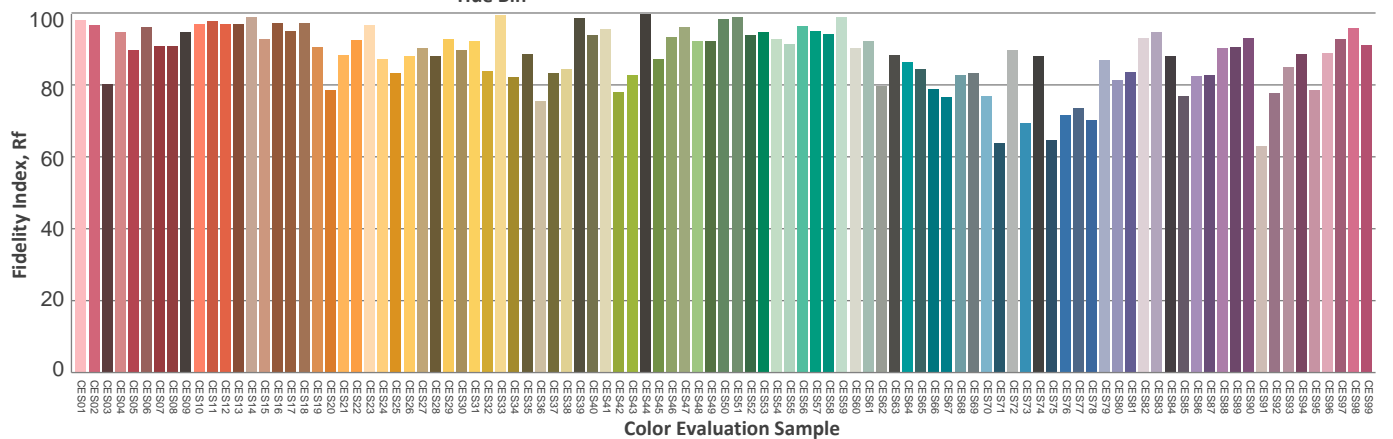
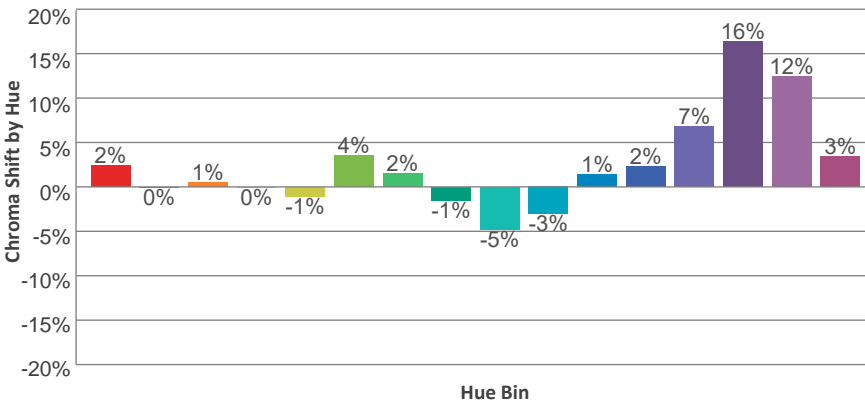
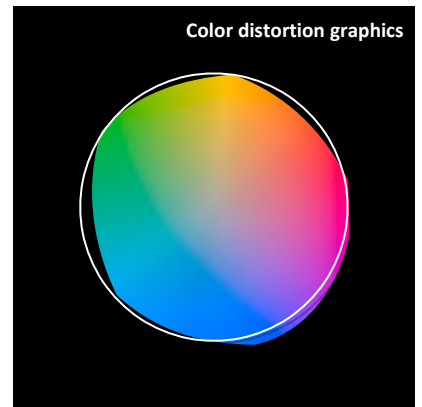
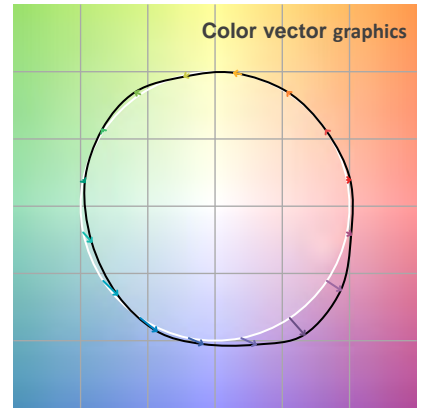
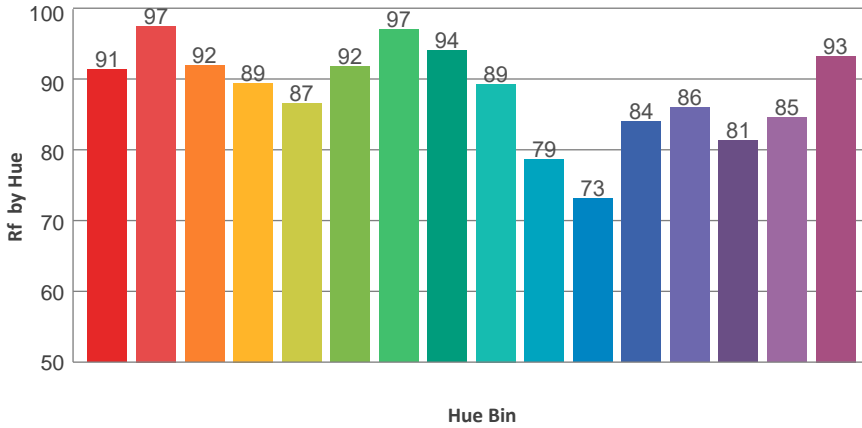
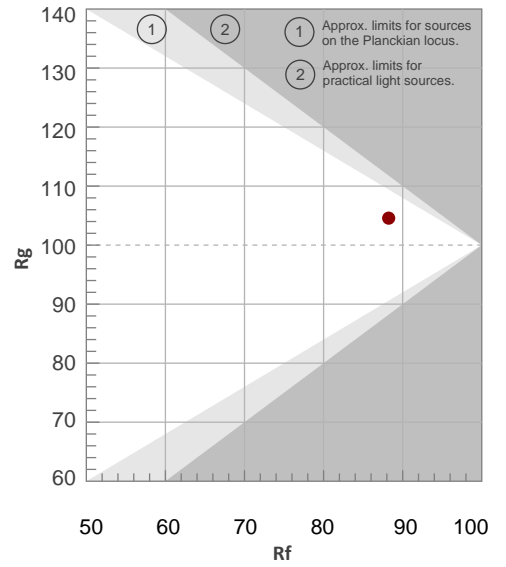
Color Temperature	Color Rendering Index	Red Component	Color Fidelity	Color Gamut	Color Quality Scale	Color Coordinate CIE 1931	Color Coordinate CIE 1931	Color Coordinate	Color Coordinate	Color Diviation from Black
CCT	CRI	CRI R9	TM30 Rf	TM30 Rg	CQS	x	y	u	v	Δuv
6927 K	91.5	72.6	88.2	104.6	89.9	0.308	0.315	0.200	0.307	-0.0048

TM30 Details

**Rf 88.2**  
Fidelity Index Rf

**Rg 104.6**  
Gamut Index Rg

Hue Bin	R <sub>f</sub>	Graphic shifts (%)	
		Chroma	Hue
1	91	2%	0%
2	97	0%	1%
3	92	1%	2%
4	89	0%	5%
5	87	-1%	3%
6	92	4%	2%
7	97	2%	-1%
8	94	-1%	1%
9	89	-5%	8%
10	79	-3%	14%
11	73	1%	15%
12	84	2%	11%
13	86	7%	10%
14	81	16%	2%
15	85	12%	0%
16	93	3%	-1%



**Total Lumen Output: 11697 lm**

**Color Temperature: 6880 K**

**CRI: 91.4**

**TLCI: 93**

**TM30: 88.1**

**CQS: 89.9**

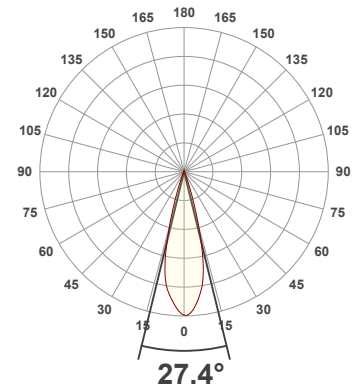
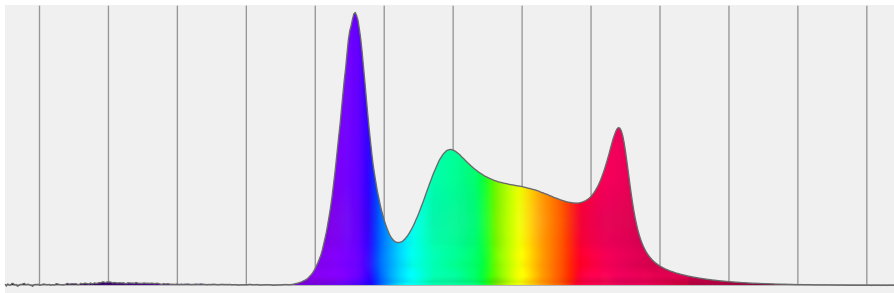
**Measurement Date: 3/29/2021**

**Voltage: 116 V, Current: 4.12 A**

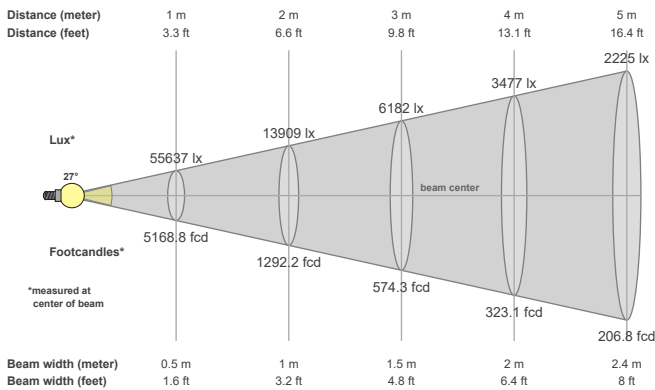
**Power: 479 W**

**Efficacy: 24 Lumen/Watt**

**Spectral distribution**  
Dominant Wavelength 360



**Beam details**



**Beam angles**

Beam angle 50%	Field angle 10%	Cutoff angle 2,5%
27.4°	40.2°	50°

**Beam intensities**

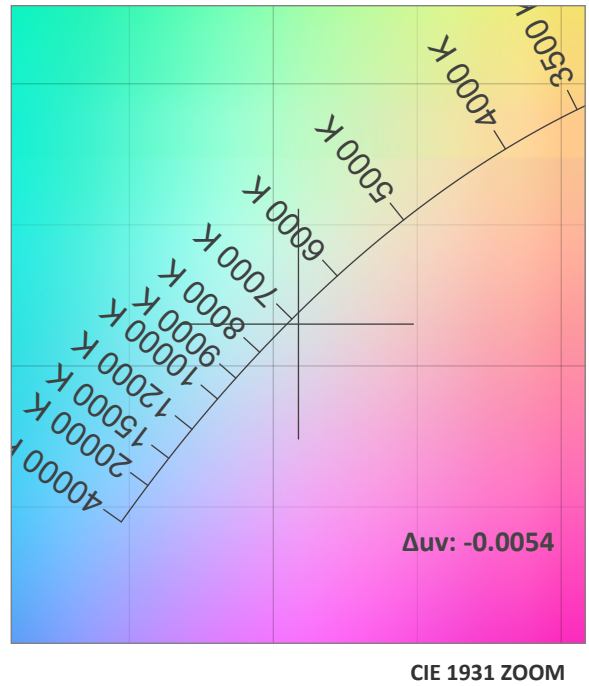
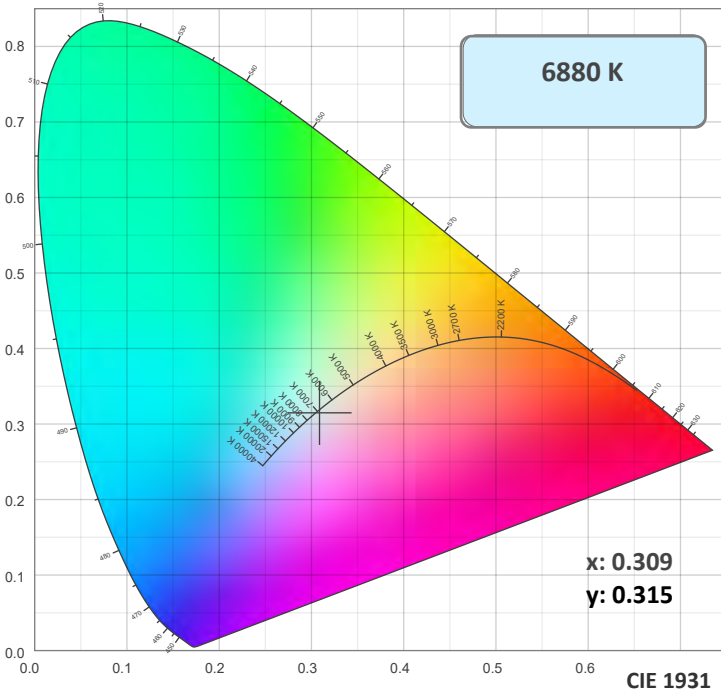
Peak intensity	Int. ratio in 120° cone	Int. ratio in 90° cone
55782 cd	100.0%	99.3%

**Beam Intensities from 1-20m**

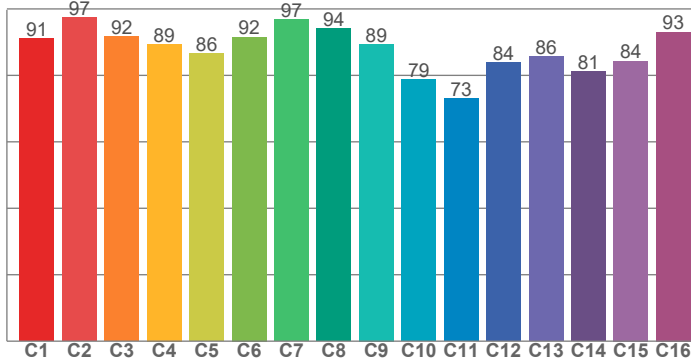
M	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
FT	3.3	6.6	9.8	13.1	16.4	19.7	23	26.2	29.5	32.8	36.1	39.4	42.7	45.9	49.2	52.5	55.8	59.1	62.3	65.6
LX	55637	13909	6182	3477	2225	1545	1135	869	687	556	460	386	329	284	247	217	193	172	154	139
FC	5168.8	1292.2	574.3	323.1	206.8	143.6	105.5	80.8	63.8	51.7	42.7	35.9	30.6	26.4	23	20.2	17.9	16	14.3	12.9



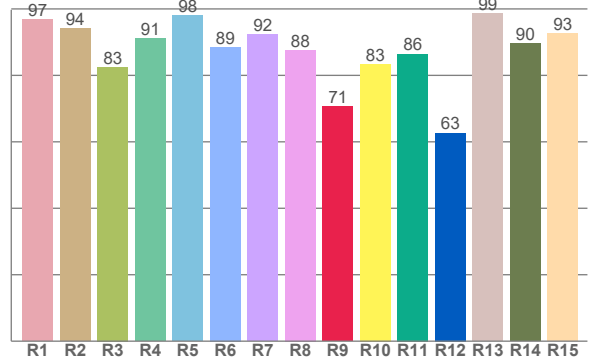
### Color Details



#### TM30: 88.1



#### CRI: 91.4 (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
96.9	94.1	82.5	91.1	98.1	88.5	92.3	87.7	70.6	83.4	86.5	62.7	98.6	89.6	92.6

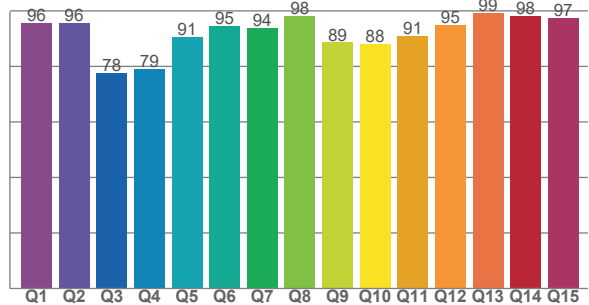
#### TM30 C Values, 16 binned values out of total of 99 C values

C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16
91.1	97.3	91.8	89.4	86.5	91.6	96.9	94.1	89.4	78.7	73.1	83.9	85.7	81.1	84.3	93.0

#### CQS Q Values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
95.6	95.6	77.7	79.2	90.5	94.7	93.8	98.2	88.6	88.1	91.0	94.9	99.2	98.2	97.5

