

# Light Measurement Report

Print date: 1/7/2026

Measurement date and time: 11/14/2025 1:03:39 PM – Measurement no. VFR-251114-0502-MS

Measurement tracking No. and Link: [n/a](#)

Operator:



## Laboratory and Equipment

Laboratory Owner and Location

Goniospectrometer System and Type

Sensor Name, Calibr. Date and Serial No.

Spectrometer Manufacturer and Model

Viso Systems, Copenhagen V, Denmark

LabSpion – Type C, horizontal

LabSensor Model2 – 4/8/2025 – 1516006613

Ibsen Photonics, Denmark – Freedom VIS (Custom Viso)

## Measurement Conditions

Number of C-planes and Resolution

$\gamma$  (gamma)-Resolution

Test Distance

Input Power, Power and Displ. Factors

Input RMS Voltage and Current

Frequency of Input Power

Warm-up Time and Variation

4 planes – 90°

5°

10.57 m

12.5 W – PF 0.99 – DPF 0.99

121 V – 0.105 A

60 Hz

Not completed – 2.0%

## Tested Light Source

Product Name

Item No. and Manufacturer

Product Description (line 1)

casted endcap, where I was not powered.

HP1-P-D-4'-B-835-F-BLX2835

HP1-P-D-4'-B-835-F-BLX2835 – Finelite Inc.

Tested using the BLX 2835 boards, with the final HP1 I/D prototype with

## Main Light Measurement Results

Output – Total Lumen (Up% / Down%)

Efficiency

Peak Intensity and Beam Angle

Correlated Color Temperature, Target/Measured

Color Rendering Index

Color Rendering TM30-18

Color Shift, CIE duv and MacAdam Steps

Flicker

1446 lm – 1.16% / 98.84%

116 lm/W

628 cd – 91.2°

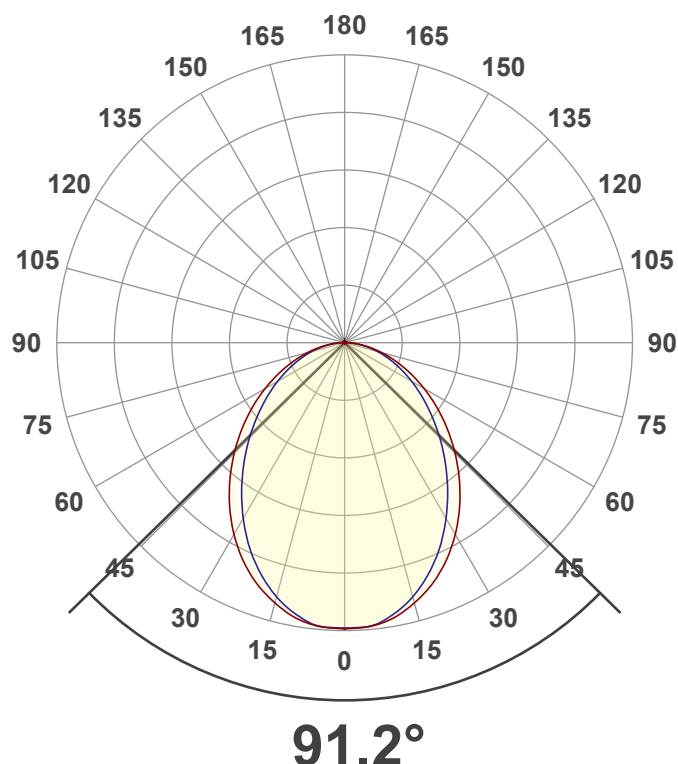
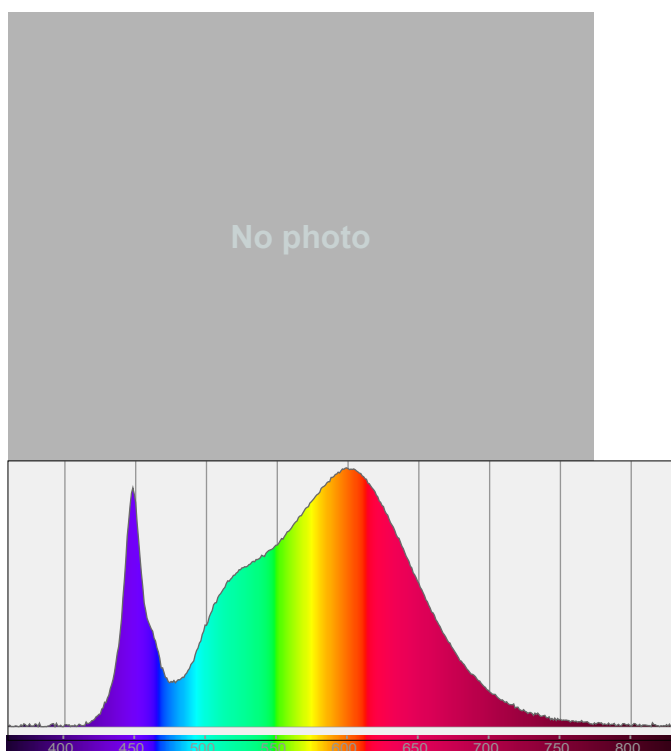
CCT = 3456 K / 3456 K