#### CQS: 89.9



### Color Parameters

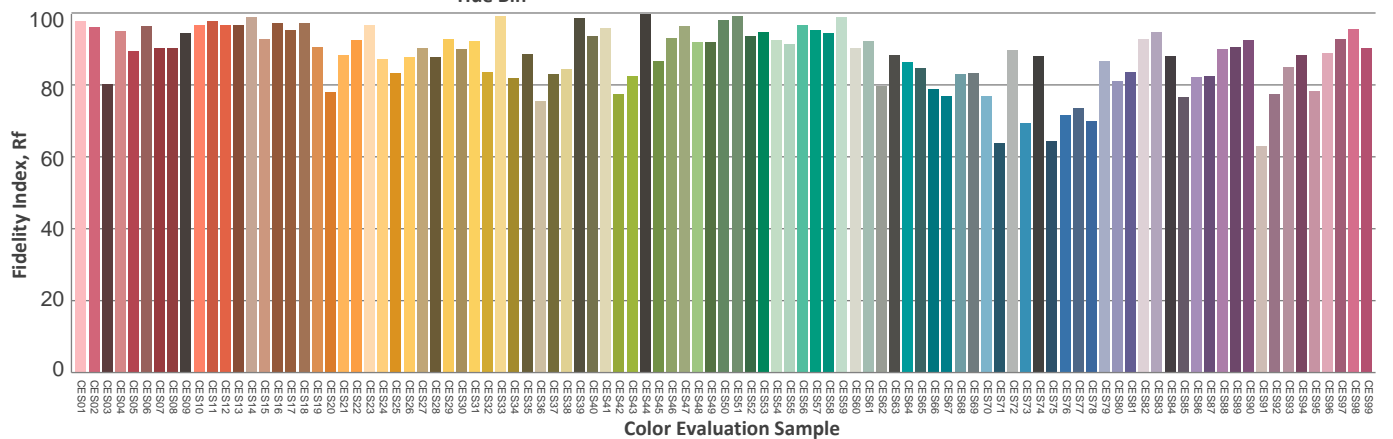
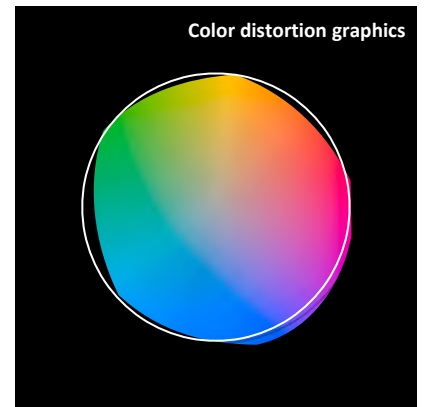
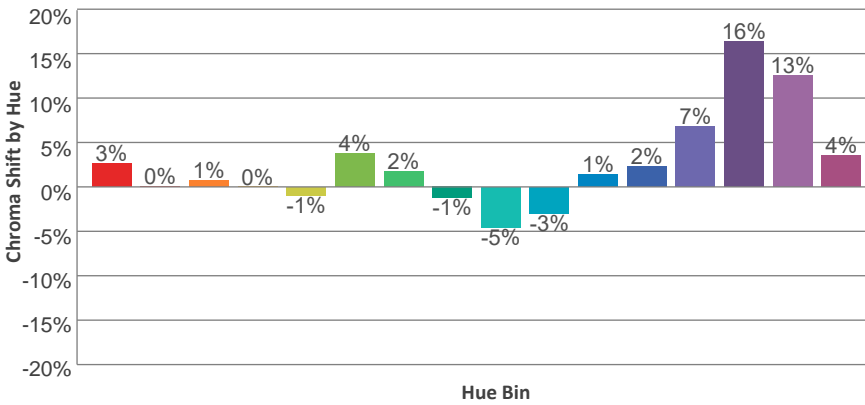
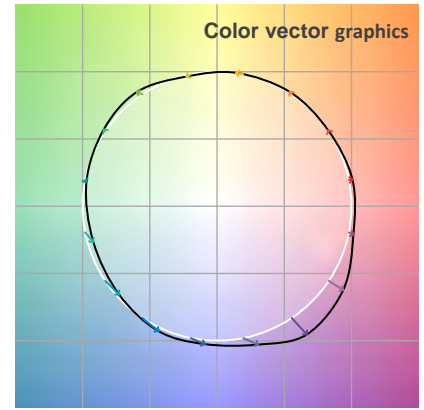
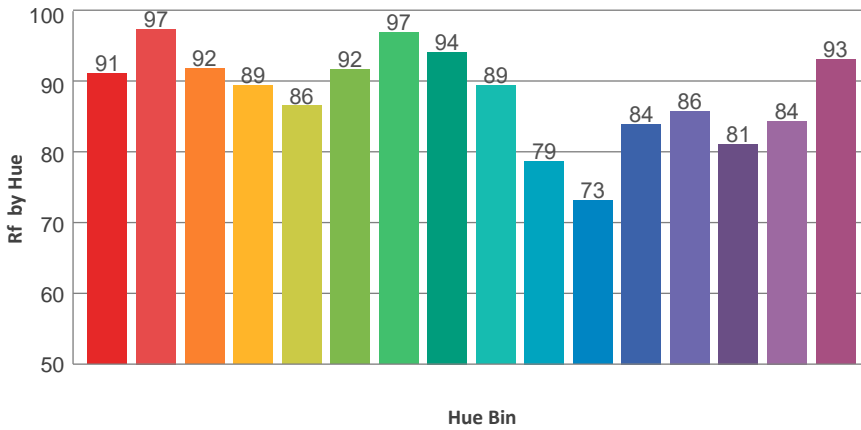
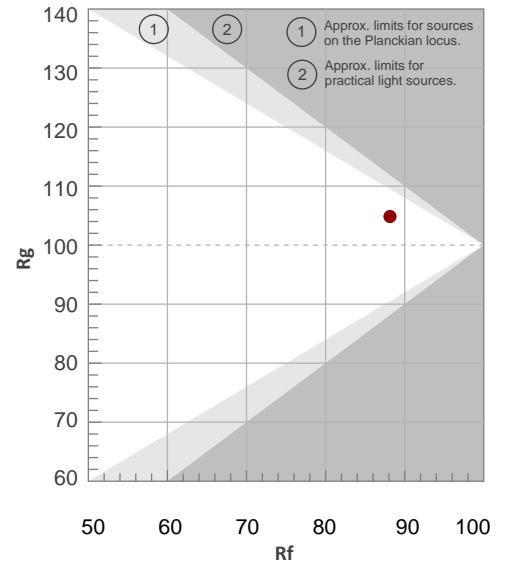
Color Temperature	Color Rendering Index	Red Component	Color Fidelity	Color Gamut	Color Quality Scale	Color Coordinate CIE 1931	Color Coordinate CIE 1931	Color Coordinate	Color Coordinate	Color Deviation from Black
CCT	CRI	CRI R9	TM30 Rf	TM30 Rg	CQS	x	y	u	v	Δuv
6880 K	91.4	70.6	88.1	104.8	89.9	0.309	0.315	0.200	0.307	-0.0054

TM30 Details

**Rf 88.1**  
Fidelity Index Rf

**Rg 104.8**  
Gamut Index Rg

Hue Bin	R <sub>f</sub>	Graphic shifts (%)	
		Chroma	Hue
1	91	3%	0%
2	97	0%	1%
3	92	1%	2%
4	89	0%	5%
5	86	-1%	4%
6	92	4%	2%
7	97	2%	-1%
8	94	-1%	1%
9	89	-5%	8%
10	79	-3%	14%
11	73	1%	15%
12	84	2%	11%
13	86	7%	10%
14	81	16%	2%
15	84	13%	0%
16	93	4%	-1%



**Total Lumen Output: 7403 lm**

**Color Temperature: 6850 K**

**CRI: 91.5**

**TLCI: 93**

**TM30: 88.2**

**CQS: 90.0**

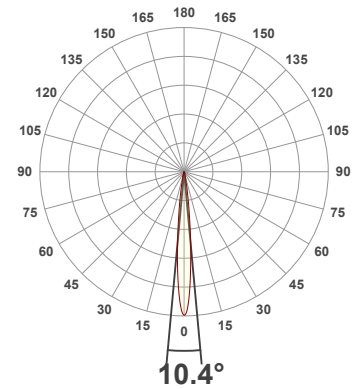
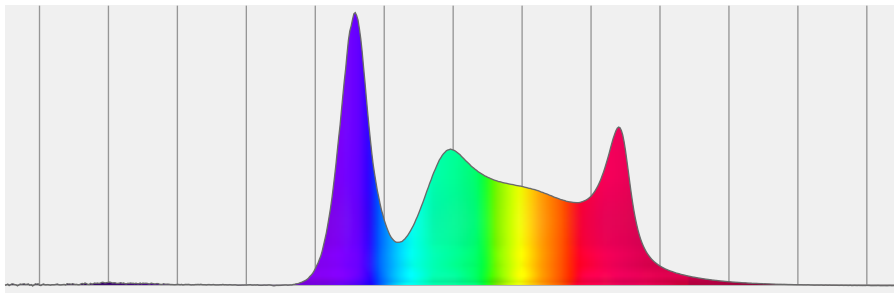
**Measurement Date: 3/29/2021**

**Voltage: 116 V, Current: 4.13 A**

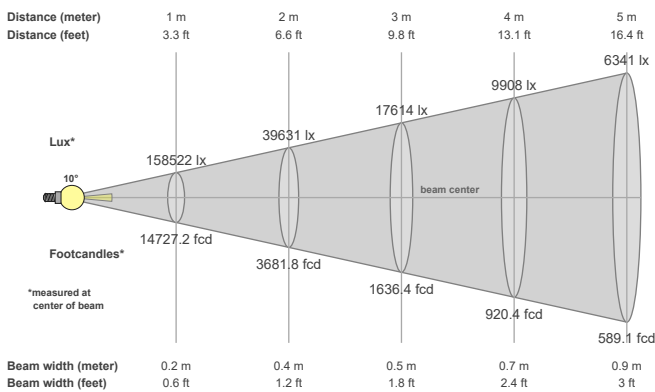
**Power: 479 W**

**Efficacy: 15 Lumen/Watt**

**Spectral distribution**  
Dominant Wavelength 360



**Beam details**



**Beam angles**

Beam angle 50%	Field angle 10%	Cutoff angle 2,5%
<b>10.4°</b>	<b>20.6°</b>	<b>29.2°</b>

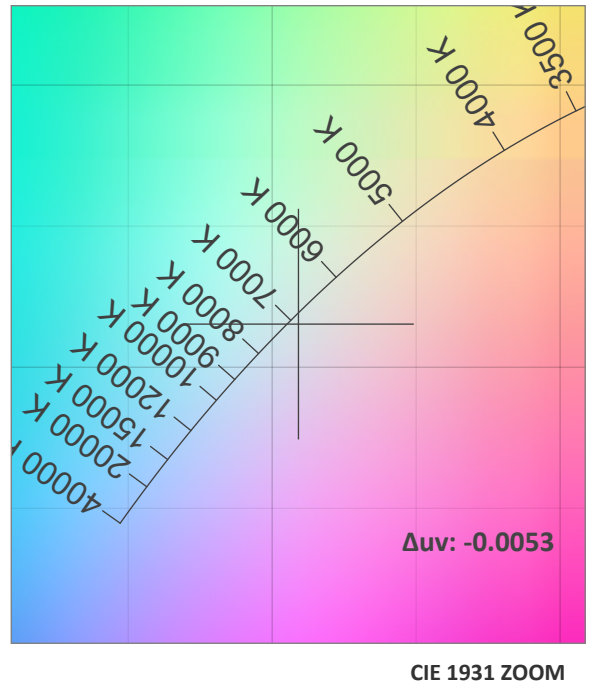
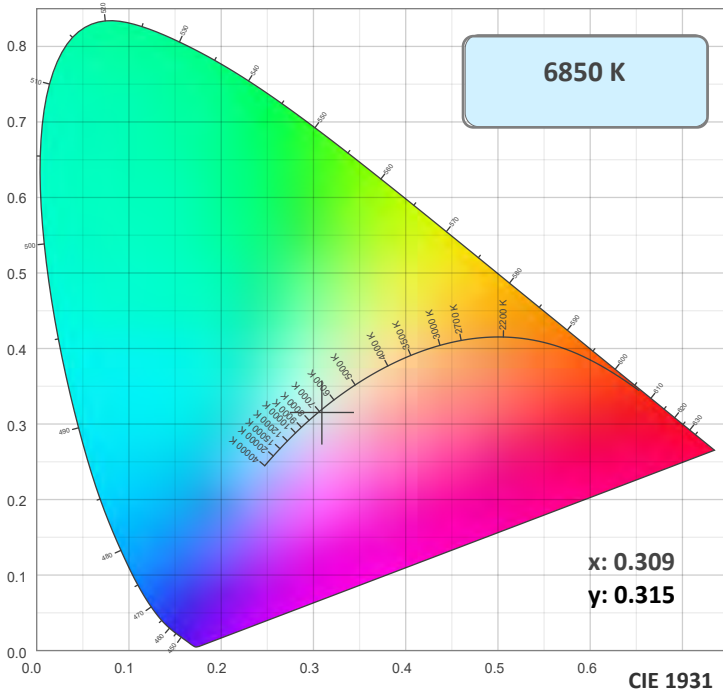
**Beam intensities**

Peak intensity	Int. ratio in 120° cone	Int. ratio in 90° cone
<b>158552 cd</b>	<b>100.0%</b>	<b>100.0%</b>

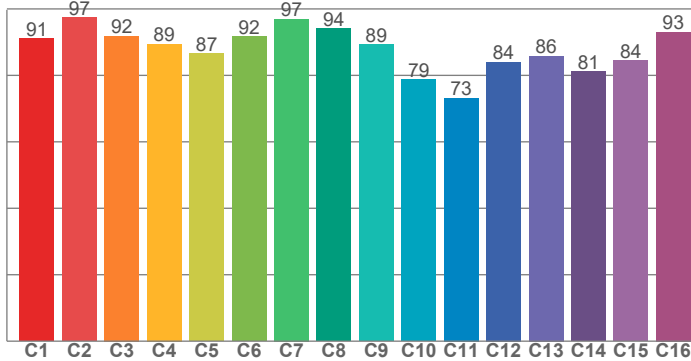
**Beam Intensities from 1-20m**

M	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
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	158522	39631	17614	9908	6341	4403	3235	2477	1957	1585	1310	1101	938	809	705	619	549	489	439	396
FC	14727.2	3681.8	1636.4	920.4	589.1	409.1	300.6	230.1	181.8	147.3	121.7	102.3	87.1	75.1	65.5	57.5	51	45.5	40.8	36.8

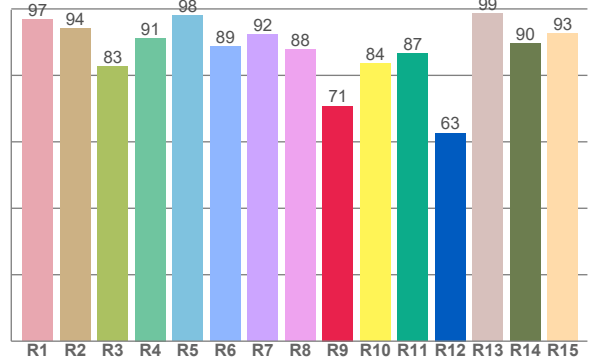
### Color Details



#### TM30: 88.2



#### CRI: 91.5 (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
96.8	94.1	82.6	91.2	98.1	88.6	92.4	87.8	70.8	83.6	86.6	62.7	98.6	89.7	92.6

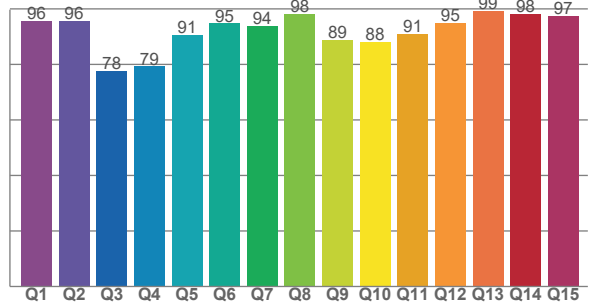
#### TM30 C Values, 16 binned values out of total of 99 C values

C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16
91.1	97.4	91.8	89.5	86.5	91.6	96.9	94.1	89.4	78.7	73.2	84.1	85.9	81.1	84.4	93.1

#### CQS Q Values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
95.6	95.7	77.7	79.2	90.5	94.8	93.8	98.2	88.7	88.2	91.0	95.0	99.2	98.2	97.4

#### CQS: 90.0



### Color Parameters

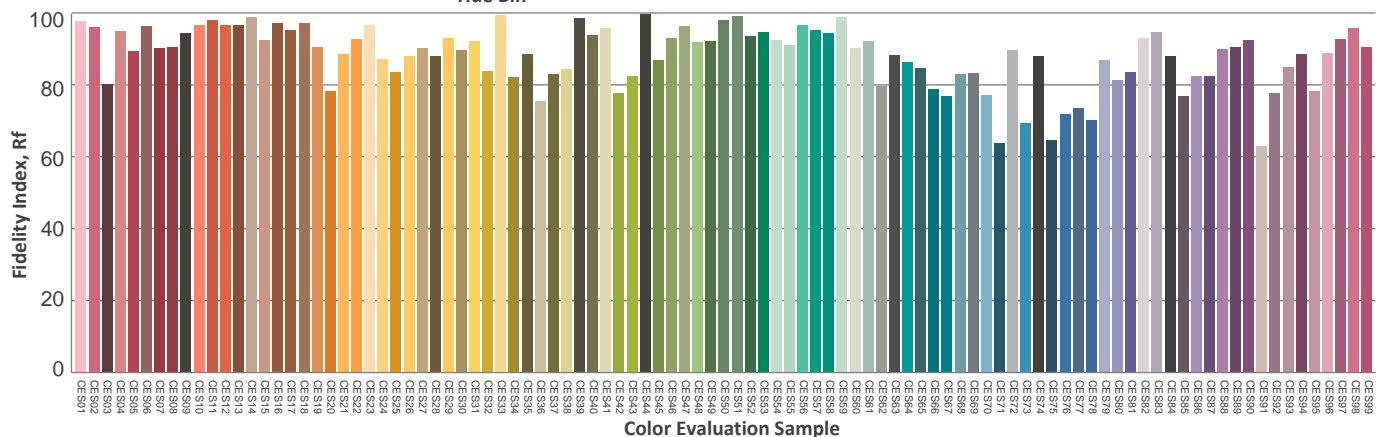
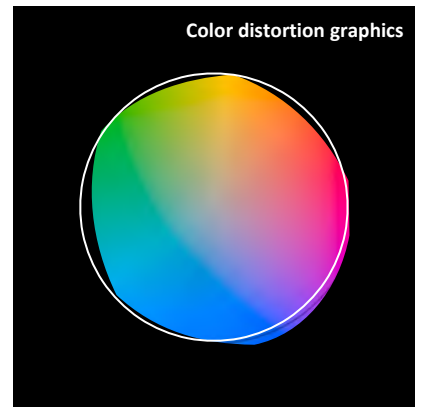
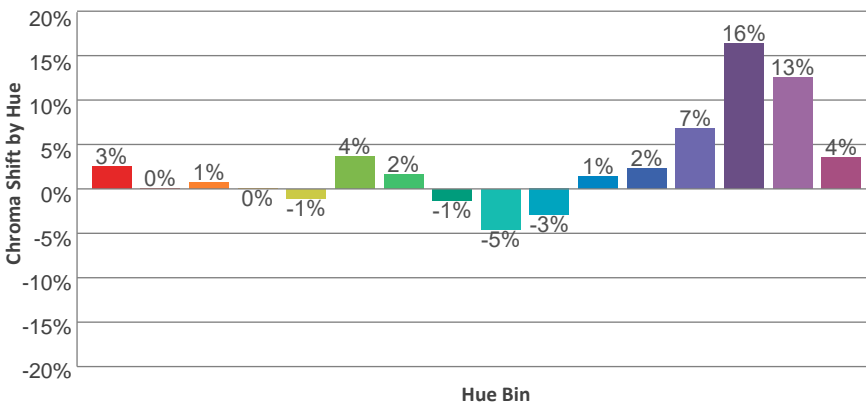
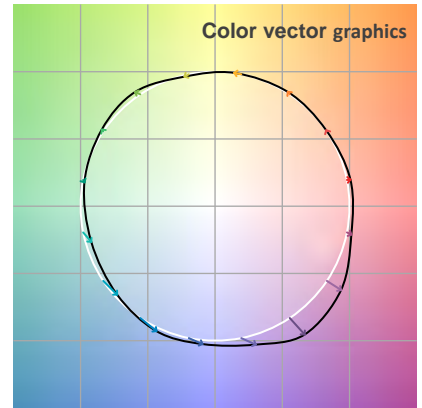
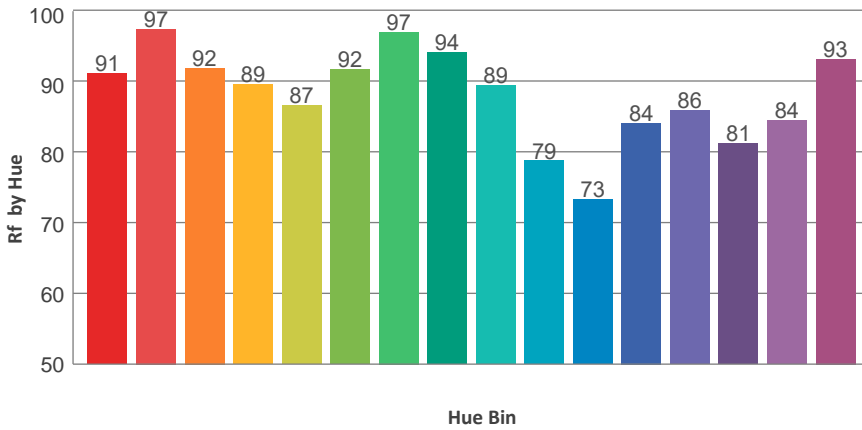
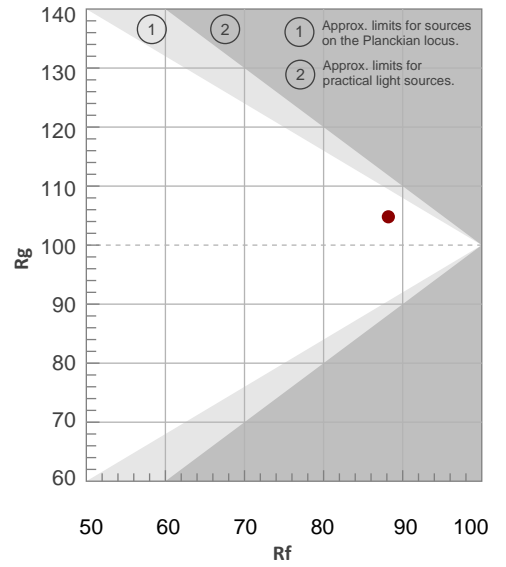
Color Temperature	Color Rendering Index	Red Component	Color Fidelity	Color Gamut	Color Quality Scale	Color Coordinate CIE 1931	Color Coordinate CIE 1931	Color Coordinate	Color Coordinate	Color Diviation from Black
CCT	CRI	CRI R9	TM30 Rf	TM30 Rg	CQS	x	y	u	v	$\Delta uv$
6850 K	91.5	70.8	88.2	104.8	90.0	0.309	0.315	0.201	0.307	-0.0053