CRI 82.7

R<sub>f</sub> 84.1 – R<sub>g</sub> 97.3

Duv 0.0009 – SDCM n/a

SVM n/a – PstLM n/a



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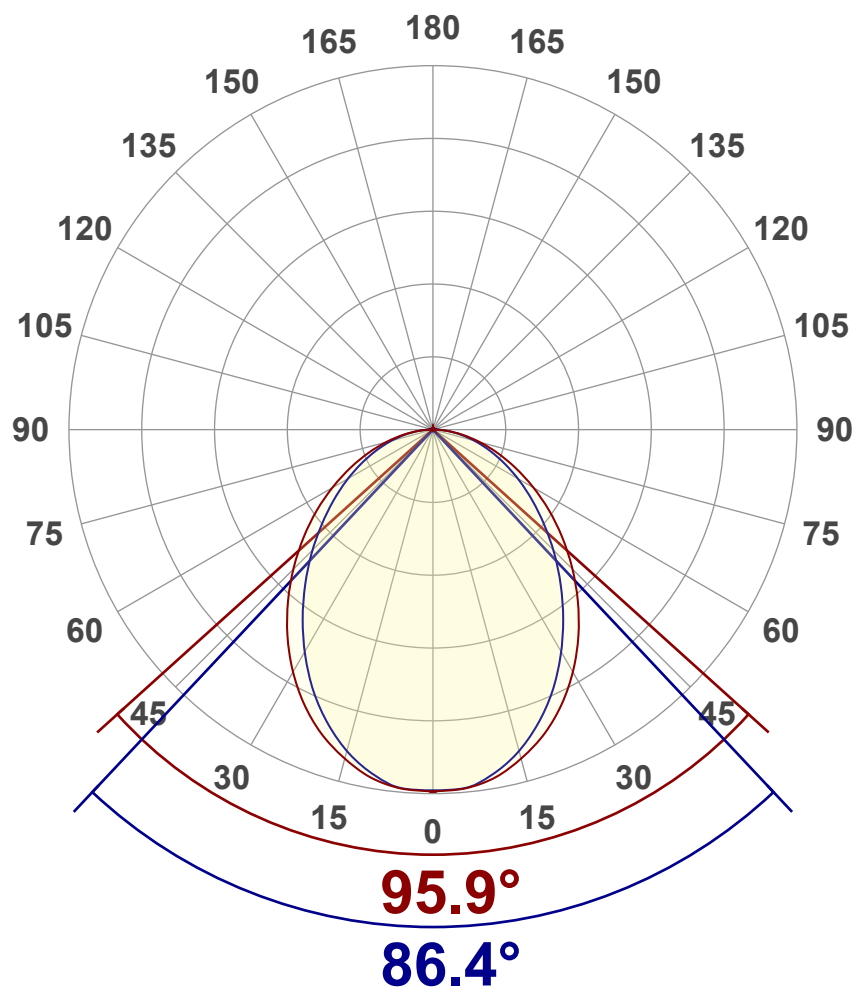
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## Luminous Intensity diagram

Unit: 0-100% of peak intensity



## Main Values

Output (total Lumen)	1446 lm
Lumen Up% / Down%	1.16% / 98.84%
Peak Intensity	628 cd
Beam Angle (50%)	91.2°
Beam Angle (90%)	86.4°
Beam Angle (10%)	95.9°

## Cut-off Angle

Average 2,5%	175.1°
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## Field Angle

Average 10%	155.7°
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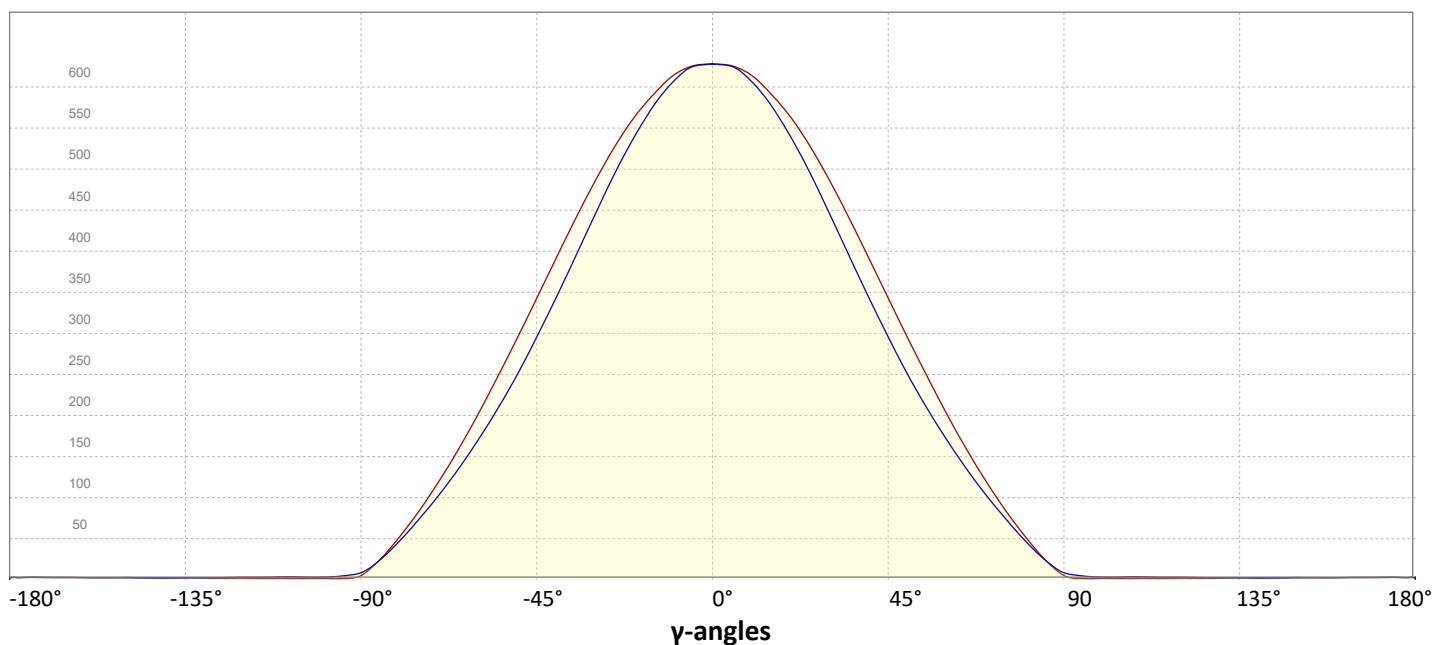
## Intensity Ratio