TM30 Details

**Rf 88.2**  
Fidelity Index Rf

**Rg 104.8**  
Gamut Index Rg

Hue Bin	R <sub>f</sub>	Graphic shifts (%)	
		Chroma	Hue
1	91	3%	0%
2	97	0%	1%
3	92	1%	2%
4	89	0%	5%
5	87	-1%	3%
6	92	4%	2%
7	97	2%	-1%
8	94	-1%	2%
9	89	-5%	8%
10	79	-3%	14%
11	73	1%	15%
12	84	2%	11%
13	86	7%	10%
14	81	16%	2%
15	84	13%	0%
16	93	4%	-1%



**Total Lumen Output: 7336 lm**

**Color Temperature: 2754 K**

**CRI: 94.5**

**TLCI: 91**

**TM30: 93.9**

**CQS: 93.0**

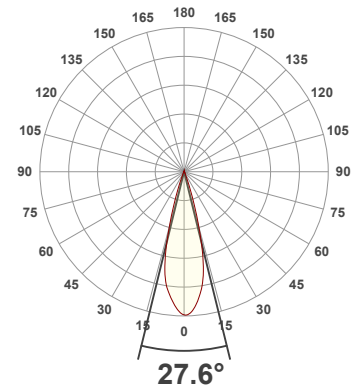
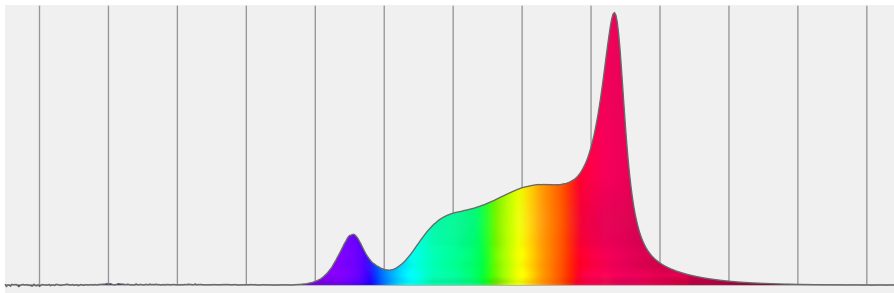
**Measurement Date: 3/29/2021**

**Voltage: 112 V, Current: 2.64 A**

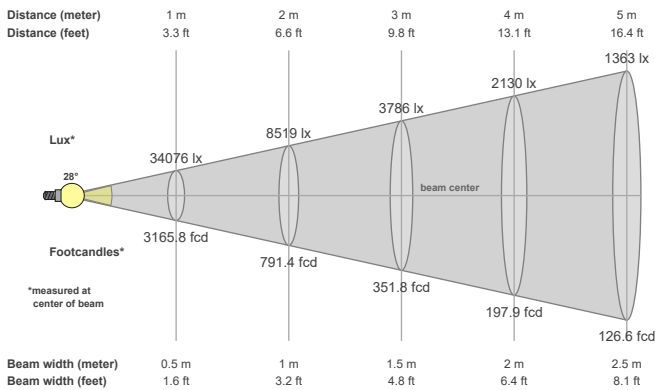
**Power: 291.8 W**

**Efficacy: 25 Lumen/Watt**

**Spectral distribution**  
Dominant Wavelength 584



**Beam details**



**Beam angles**

Beam angle 50%	Field angle 10%	Cutoff angle 2,5%
27.6°	40.4°	50.4°

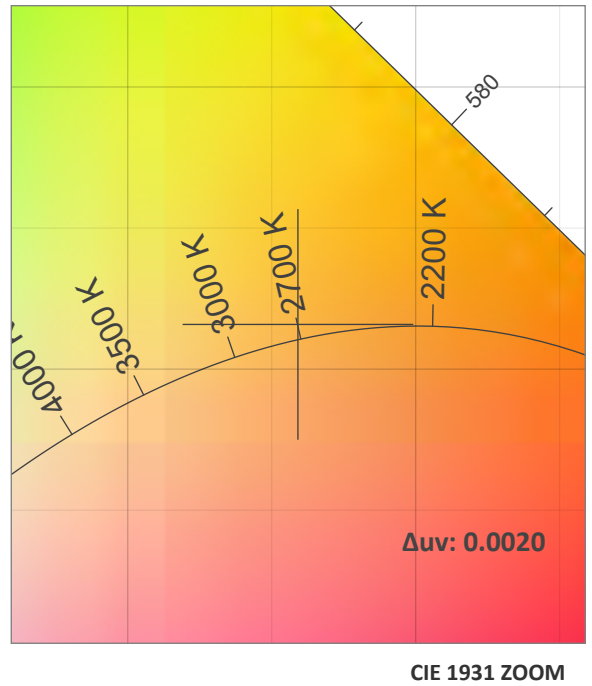
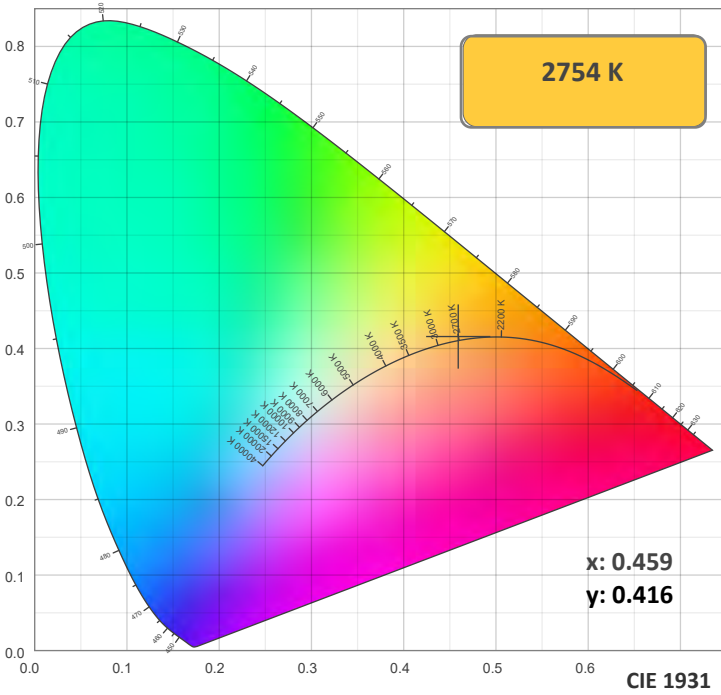
**Beam intensities**

Peak intensity	Int. ratio in 120° cone	Int. ratio in 90° cone
34227 cd	99.5%	98.3%

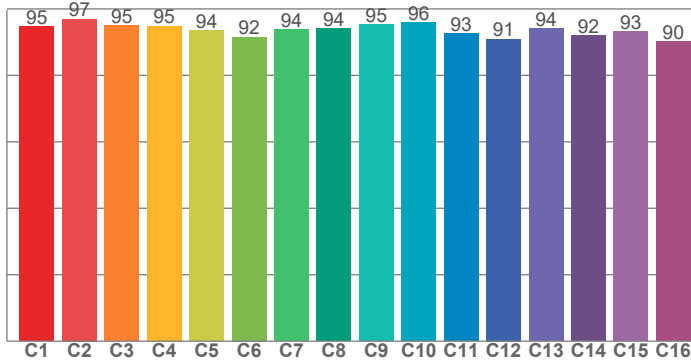
**Beam Intensities from 1-20m**

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	34076	8519	3786	2130	1363	947	695	532	421	341	282	237	202	174	151	133	118	105	94	85
FC	3165.8	791.4	351.8	197.9	126.6	87.9	64.6	49.5	39.1	31.7	26.2	22	18.7	16.2	14.1	12.4	11	9.8	8.8	7.9

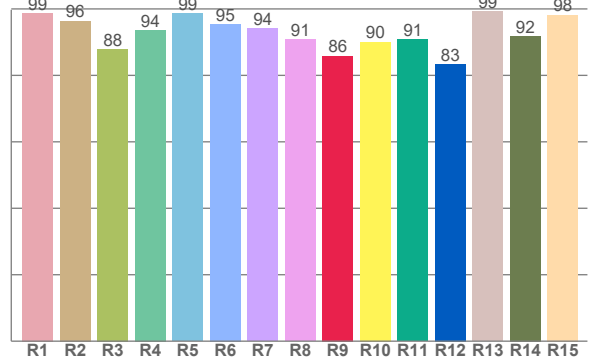
### Color Details



**TM30: 93.9**



**CRI: 94.5 (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
98.7	96.4	87.9	93.7	98.7	95.4	94.2	90.8	85.9	90.1	90.8	83.4	99.2	91.9	98.2

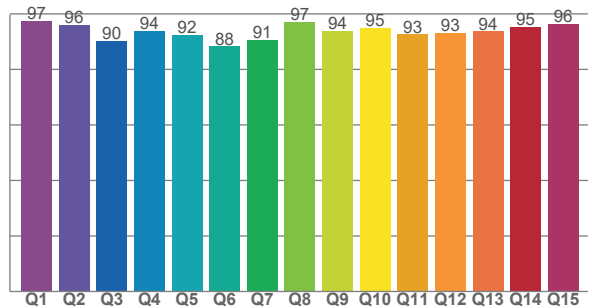
**TM30 C Values, 16 binned values out of total of 99 C values**

C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16
94.8	97.0	95.1	94.9	93.5	91.5	93.8	94.1	95.3	95.9	92.6	90.9	94.1	92.0	93.2	90.1

**CQS Q Values**

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
97.5	95.9	90.2	94.0	92.3	88.3	90.8	97.0	93.8	94.9	92.6	93.3	93.7	95.4	96.5

**CQS: 93.0**



**Color Parameters**

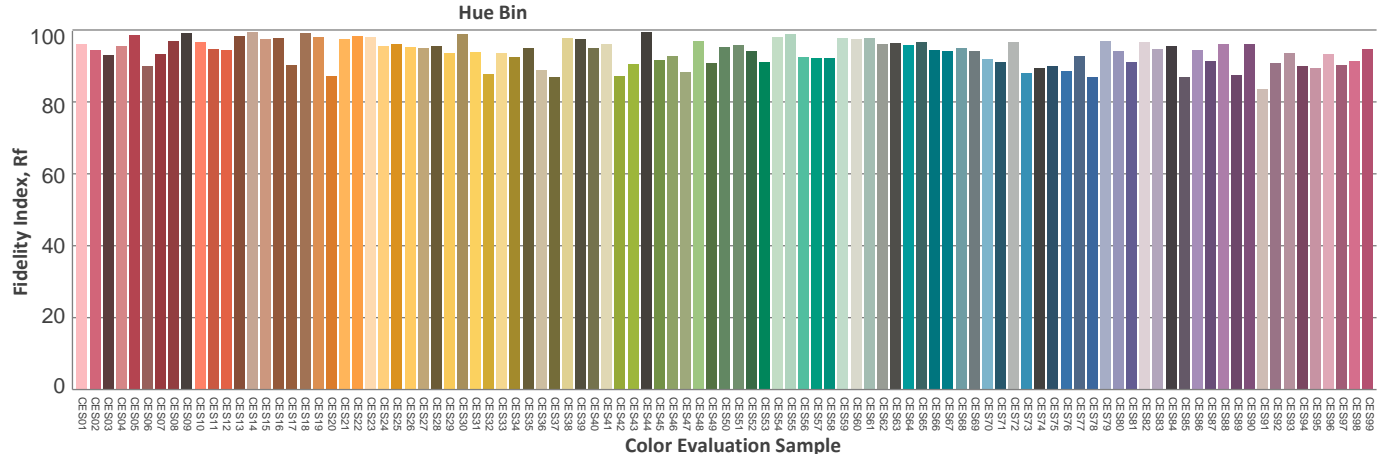
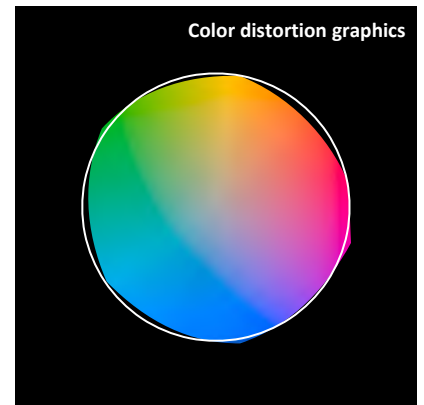
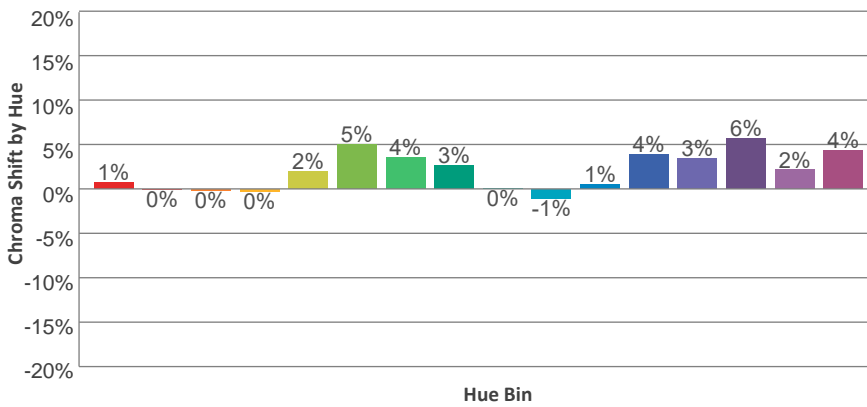
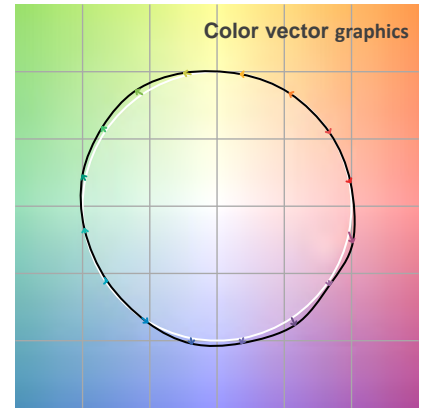
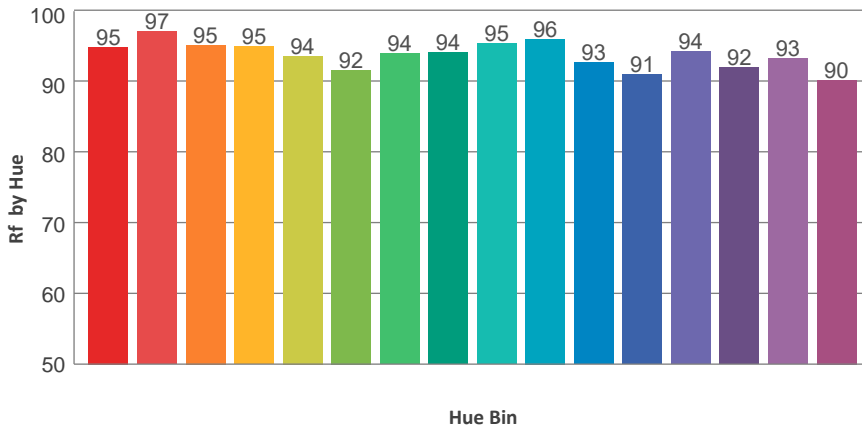
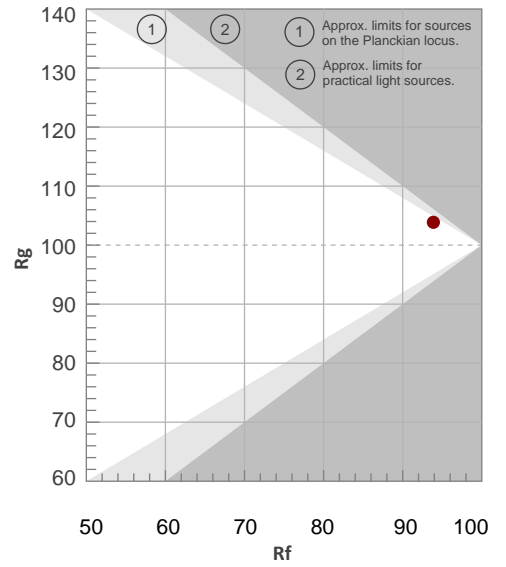
Color Temperature	Color Rendering Index	Red Component	Color Fidelity	Color Gamut	Color Quality Scale	Color Coordinate CIE 1931	Color Coordinate CIE 1931	Color Coordinate	Color Coordinate	Color Diviation from Black
CCT	CRI	CRI R9	TM30 Rf	TM30 Rg	CQS	x	y	u	v	$\Delta uv$
2754 K	94.5	85.9	93.9	103.9	93.0	0.459	0.416	0.260	0.353	0.0020

TM30 Details

**Rf 93.9**  
Fidelity Index Rf

**Rg 103.9**  
Gamut Index Rg

Hue Bin	R <sub>f</sub>	Graphic shifts (%)	
		Chroma	Hue
1	95	1%	-2%
2	97	0%	-1%
3	95	0%	2%
4	95	0%	2%
5	94	2%	5%
6	92	5%	2%
7	94	4%	-1%
8	94	3%	-3%
9	95	0%	-3%
10	96	-1%	1%
11	93	1%	5%
12	91	4%	2%
13	94	3%	-2%
14	92	6%	-1%
15	93	2%	-2%
16	90	4%	-7%





**Total Lumen Output: 8805 lm**

**Color Temperature: 3198 K**

**CRI: 93.3**

**TLCI: 93**

**TM30: 92.7**

**CQS: 92.9**

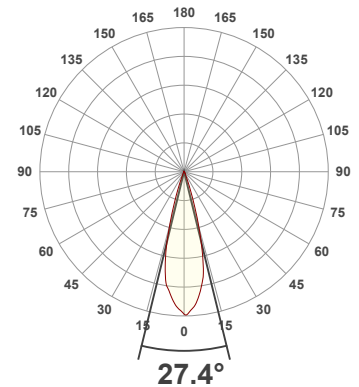
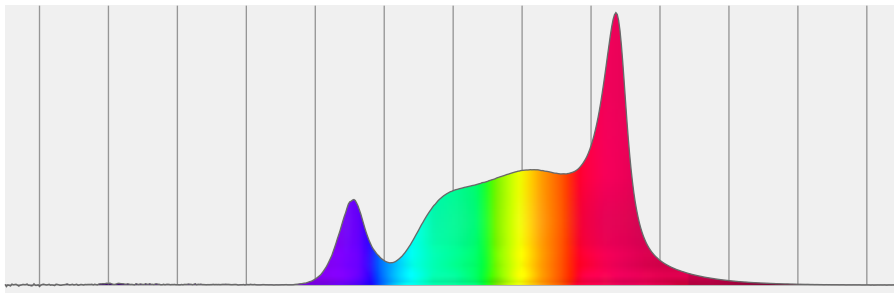
**Measurement Date: 3/29/2021**