In 120° cone	80.8%
In 90° cone	58.5%

C000-C180

C090-C270

## Linear distribution diagram - Intensity (candela) vs γ-angle

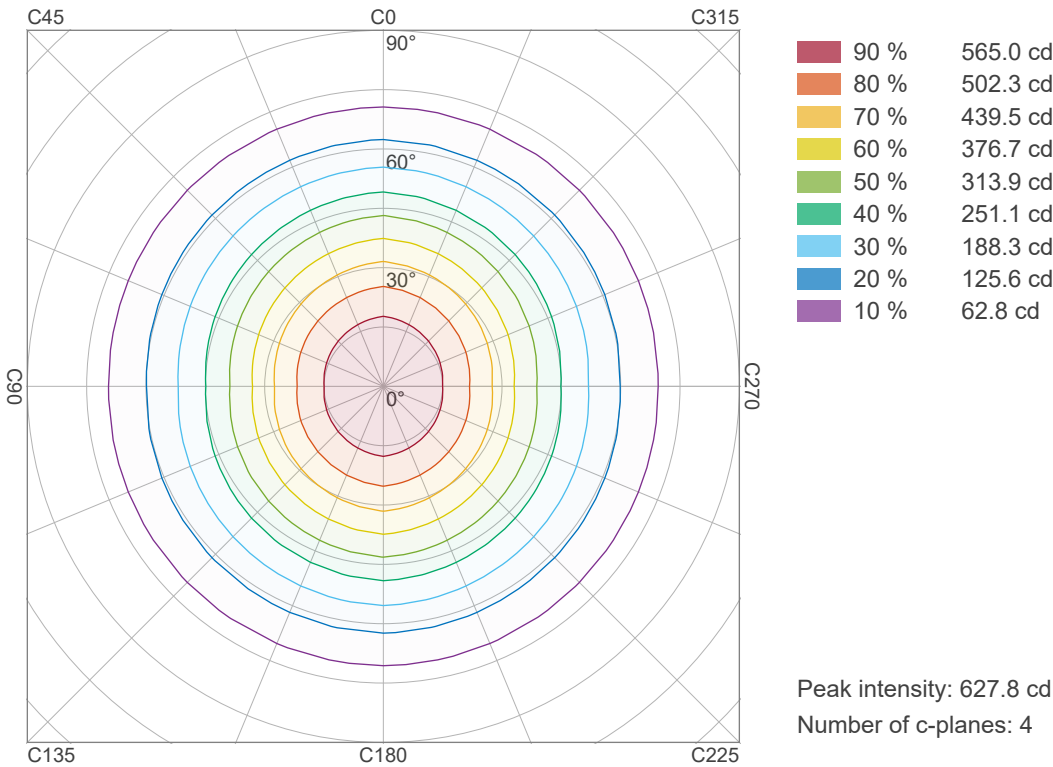


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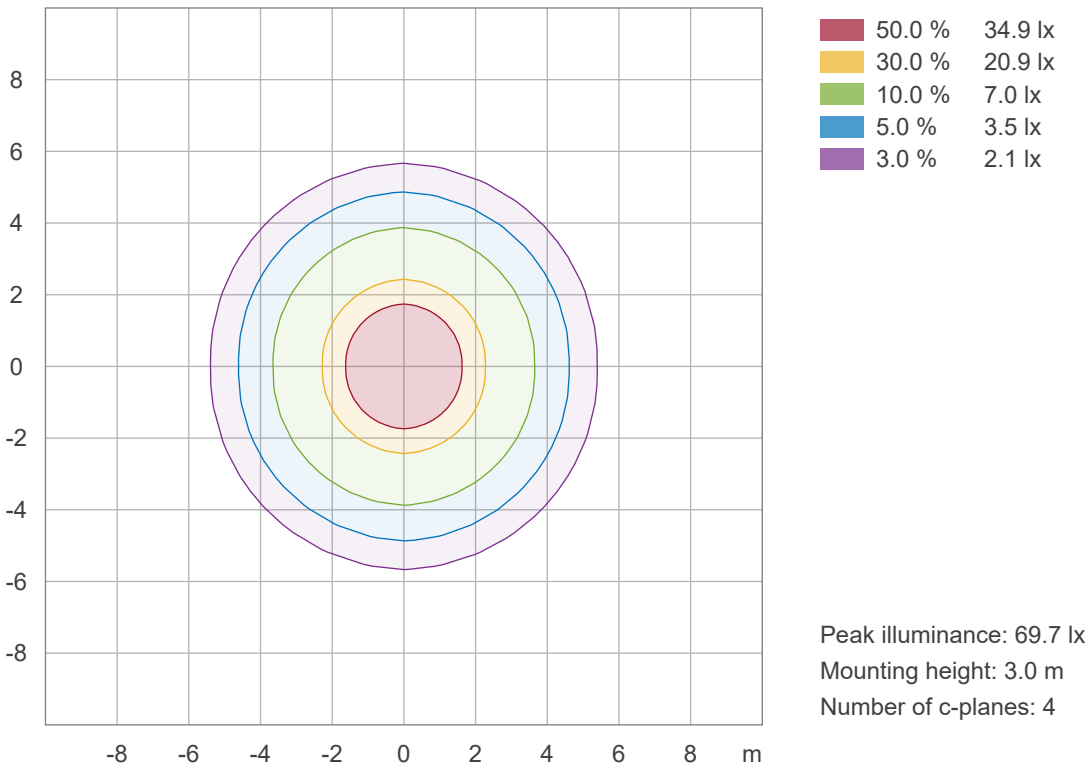
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## Iso-intensity Diagram (Iso-candela)