**Voltage: 111 V, Current: 3.07 A**

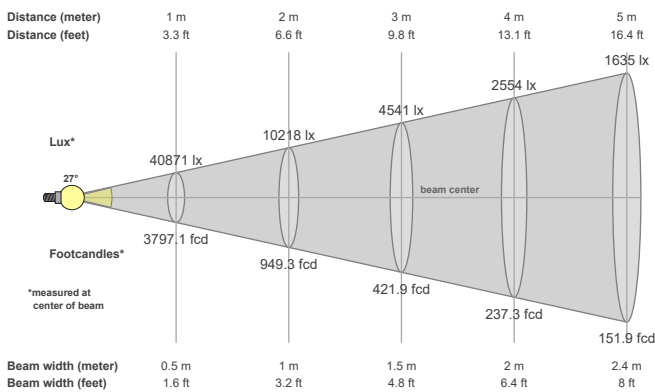
**Power: 337.5 W**

**Efficacy: 26 Lumen/Watt**

**Spectral distribution**  
Dominant Wavelength 582



**Beam details**



**Beam angles**

Beam angle 50%	Field angle 10%	Cutoff angle 2,5%
27.4°	40.4°	50.6°

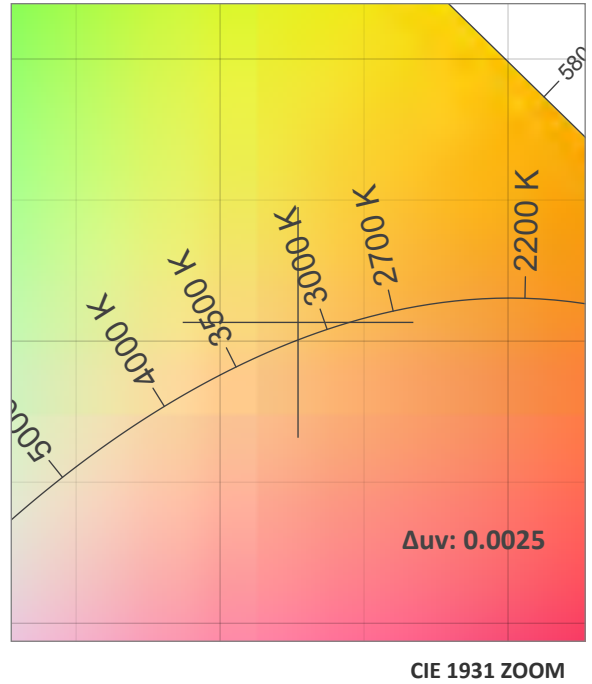
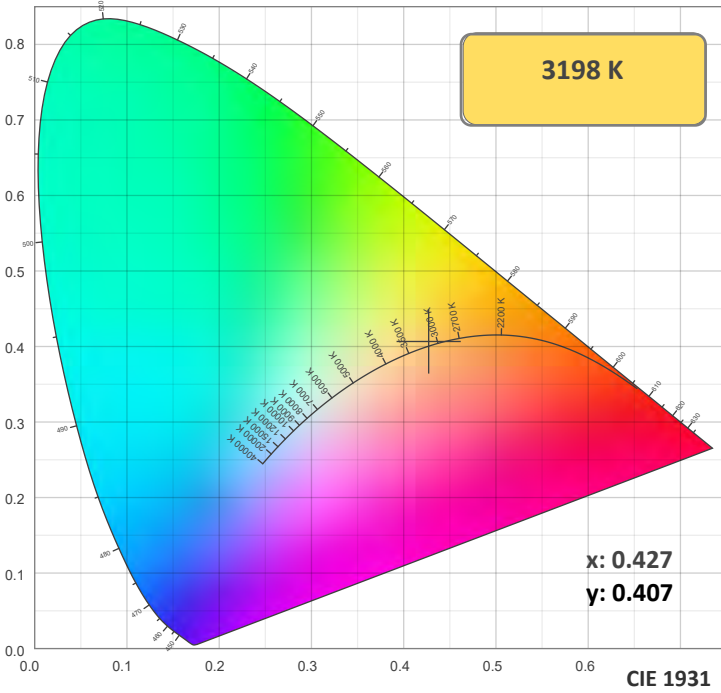
**Beam intensities**

Peak intensity	Int. ratio in 120° cone	Int. ratio in 90° cone
41321 cd	99.4%	98.1%

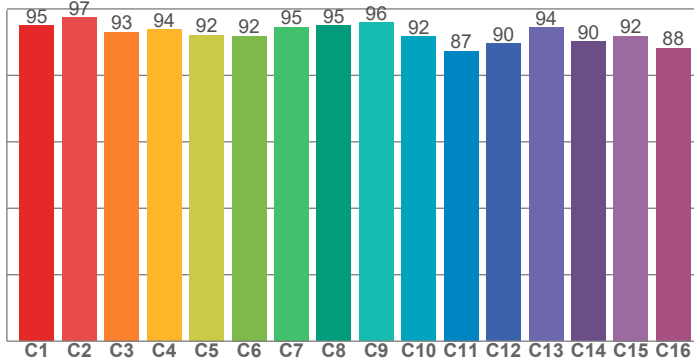
**Beam Intensities from 1-20m**

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	40871	10218	4541	2554	1635	1135	834	639	505	409	338	284	242	209	182	160	141	126	113	102
FC	3797.1	949.3	421.9	237.3	151.9	105.5	77.5	59.3	46.9	38	31.4	26.4	22.5	19.4	16.9	14.8	13.1	11.7	10.5	9.5

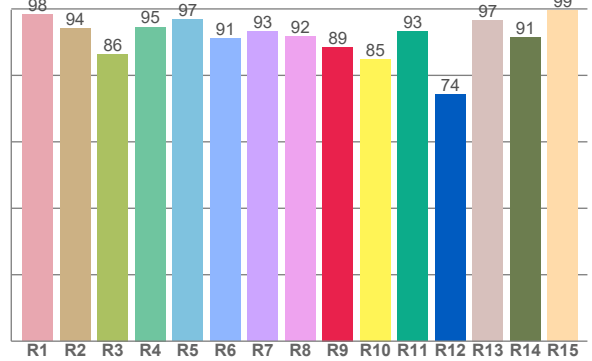
### Color Details



**TM30: 92.7**



**CRI: 93.3 (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
98.3	94.2	86.4	94.6	96.8	91.1	93.3	91.8	88.5	84.9	93.2	74.2	96.6	91.4	99.5

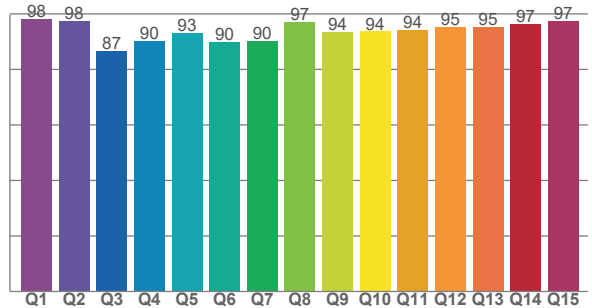
**TM30 C Values, 16 binned values out of total of 99 C values**

C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16
94.9	97.4	93.1	93.9	92.1	91.9	94.6	95.0	95.8	91.7	87.4	89.6	94.3	90.2	91.8	88.2

**CQS Q Values**

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
98.2	97.6	86.6	90.4	93.3	89.9	90.3	97.0	93.6	93.7	94.3	95.2	95.4	96.5	97.5

**CQS: 92.9**



**Color Parameters**

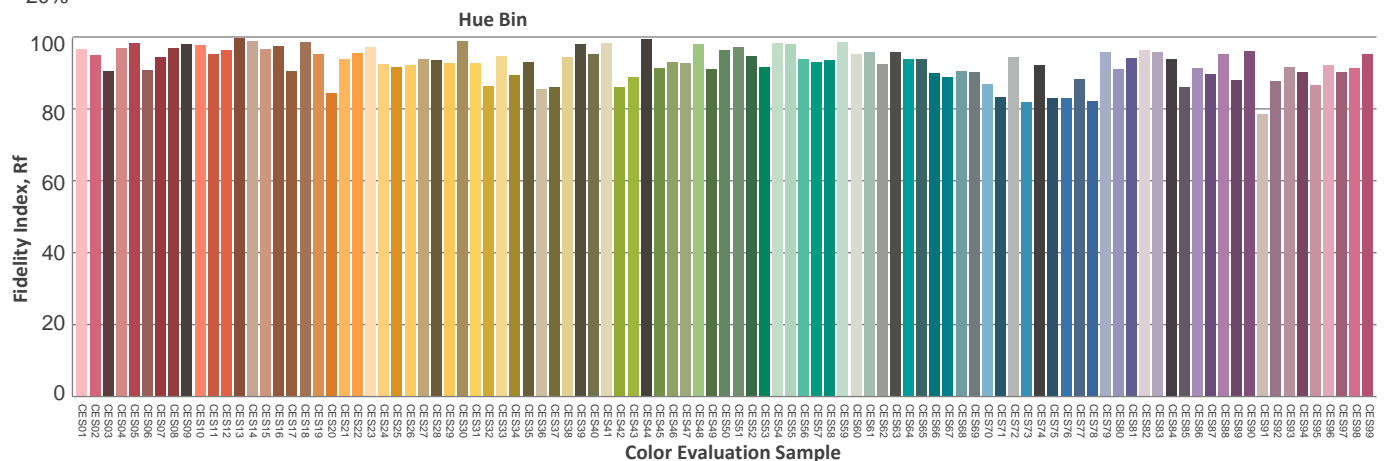
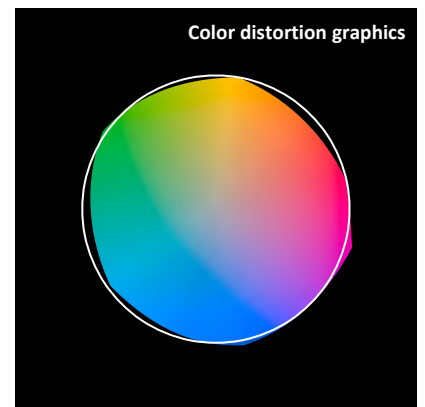
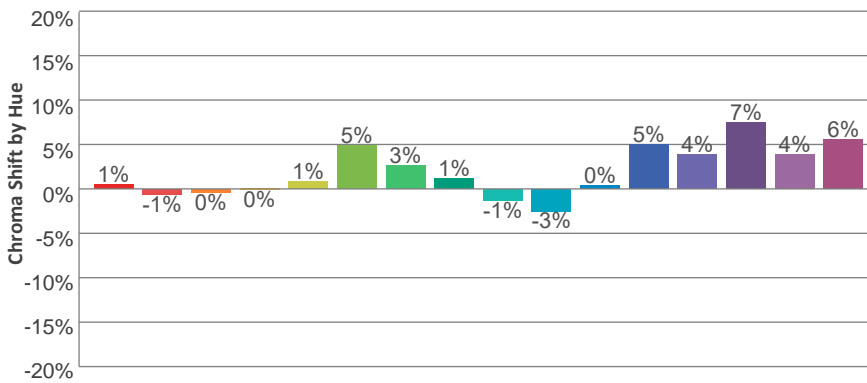
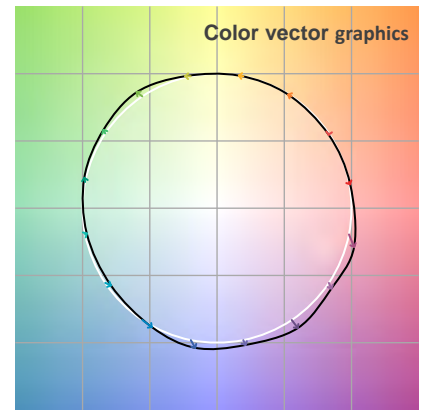
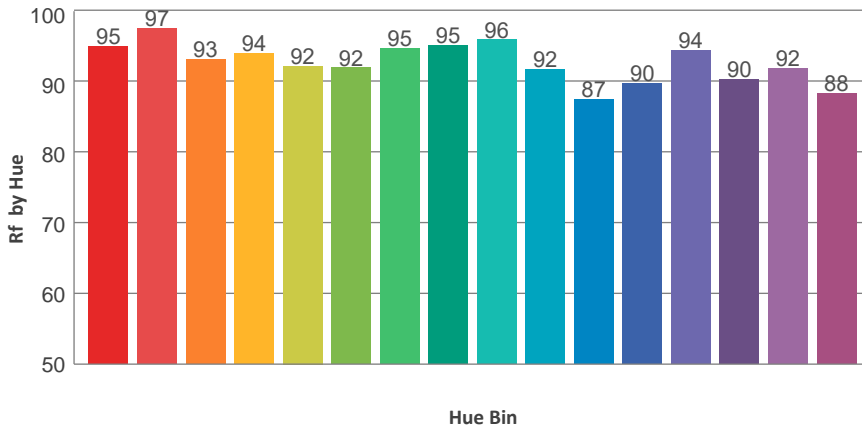
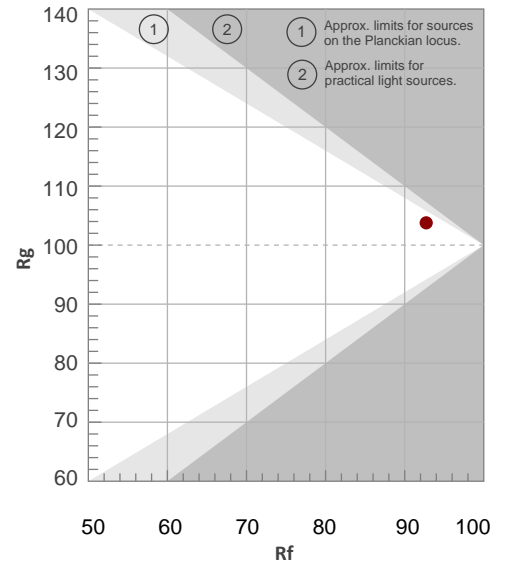
Color Temperature	Color Rendering Index	Red Component	Color Fidelity	Color Gamut	Color Quality Scale	Color Coordinate CIE 1931	Color Coordinate CIE 1931	Color Coordinate	Color Coordinate	Color Diviation from Black
CCT	CRI	CRI R9	TM30 Rf	TM30 Rg	CQS	x	y	u	v	Δuv
3198 K	93.3	88.5	92.7	103.8	92.9	0.427	0.407	0.243	0.347	0.0025

TM30 Details

**Rf 92.7**  
Fidelity Index Rf

**Rg 103.8**  
Gamut Index Rg

Hue Bin	R <sub>f</sub>	Graphic shifts (%)	
		Chroma	Hue
1	95	1%	-2%
2	97	-1%	-1%
3	93	0%	3%
4	94	0%	3%
5	92	1%	4%
6	92	5%	2%
7	95	3%	-1%
8	95	1%	-3%
9	96	-1%	0%
10	92	-3%	4%
11	87	0%	9%
12	90	5%	4%
13	94	4%	1%
14	90	7%	0%
15	92	4%	-2%
16	88	6%	-8%



**Total Lumen Output: 12110 lm**

**Color Temperature: 4525 K**

**CRI: 90.9**

**TLCI: 93**

**TM30: 89.4**

**CQS: 90.9**

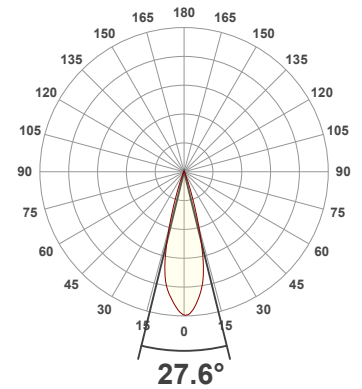
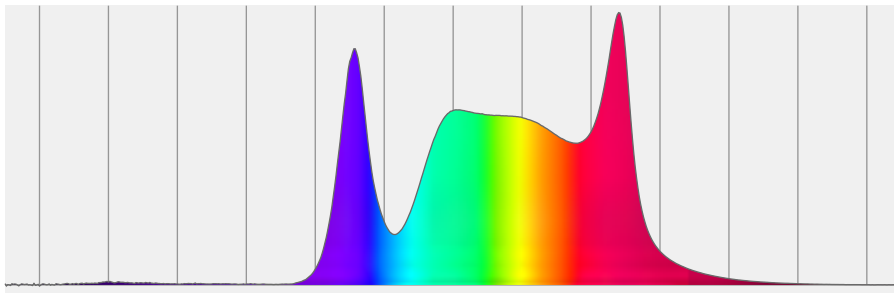
**Measurement Date: 3/29/2021**

**Voltage: 108 V, Current: 4.69 A**

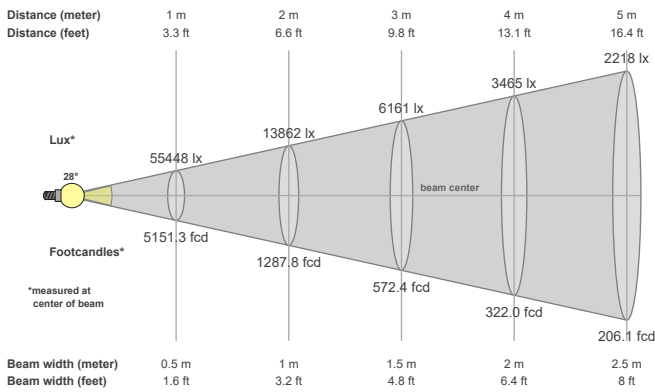
**Power: 504.3 W**

**Efficacy: 24 Lumen/Watt**

**Spectral distribution**  
Dominant Wavelength 578



**Beam details**



**Beam angles**

Beam angle 50%	Field angle 10%	Cutoff angle 2,5%
27.6°	40.3°	51°

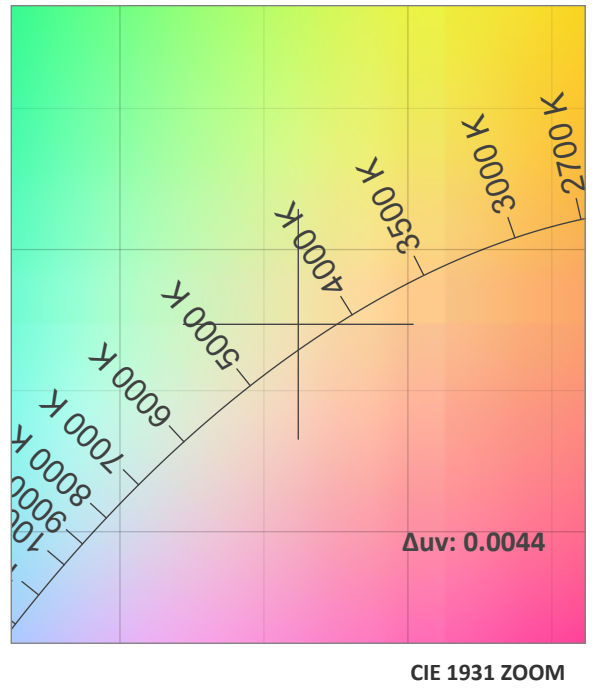
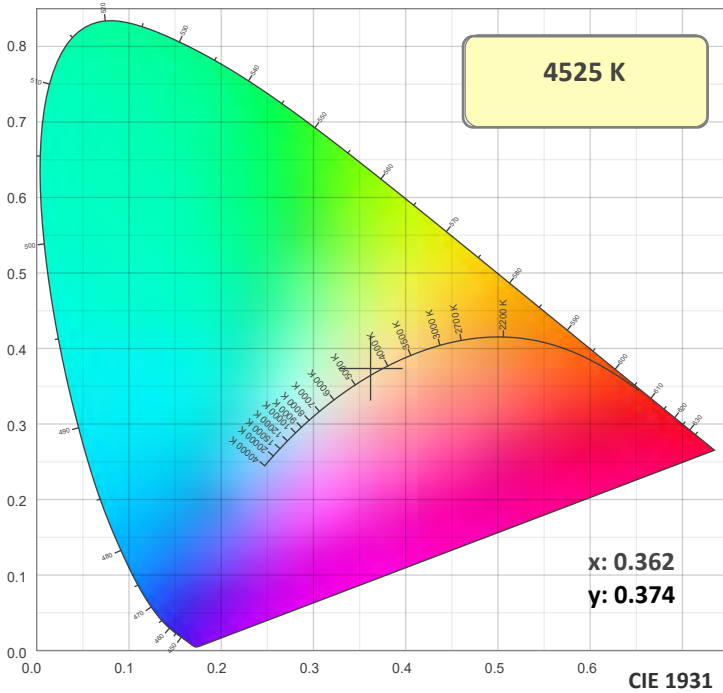
**Beam intensities**

Peak intensity	Int. ratio in 120° cone	Int. ratio in 90° cone
55475 cd	98.9%	97.3%

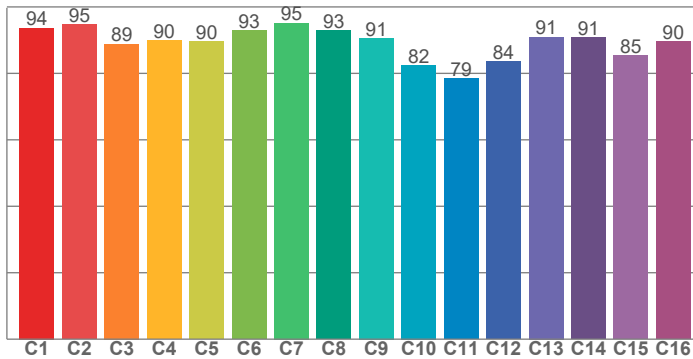
**Beam Intensities from 1-20m**

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	55448	13862	6161	3465	2218	1540	1132	866	685	554	458	385	328	283	246	217	192	171	154	139
FC	5151.3	1287.8	572.4	322	206.1	143.1	105.1	80.5	63.6	51.5	42.6	35.8	30.5	26.3	22.9	20.1	17.8	15.9	14.3	12.9

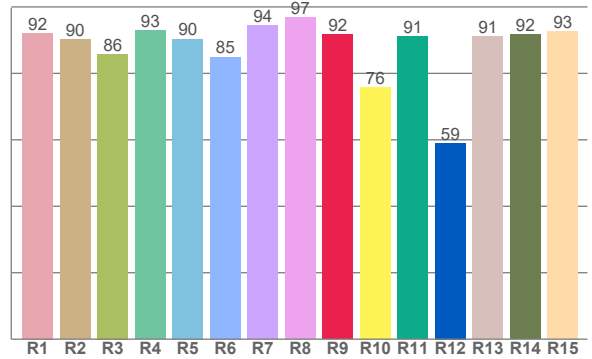
### Color Details



TM30: 89.4



CRI: 90.9 (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
92.2	90.2	85.9	92.8	90.4	85.0	94.4	96.8	91.6	75.9	91.0	59.0	91.1	91.7	92.6

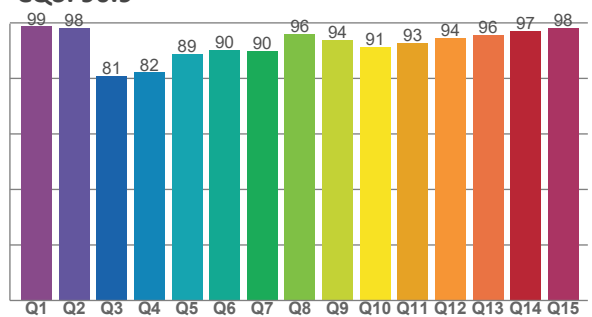
TM30 C Values, 16 binned values out of total of 99 C values

C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16
93.7	94.6	88.9	90.0	89.5	92.9	95.2	92.9	90.6	82.5	78.5	83.5	90.9	90.9	85.3	89.7

CQS Q Values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
98.7	98.2	81.0	82.2	88.9	90.1	90.0	96.0	93.9	91.2	92.6	94.5	95.6	97.2	98.0

CQS: 90.9



### Color Parameters

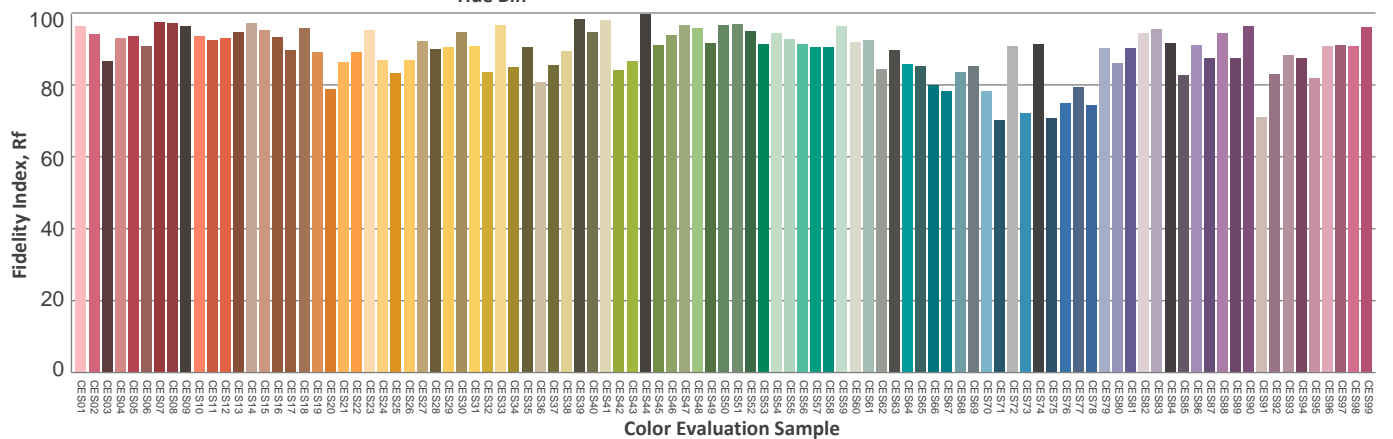
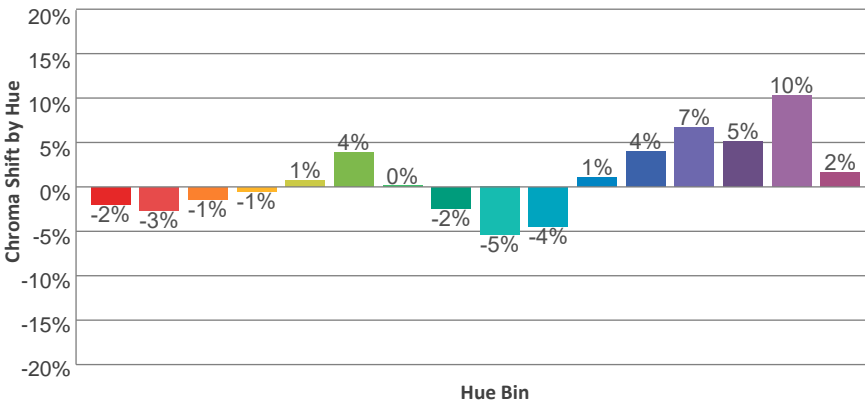
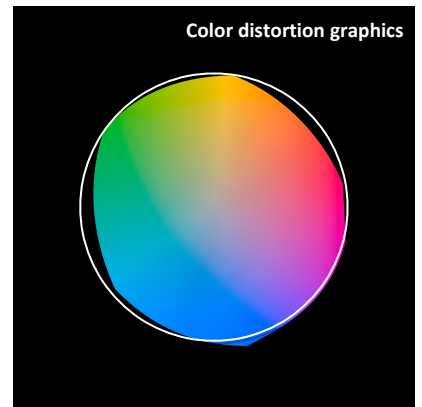
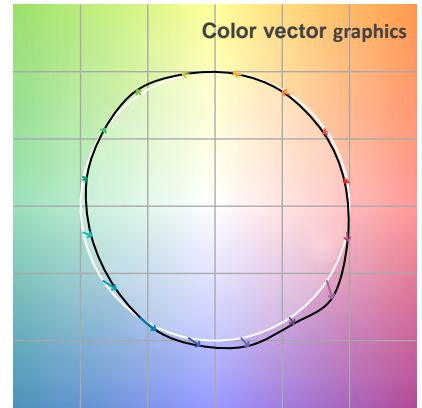
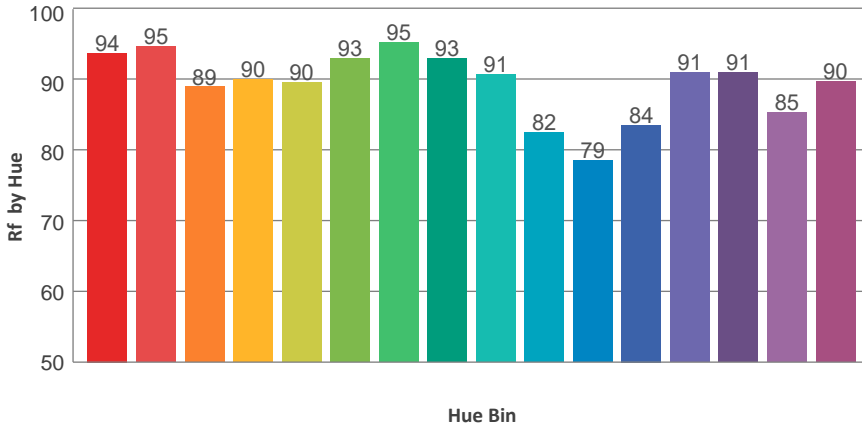
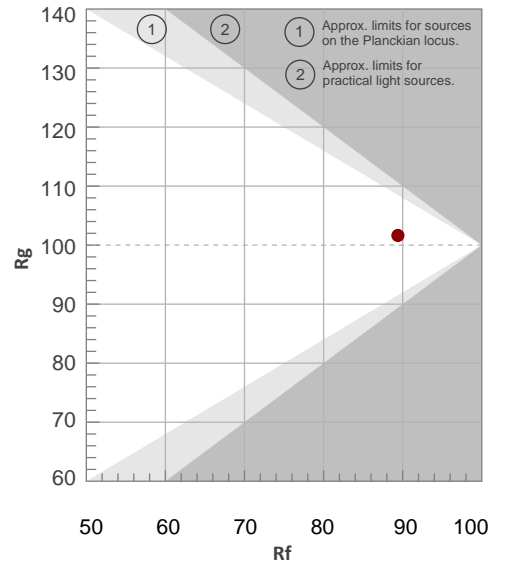
Color Temperature	Color Rendering Index	Red Component	Color Fidelity	Color Gamut	Color Quality Scale	Color Coordinate CIE 1931	Color Coordinate CIE 1931	Color Coordinate	Color Coordinate	Color Diviation from Black
CCT	CRI	CRI R9	TM30 Rf	TM30 Rg	CQS	x	y	u	v	Δuv
4525 K	90.9	91.6	89.4	101.6	90.9	0.362	0.374	0.214	0.332	0.0044

TM30 Details

**Rf 89.4**  
Fidelity Index Rf

**Rg 101.6**  
Gamut Index Rg

Hue Bin	R <sub>f</sub>	Graphic shifts (%)	
		Chroma	Hue
1	94	-2%	-1%
2	95	-3%	0%
3	89	-1%	5%
4	90	-1%	5%
5	90	1%	4%
6	93	4%	1%
7	95	0%	-2%
8	93	-2%	-2%
9	91	-5%	3%
10	82	-4%	10%
11	79	1%	14%
12	84	4%	9%
13	91	7%	4%
14	91	5%	0%
15	85	10%	-8%
16	90	2%	-6%



**Total Lumen Output: 12182 lm**

**Color Temperature: 5634 K**

**CRI: 90.3**

**TLCI: 93**

**TM30: 88.6**

**CQS: 89.5**

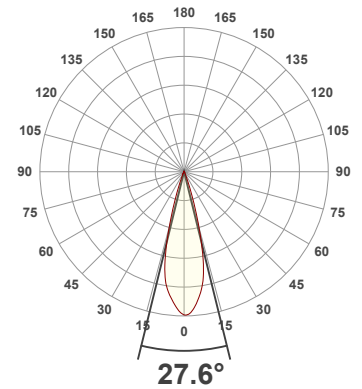
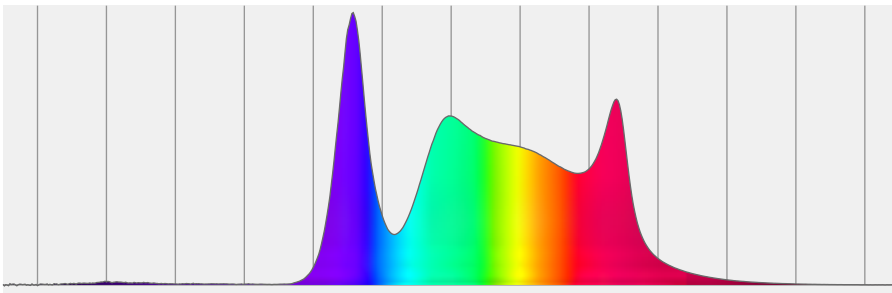
**Measurement Date: 3/29/2021**

**Voltage: 116 V, Current: 3.90 A**

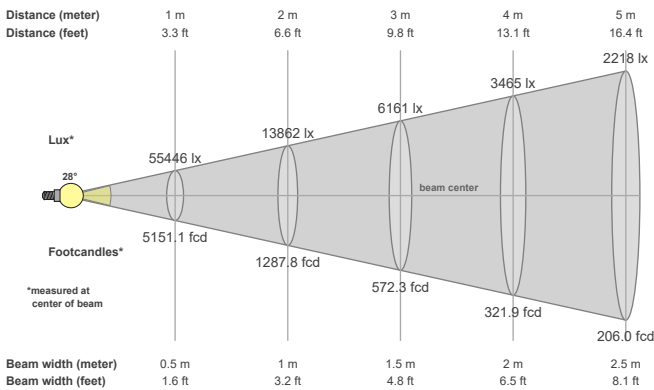
**Power: 451 W**

**Efficacy: 27 Lumen/Watt**

**Spectral distribution**  
Dominant Wavelength 575



**Beam details**



**Beam angles**

Beam angle 50%	Field angle 10%	Cutoff angle 2,5%
27.6°	40.4°	51.1°

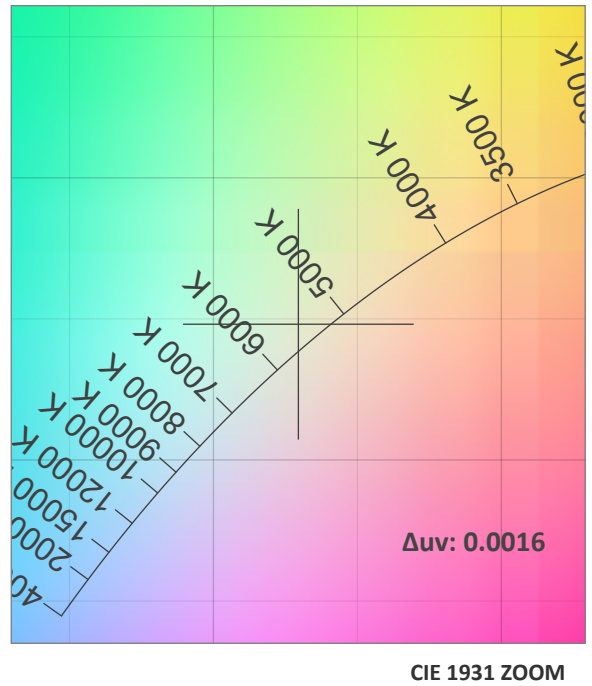
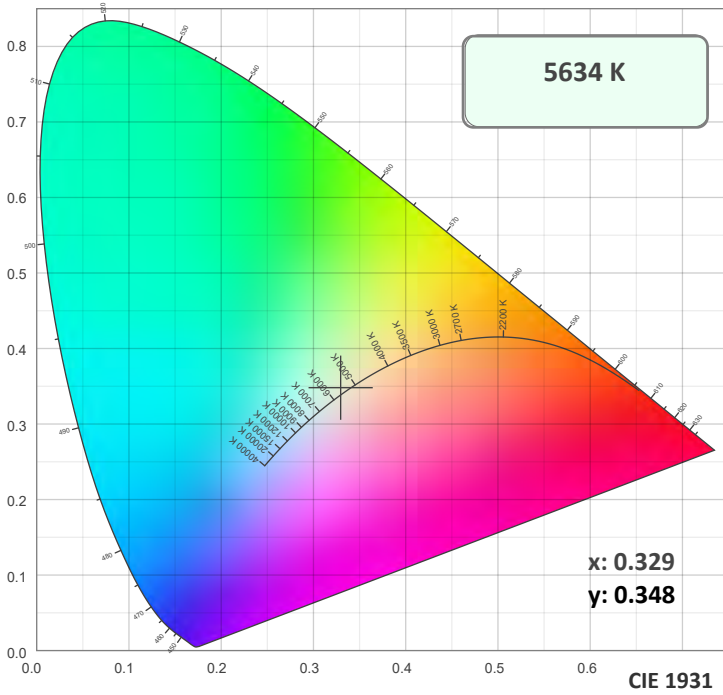
**Beam intensities**

Peak intensity	Int. ratio in 120° cone	Int. ratio in 90° cone
55621 cd	98.9%	97.3%

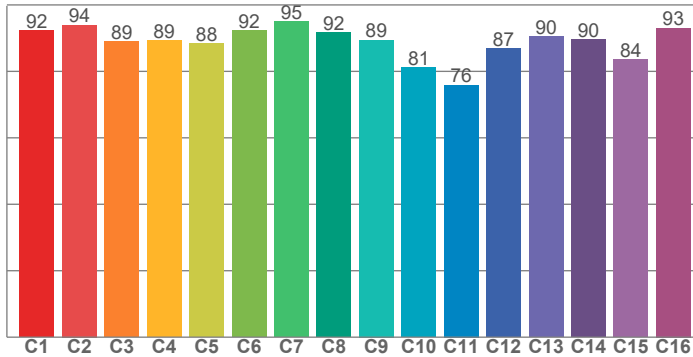
**Beam Intensities from 1-20m**

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	55446	13862	6161	3465	2218	1540	1132	866	685	554	458	385	328	283	246	217	192	171	154	139
FC	5151.1	1287.8	572.3	321.9	206	143.1	105.1	80.5	63.6	51.5	42.6	35.8	30.5	26.3	22.9	20.1	17.8	15.9	14.3	12.9

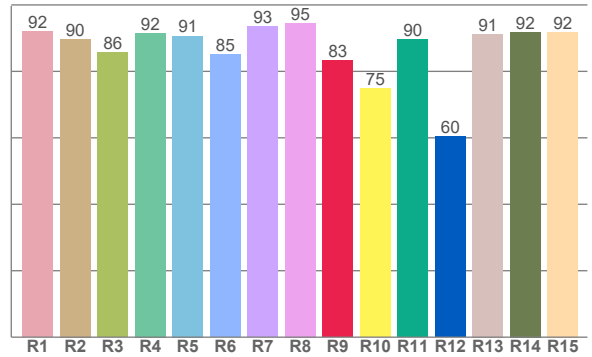
### Color Details



TM30: 88.6



CRI: 90.3 (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
92.0	89.7	85.7	91.5	90.7	85.1	93.5	94.5	83.2	74.9	89.7	60.3	91.2	91.8	91.8

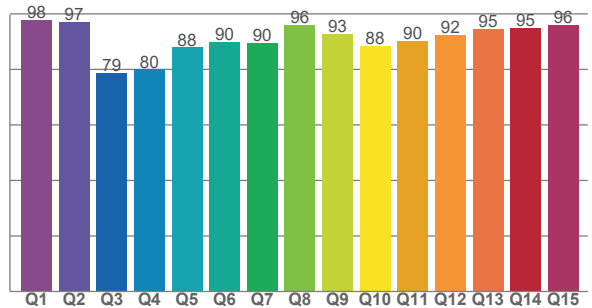
TM30 C Values, 16 binned values out of total of 99 C values

C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16
92.3	94.0	89.0	89.3	88.4	92.3	95.0	91.8	89.5	81.2	75.9	86.9	90.4	89.7	83.5	93.0

CQS Q Values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
97.8	97.0	78.6	80.0	87.9	90.0	89.5	95.9	92.8	88.4	90.2	92.4	94.6	94.8	95.9

CQS: 89.5



### 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
5634 K	90.3	83.2	88.6	101.2	89.5	0.329	0.348	0.202	0.320	0.0016