## Iso-illuminance Diagram (Iso-lux)



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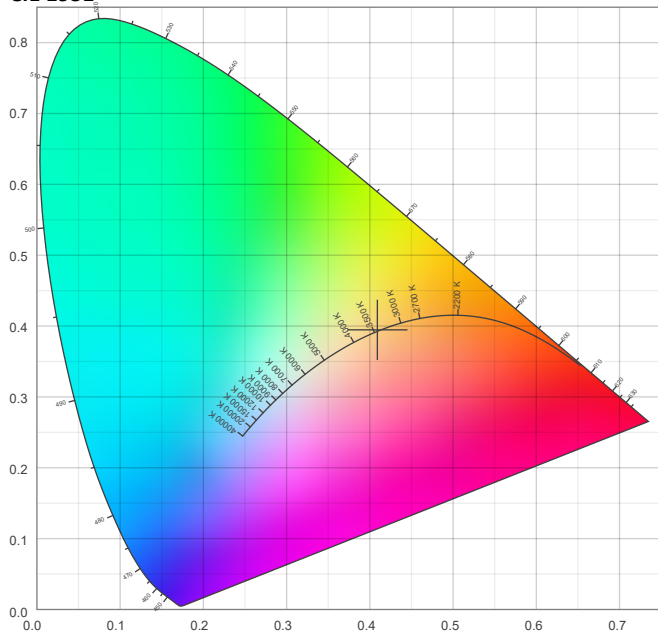


## Color details

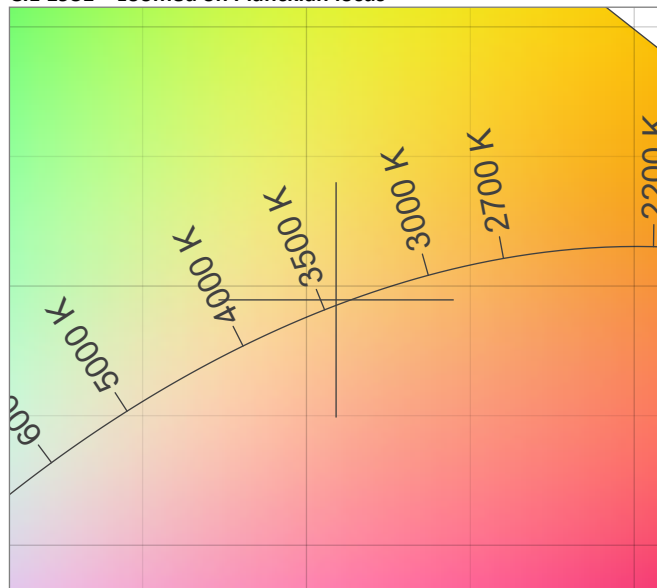
Correlated Color Temperature, Target CCT = 3456 K  
Correlated Color Temperature, Measured CCT = 3456 K  
Color Rendering Index CRI 82.7  
Color Rendering Index, R9 (red component) R9 = 8.3  
Color Rendering TM30-18  $R_f$  84.1 –  $R_g$  97.3  
Color Quality Scale CQS = 82.7