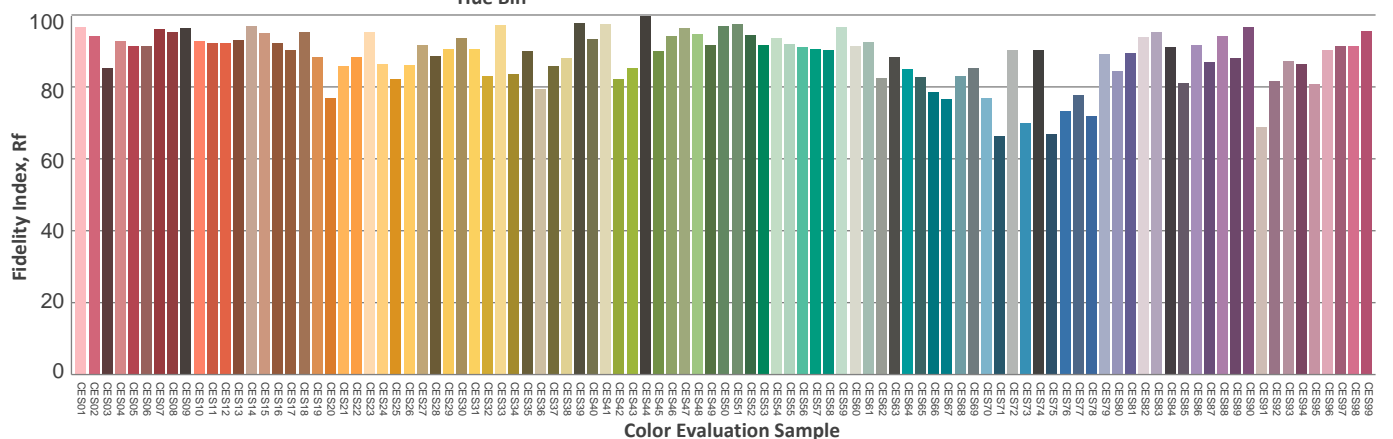
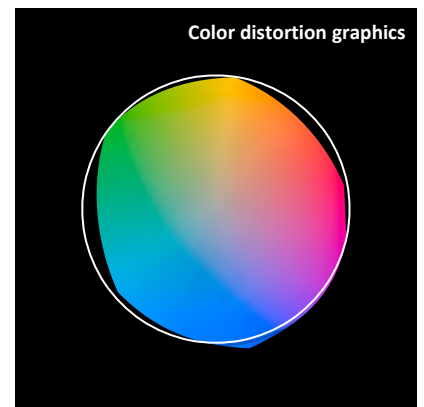
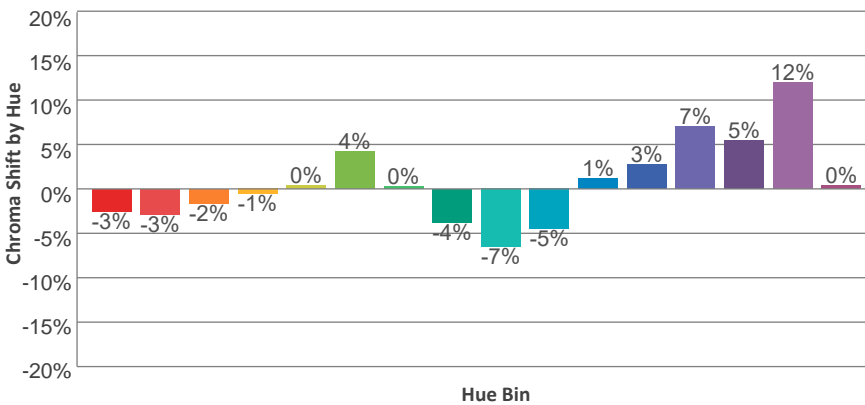
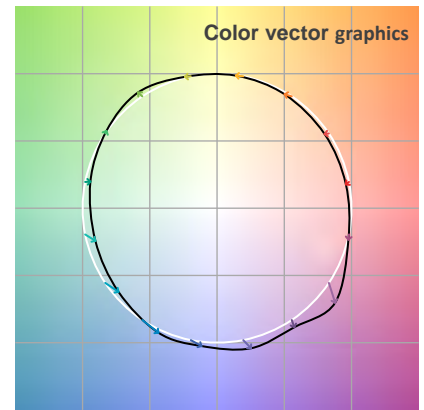
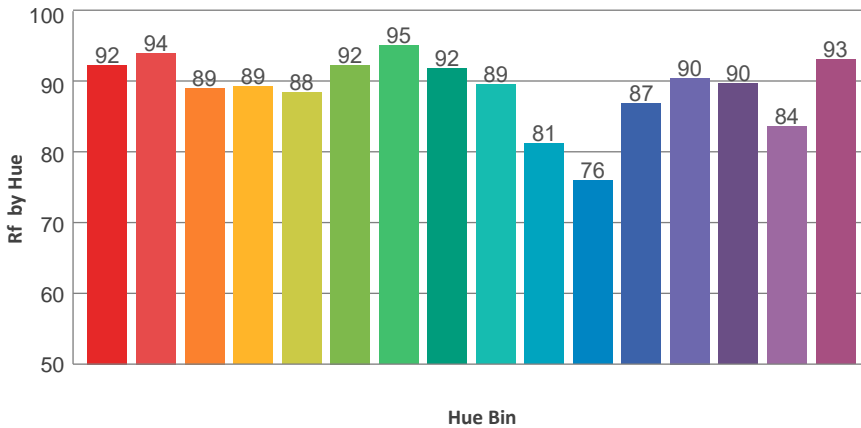
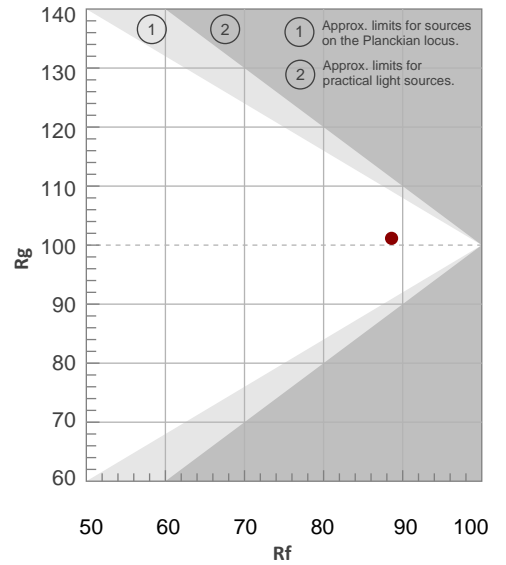


TM30 Details

**Rf 88.6**  
Fidelity Index Rf

**Rg 101.2**  
Gamut Index Rg

Hue Bin	R <sub>f</sub>	Graphic shifts (%)	
		Chroma	Hue
1	92	-3%	-1%
2	94	-3%	1%
3	89	-2%	5%
4	89	-1%	5%
5	88	0%	4%
6	92	4%	1%
7	95	0%	-2%
8	92	-4%	-1%
9	89	-7%	6%
10	81	-5%	11%
11	76	1%	15%
12	87	3%	9%
13	90	7%	4%
14	90	5%	-1%
15	84	12%	-10%
16	93	0%	-4%



**Total Lumen Output: 11950 lm**

**Color Temperature: 6000 K**

**CRI: 90.6**

**TLCI: 93**

**TM30: 88.6**

**CQS: 89.7**

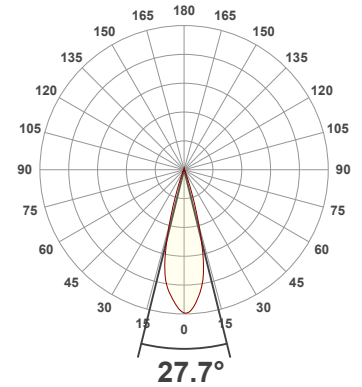
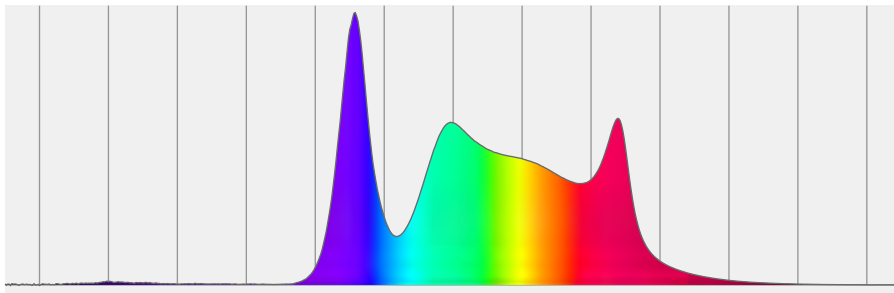
**Measurement Date: 3/29/2021**

**Voltage: 116 V, Current: 3.86 A**

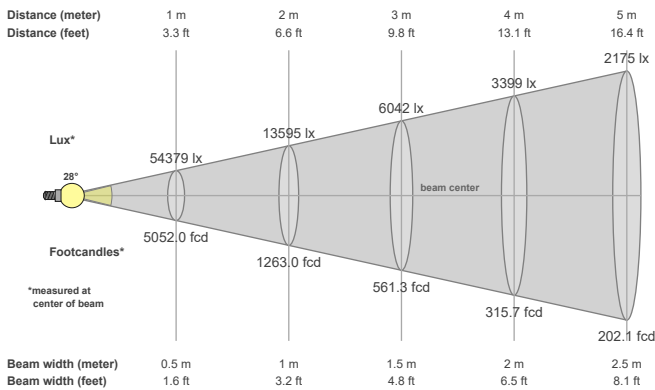
**Power: 448 W**

**Efficacy: 27 Lumen/Watt**

**Spectral distribution**  
Dominant Wavelength 573



**Beam details**



**Beam angles**

Beam angle 50%	Field angle 10%	Cutoff angle 2,5%
27.7°	40.4°	51.1°

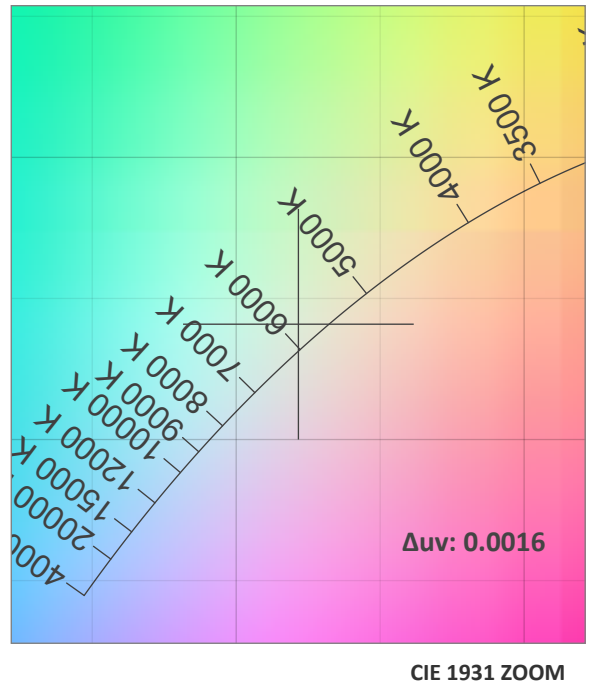
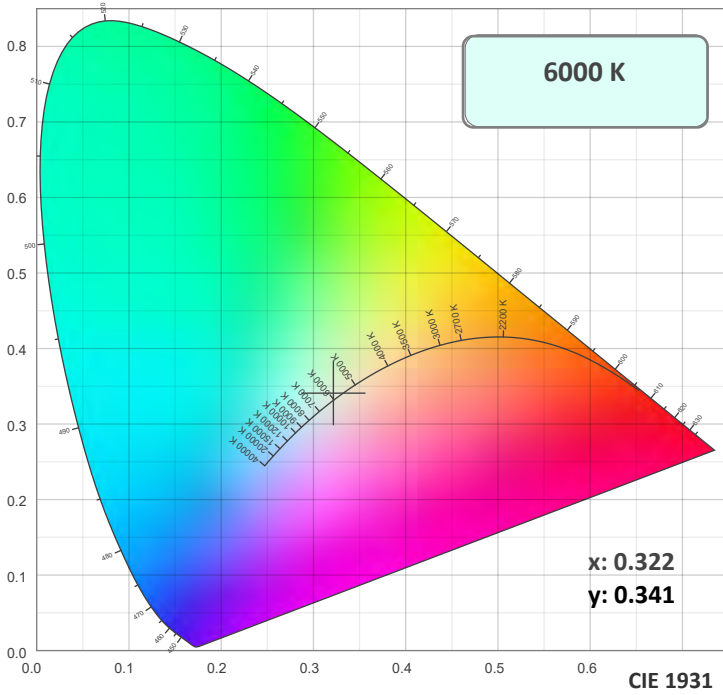
**Beam intensities**

Peak intensity	Int. ratio in 120° cone	Int. ratio in 90° cone
54472 cd	98.9%	97.3%

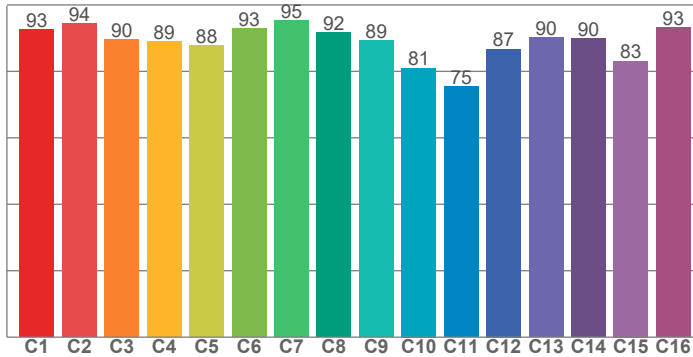
**Beam Intensities from 1-20m**

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	54379	13595	6042	3399	2175	1511	1110	850	671	544	449	378	322	277	242	212	188	168	151	136
FC	5052	1263	561.3	315.7	202.1	140.3	103.1	78.9	62.4	50.5	41.8	35.1	29.9	25.8	22.5	19.7	17.5	15.6	14	12.6

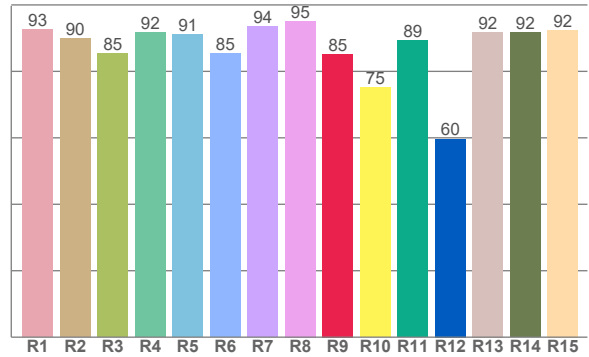
### Color Details



TM30: 88.6



CRI: 90.6 (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
92.7	89.9	85.4	91.7	91.2	85.3	93.6	95.1	85.2	75.2	89.3	59.7	91.8	91.7	92.5

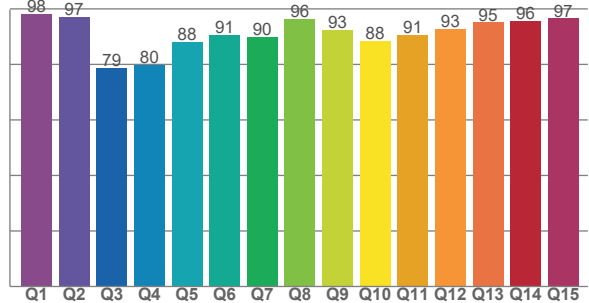
TM30 C Values, 16 binned values out of total of 99 C values

C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16
92.5	94.4	89.5	89.0	87.7	92.9	95.2	91.8	89.3	81.0	75.4	86.7	90.3	89.8	83.1	93.2

CQS Q Values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
98.2	97.0	78.7	79.9	88.2	90.5	90.0	96.3	92.5	88.5	90.6	92.9	95.1	95.5	96.6

CQS: 89.7



### Color Parameters

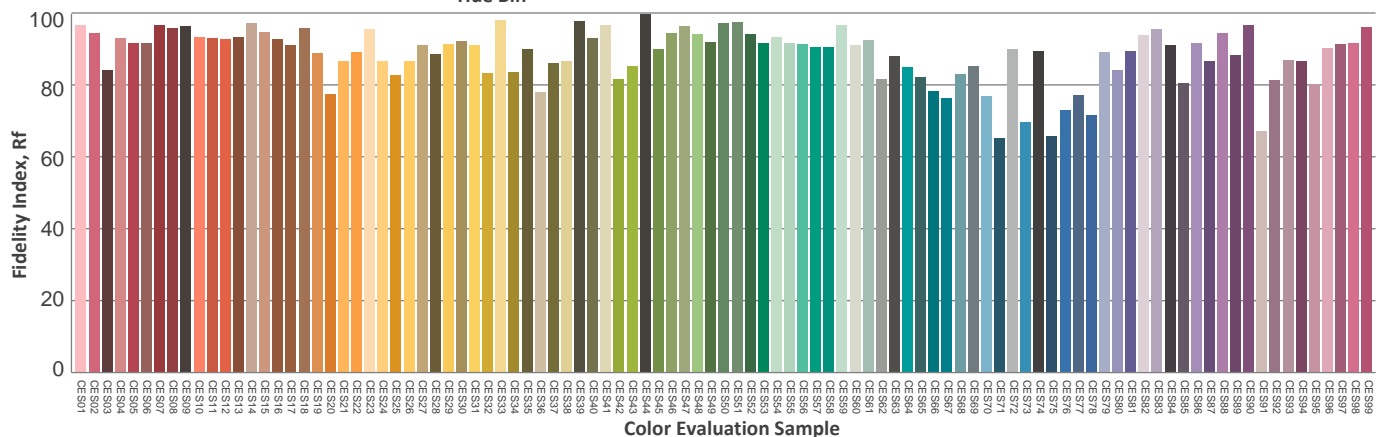
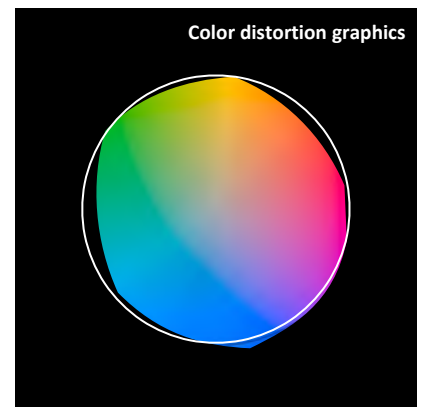
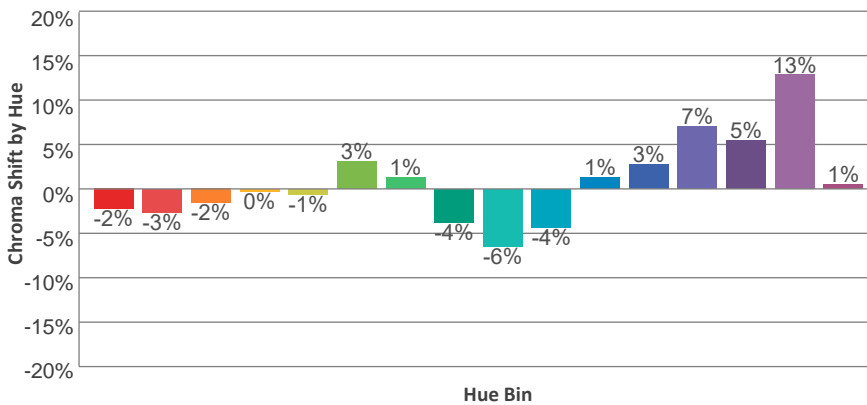
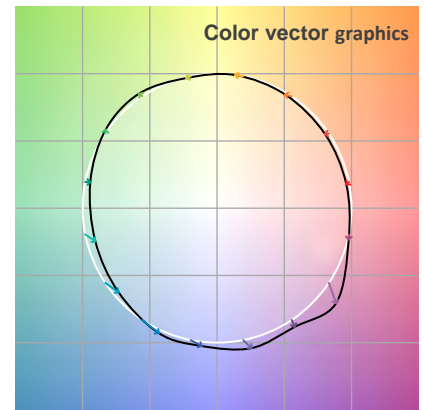
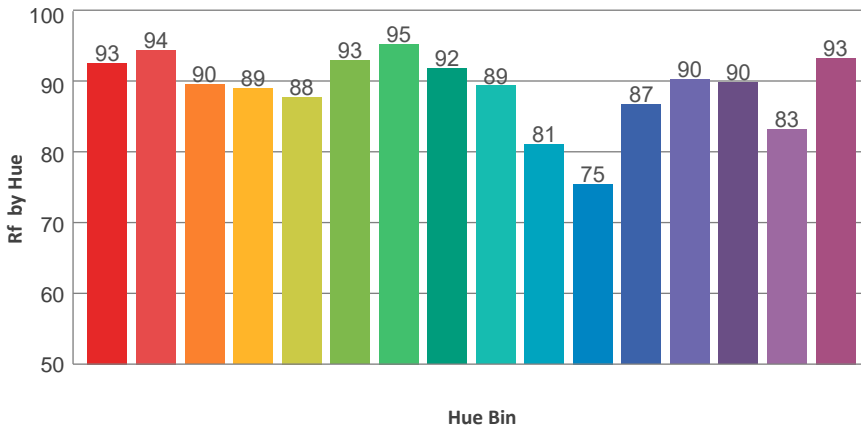
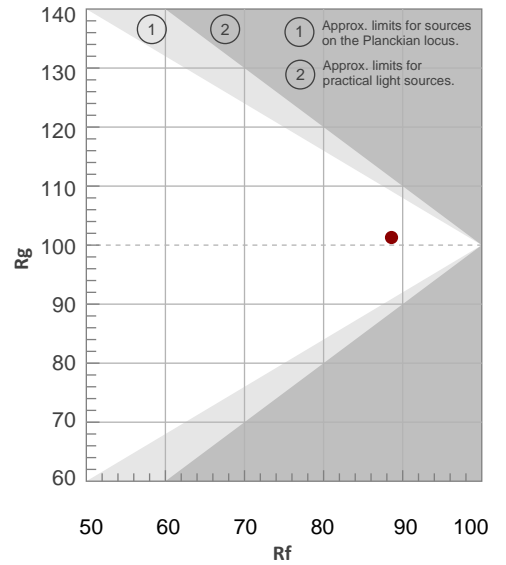
Color Temperature	Color Rendering Index	Red Component	Color Fidelity	Color Gamut	Color Quality Scale	Color Coordinate CIE 1931	Color Coordinate CIE 1931	Color Coordinate	Color Coordinate	Color Diviation from Black
CCT	CRI	CRI R9	TM30 Rf	TM30 Rg	CQS	x	y	u	v	Δuv
6000 K	90.6	85.2	88.6	101.3	89.7	0.322	0.341	0.200	0.317	0.0016

TM30 Details

**Rf 88.6**  
Fidelity Index Rf

**Rg 101.3**  
Gamut Index Rg

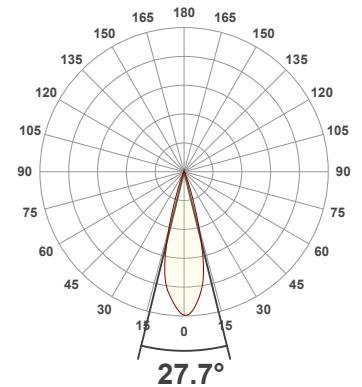
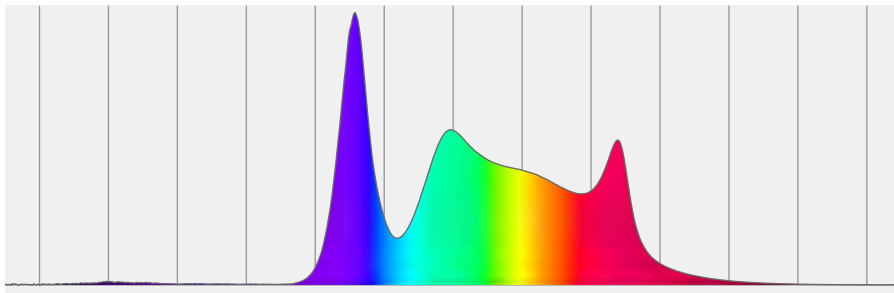
Hue Bin	R <sub>f</sub>	Graphic shifts (%)	
		Chroma	Hue
1	93	-2%	-1%
2	94	-3%	1%
3	90	-2%	5%
4	89	0%	6%
5	88	-1%	4%
6	93	3%	1%
7	95	1%	-3%
8	92	-4%	-1%
9	89	-6%	6%
10	81	-4%	11%
11	75	1%	16%
12	87	3%	9%
13	90	7%	5%
14	90	5%	-1%
15	83	13%	-10%
16	93	1%	-4%



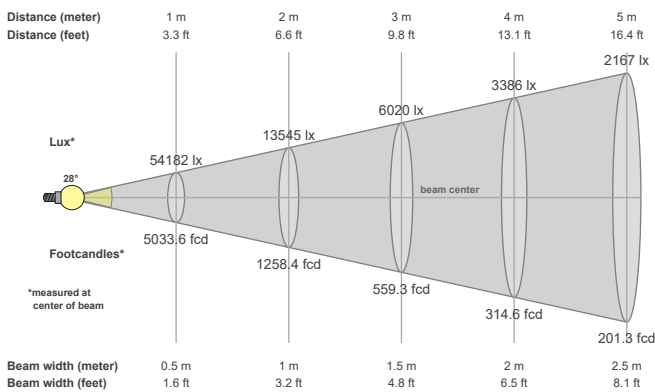
**Total Lumen Output: 11937 lm**  
**Color Temperature: 6480 K**  
**CRI: 90.6**  
**TLCI: 93**  
**TM30: 88.3**  
**CQS: 89.6**  
**Measurement Date: 3/29/2021**

**Voltage: 116 V, Current: 3.88 A**  
**Power: 450 W**  
**Efficacy: 27 Lumen/Watt**

**Spectral distribution**  
 Dominant Wavelength 553



**Beam details**



**Beam angles**

Beam angle 50%	Field angle 10%	Cutoff angle 2,5%
27.7°	40.4°	51.1°

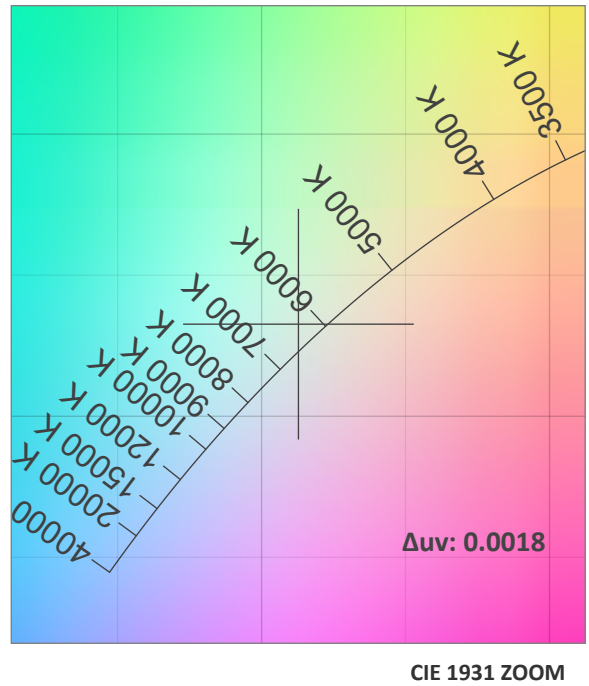
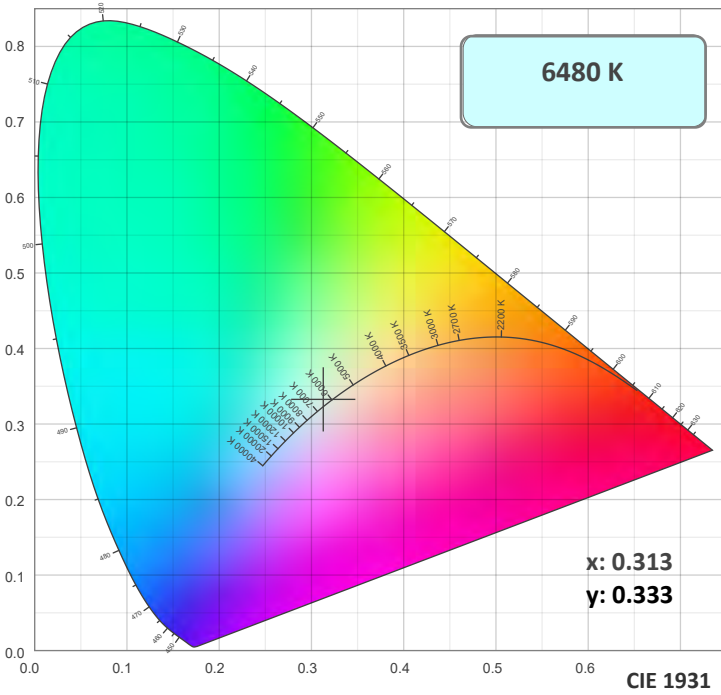
**Beam intensities**

Peak intensity	Int. ratio in 120° cone	Int. ratio in 90° cone
54195 cd	98.8%	97.2%

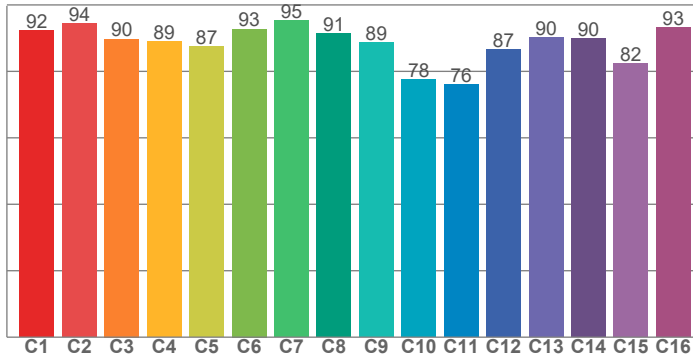
**Beam Intensities from 1-20m**

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	54182	13545	6020	3386	2167	1505	1106	847	669	542	448	376	321	276	241	212	187	167	150	135
FC	5033.6	1258.4	559.3	314.6	201.3	139.8	102.7	78.7	62.1	50.3	41.6	35	29.8	25.7	22.4	19.7	17.4	15.5	13.9	12.6

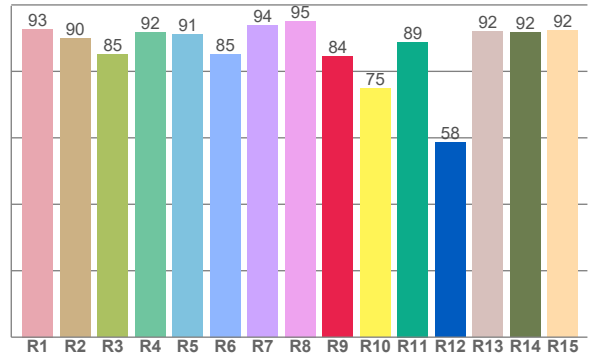
### Color Details



TM30: 88.3



CRI: 90.6 (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
92.7	89.8	85.2	91.6	91.1	85.2	93.8	95.1	84.4	74.9	88.8	58.5	91.9	91.6	92.4

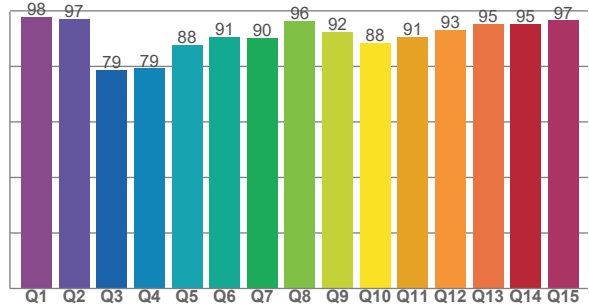
TM30 C Values, 16 binned values out of total of 99 C values

C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16
92.2	94.4	89.7	89.1	87.5	92.7	95.3	91.5	88.8	77.5	76.0	86.6	90.2	89.9	82.4	93.3

CQS Q Values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
98.0	97.1	78.7	79.3	87.8	90.7	90.2	96.5	92.4	88.4	90.6	93.0	95.3	95.4	96.6

CQS: 89.6



### Color Parameters

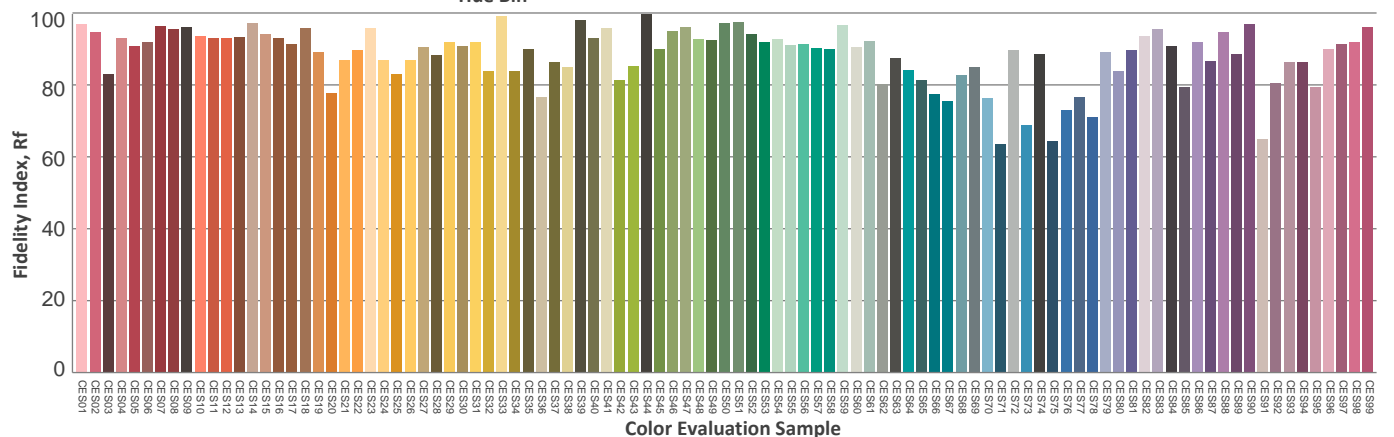
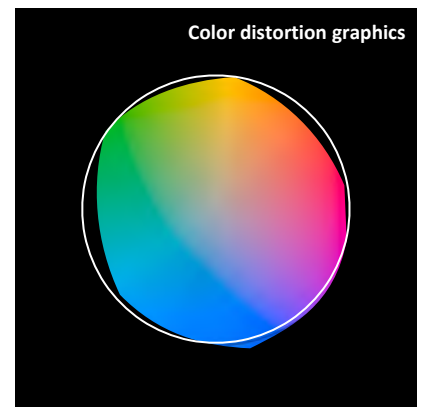
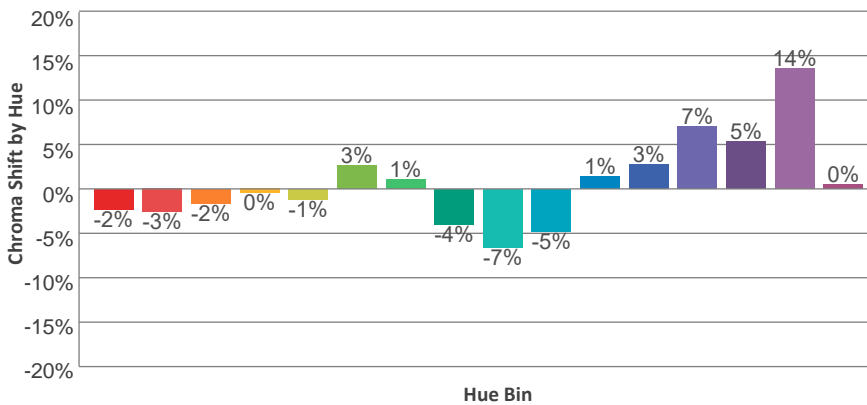
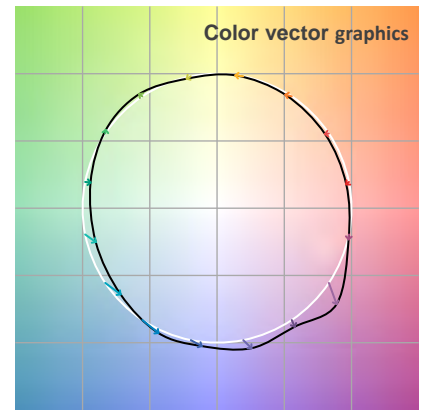
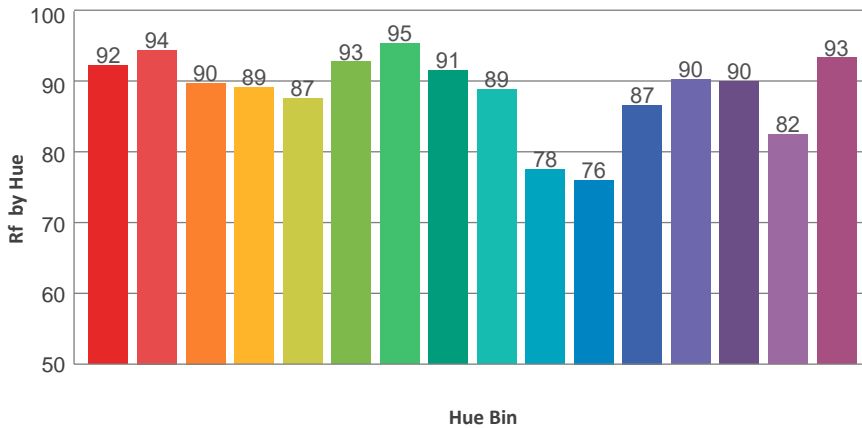
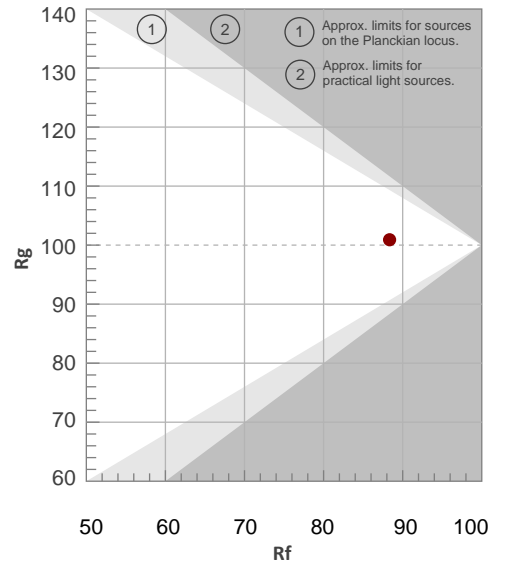
Color Temperature	Color Rendering Index	Red Component	Color Fidelity	Color Gamut	Color Quality Scale	Color Coordinate CIE 1931	Color Coordinate CIE 1931	Color Coordinate	Color Coordinate	Color Diviation from Black
CCT	CRI	CRI R9	TM30 Rf	TM30 Rg	CQS	x	y	u	v	Δuv
6480 K	90.6	84.4	88.3	100.9	89.6	0.313	0.333	0.197	0.314	0.0018