MacAdam Steps  
Color coordinates CIE 1931 (x;y) = (0.409;0.395)  
Color coordinate CIEs 1960 (u;v) = (0.237;0.342)  
Color deviation from BBL Duv = 0.0009  
Color coordinate CIEs 1976 (CIELUV) (u';v') = (0.237;0.513)

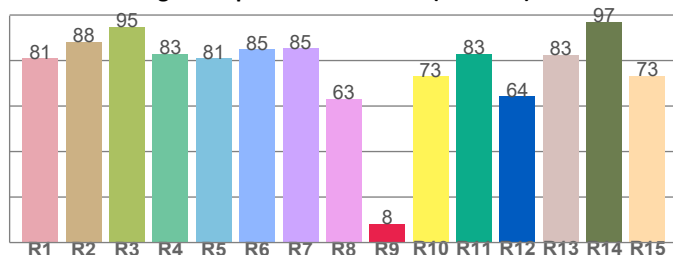
## CIE 1931



## CIE 1931 – zoomed on Planckian locus



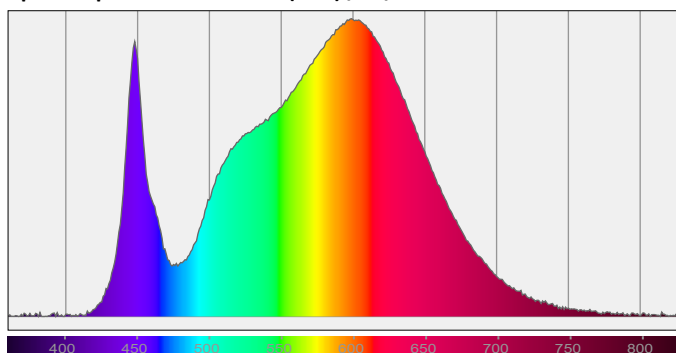
## Color Rendering Index per reference color (CIE 1995)



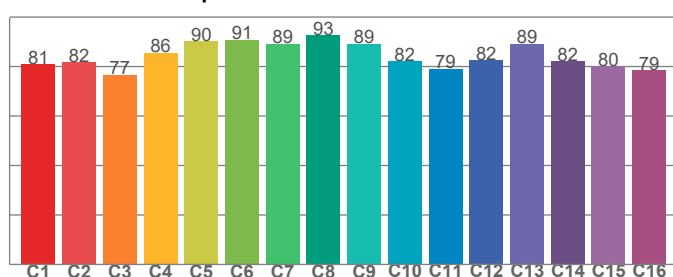
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
81.1	88.3	94.9	83.0	81.1	84.9	85.5	63.1	8.3	73.2	83.0	64.4	82.6	97.1	73.4

## Spectral power distribution (SPD) / W/nm – 0-100%



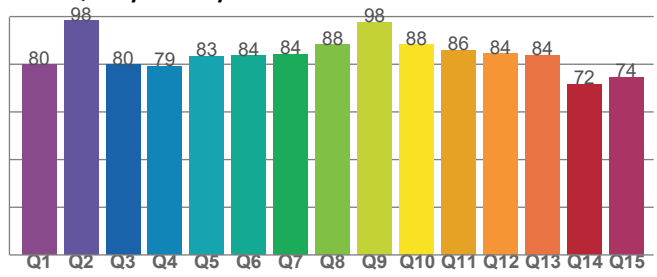
## TM30-18 $R_f$ -values per hue bin



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
80.8	81.8	76.7	85.5	90.3	90.9	89.2	92.6	89.1	82.2	79.1	82.4	89.2	82.0	80.0	78.6

## Color Quality Scale by reference color



CQS Q values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
79.8	98.2	79.8	79.1	83.4	83.6	84.3	88.1	97.6	88.3	86.0	84.3	83.7	71.7	74.5