TM30 Details

**Rf 88.3**  
Fidelity Index Rf

**Rg 100.9**  
Gamut Index Rg

Hue Bin	R <sub>f</sub>	Graphic shifts (%)	
		Chroma	Hue
1	92	-2%	-1%
2	94	-3%	1%
3	90	-2%	5%
4	89	0%	6%
5	87	-1%	3%
6	93	3%	1%
7	95	1%	-2%
8	91	-4%	0%
9	89	-7%	7%
10	78	-5%	13%
11	76	1%	15%
12	87	3%	9%
13	90	7%	5%
14	90	5%	-1%
15	82	14%	-10%
16	93	0%	-4%



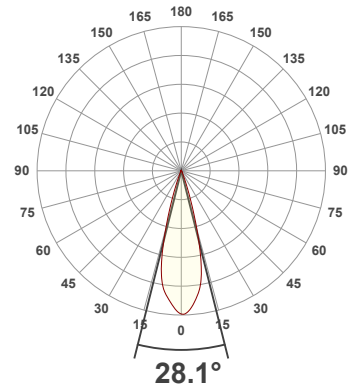
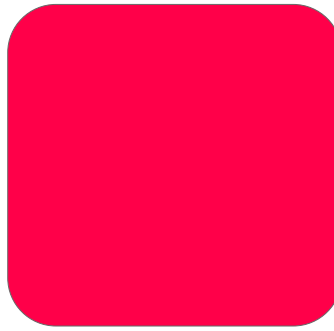
**Total Lumen Output: 1191 lm**

**Voltage: 114 V, Current: 0.890 A**

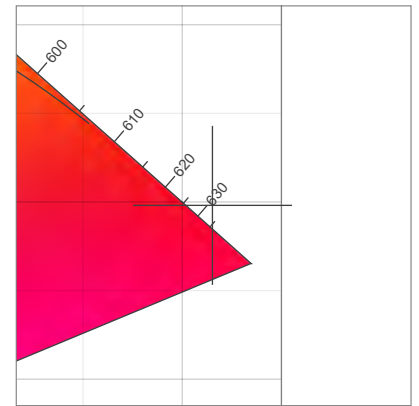
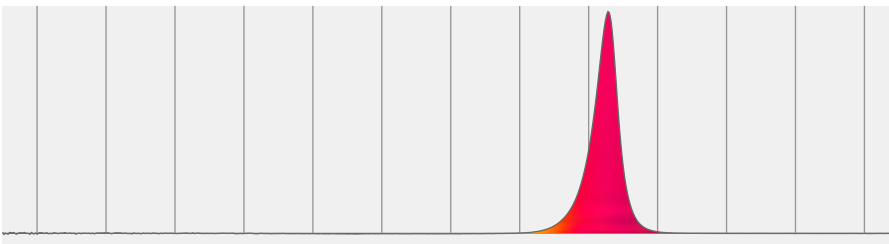
**Power: 90.4 W**

**Efficacy: 13 Lumen/Watt**

**Measurement Date: 3/29/2021**

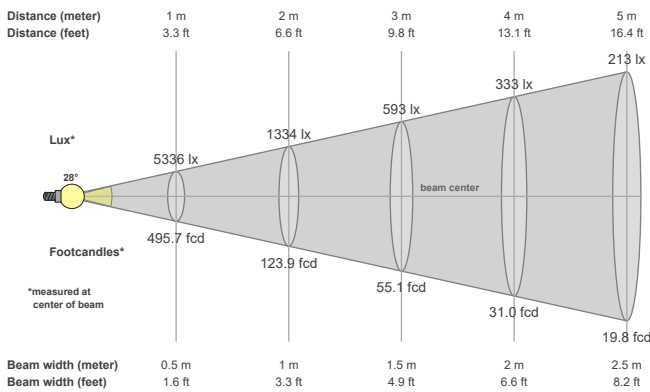


### Spectral distribution



Dominant Wavelength	Color coordinate cie 1931	Color coordinate cie 1931	Color coordinate	Color coordinate
nm	x	y	u	v
625	0.715	0.298	0.556	0.348

### Beam details



### Beam angles

Beam angle 50%	Field angle 10%	Cutoff angle 2,5%
28.1°	40.6°	50.6°

### Beam intensities

Peak intensity	Int. ratio in 120° cone	Int. ratio in 90° cone
5346 cd	99.0%	97.7%

### 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	5336	1334	593	333	213	148	109	83	66	53	44	37	32	27	24	21	18	16	15	13
FC	495.7	123.9	55.1	31	19.8	13.8	10.1	7.7	6.1	5	4.1	3.4	2.9	2.5	2.2	1.9	1.7	1.5	1.4	1.2



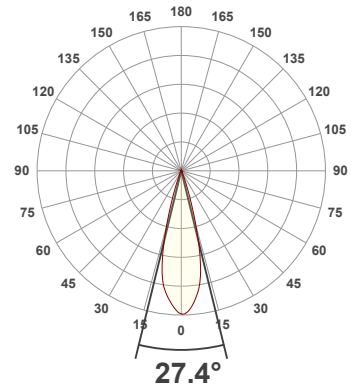
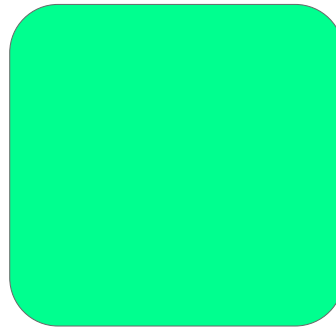
**Total Lumen Output: 2003 lm**

**Voltage: 114 V, Current: 0.756 A**

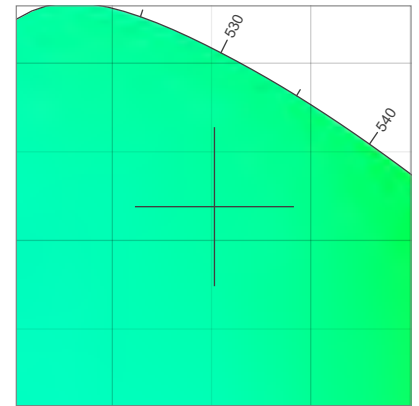
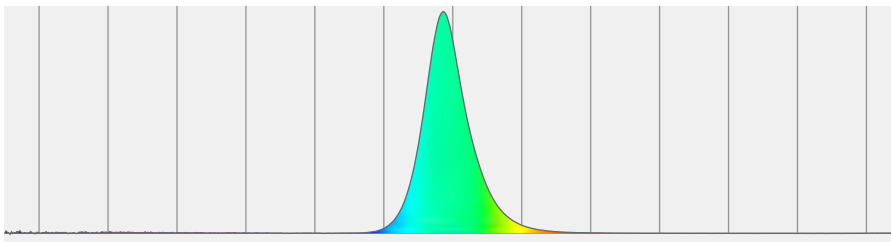
**Power: 73.8 W**

**Efficacy: 27 Lumen/Watt**

**Measurement Date: 3/29/2021**

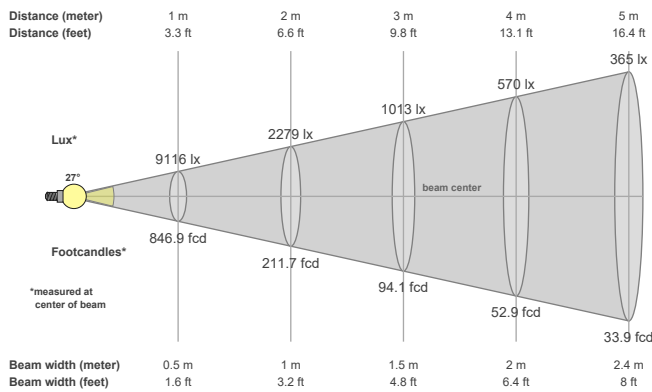


### Spectral distribution



Dominant Wavelength	Color coordinate cie 1931	Color coordinate cie 1931	Color coordinate	Color coordinate
nm	x	y	u	v
524	0.151	0.719	0.053	0.381

### Beam details



### Beam angles

Beam angle 50%	Field angle 10%	Cutoff angle 2,5%
27.4°	40.5°	51.1°

### Beam intensities

Peak intensity	Int. ratio in 120° cone	Int. ratio in 90° cone
9160 cd	98.6%	97.0%

### 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	9116	2279	1013	570	365	253	186	142	113	91	75	63	54	47	41	36	32	28	25	23
FC	846.9	211.7	94.1	52.9	33.9	23.5	17.3	13.2	10.5	8.5	7	5.9	5	4.3	3.8	3.3	2.9	2.6	2.3	2.1

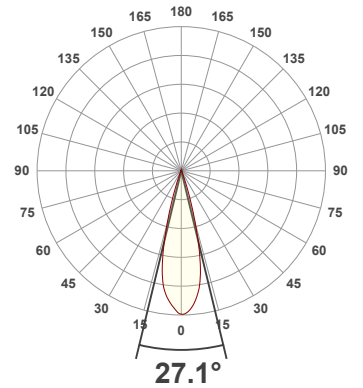
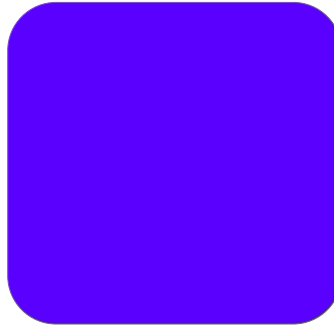
**Total Lumen Output: 599 lm**

**Voltage: 114 V, Current: 1.03 A**

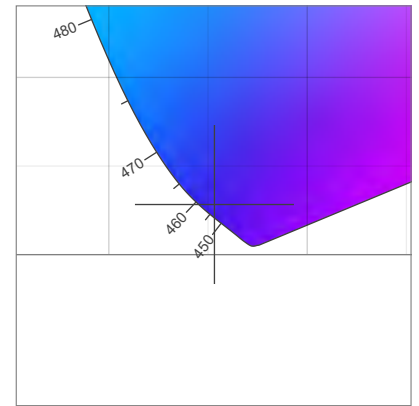
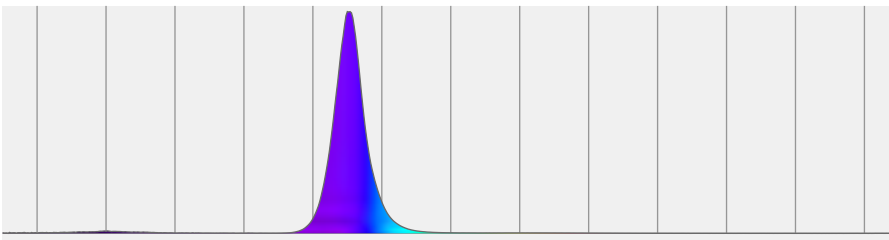
**Power: 107.6 W**

**Efficacy: 6 Lumen/Watt**

**Measurement Date: 3/29/2021**

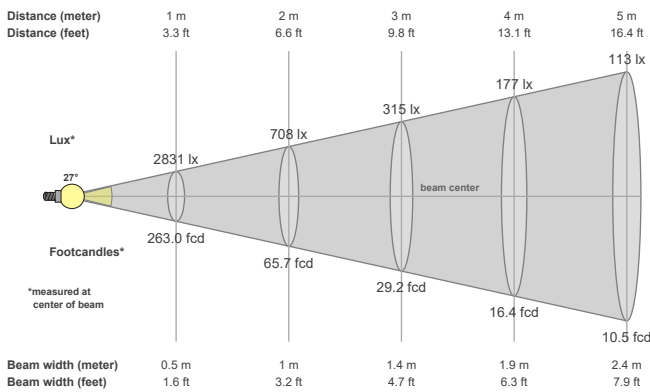


### Spectral distribution



Dominant Wavelength	Color coordinate cie 1931	Color coordinate cie 1931	Color coordinate	Color coordinate
nm	x	y	u	v
455	0.153	0.028	0.202	0.056

### Beam details



### Beam angles

Beam angle 50%	Field angle 10%	Cutoff angle 2,5%
27.1°	39.7°	49.5°

### Beam intensities

Peak intensity	Int. ratio in 120° cone	Int. ratio in 90° cone
2838 cd	98.8%	97.4%

### 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	2831	708	315	177	113	79	58	44	35	28	23	20	17	14	13	11	10	9	8	7
FC	263	65.7	29.2	16.4	10.5	7.3	5.4	4.1	3.2	2.6	2.2	1.8	1.6	1.3	1.2	1	0.9	0.8	0.7	0.7

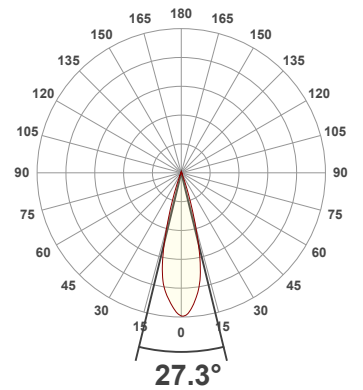
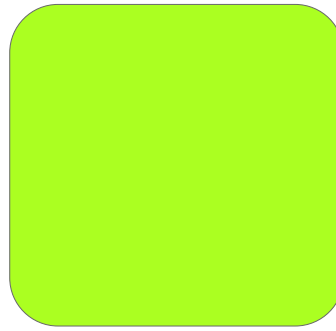
**Total Lumen Output: 9608 lm**

**Voltage: 112 V, Current: 1.87 A**

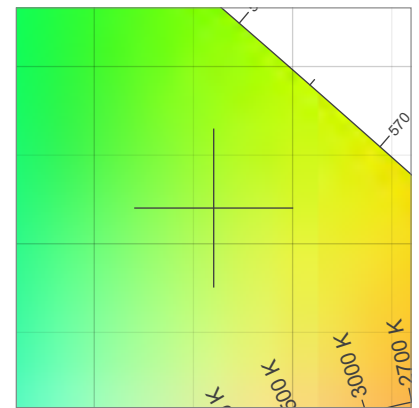
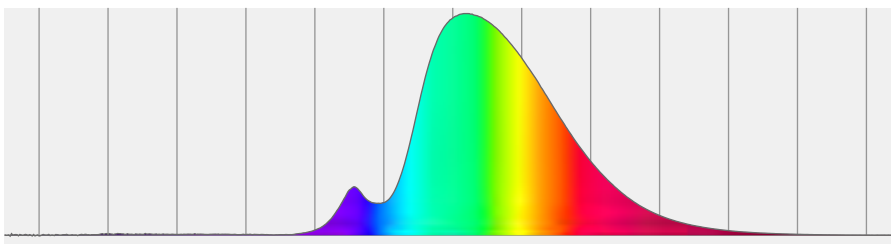
**Power: 205.7 W**

**Efficacy: 47 Lumen/Watt**

**Measurement Date: 3/29/2021**

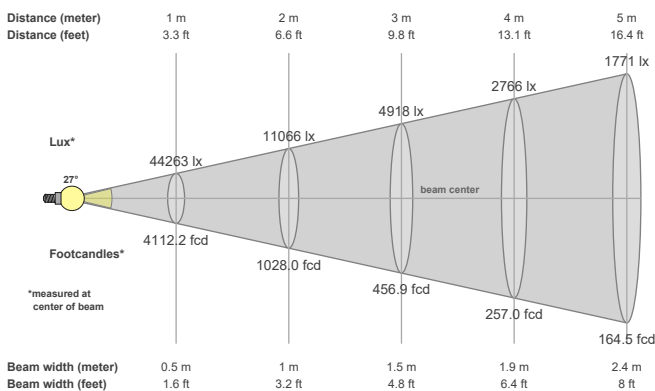


### Spectral distribution



Dominant Wavelength	Color coordinate cie 1931	Color coordinate cie 1931	Color coordinate	Color coordinate
nm	x	y	u	v
561	0.360	0.520	0.169	0.366

### Beam details



### Beam angles

Beam angle 50%	Field angle 10%	Cutoff angle 2,5%
27.3°	40.2°	50.9°

### Beam intensities

Peak intensity	Int. ratio in 120° cone	Int. ratio in 90° cone
44426 cd	98.6%	96.9%

### 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	44263	11066	4918	2766	1771	1230	903	692	546	443	366	307	262	226	197	173	153	137	123	111
FC	4112.2	1028	456.9	257	164.5	114.2	83.9	64.3	50.8	41.1	34	28.6	24.3	21	18.3	16.1	14.2	12.7	11.4	10.3

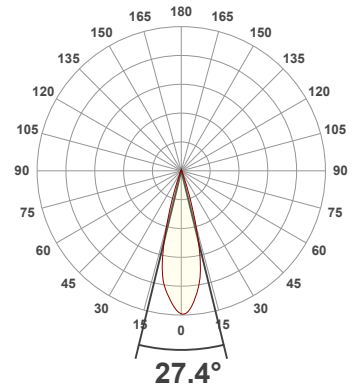
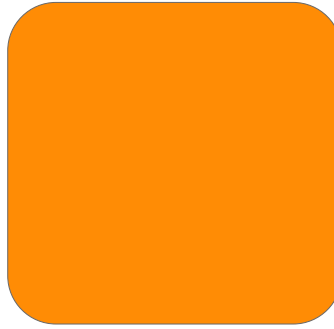
**Total Lumen Output: 2254 lm**

**Voltage: 114 V, Current: 1.10 A**

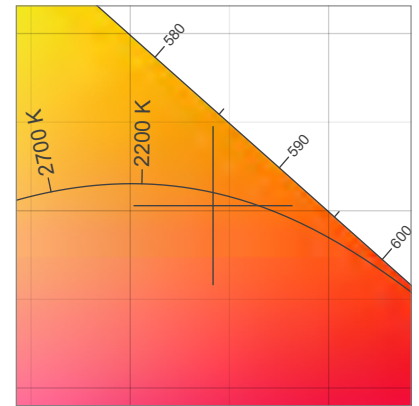
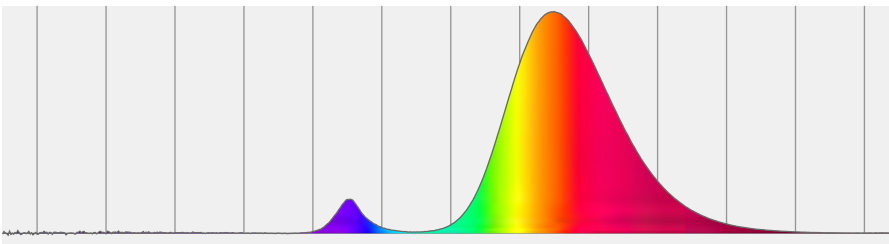
**Power: 115.4 W**

**Efficacy: 20 Lumen/Watt**

**Measurement Date: 3/29/2021**

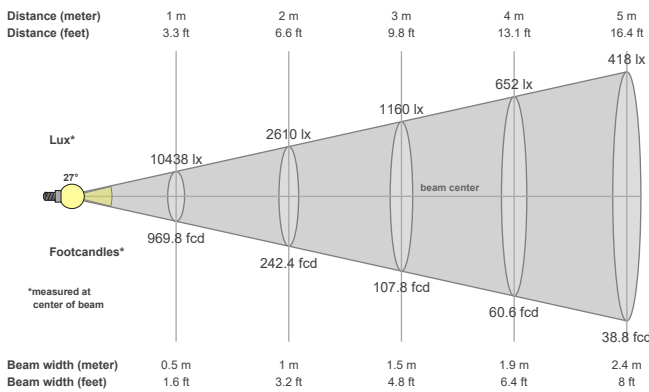


### Spectral distribution



Dominant Wavelength	Color coordinate cie 1931	Color coordinate cie 1931	Color coordinate	Color coordinate
nm	x	y	u	v
591	0.542	0.403	0.321	0.358

### Beam details



### Beam angles

Beam angle 50%	Field angle 10%	Cutoff angle 2,5%
27.4°	40.1°	50.5°

### Beam intensities

Peak intensity	Int. ratio in 120° cone	Int. ratio in 90° cone
10483 cd	98.7%	97.1%

### 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	10438	2610	1160	652	418	290	213	163	129	104	86	72	62	53	46	41	36	32	29	26
FC	969.8	242.4	107.8	60.6	38.8	26.9	19.8	15.2	12	9.7	8	6.7	5.7	4.9	4.3	3.8	3.4	3	2.7	2.4