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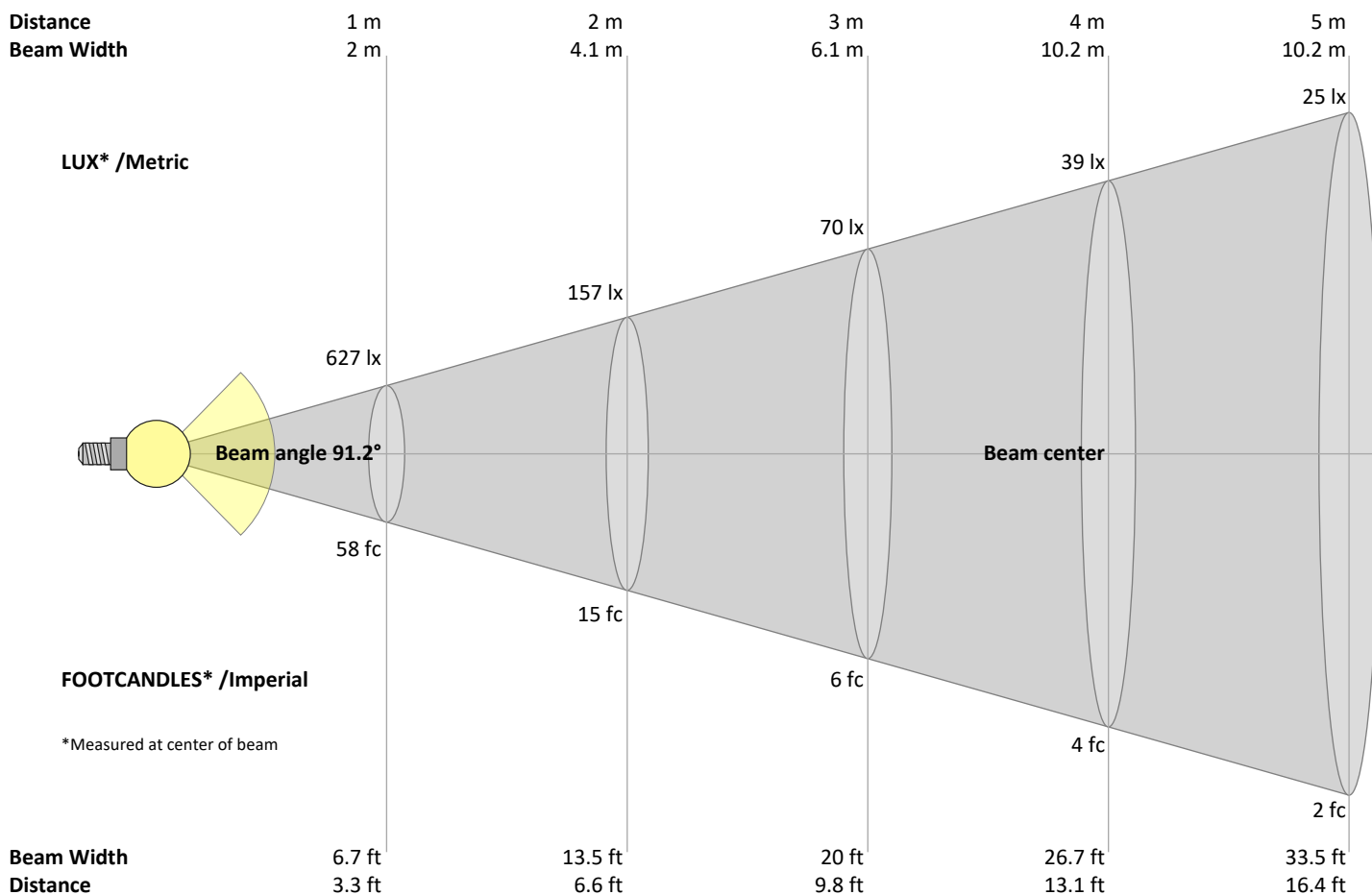
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## Beam Details



## Beam intensities from 1 – 20 m

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	m
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	ft
627	157	70	39	25	17	13	10	8	6	5	4	4	3	3	2	2	2	2	2	lux
58.2	14.6	6.5	3.6	2.3	1.6	1.2	0.9	0.7	0.6	0.5	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.1	fc

## Intensities in 0° c-plane

0°	5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°	75°	80°	85°	90°	95°	γ
627	626	614	591	563	528	486	440	392	343	294	247	202	159	120	85	53	25	5	2	cd
100%	100%	98%	94%	90%	84%	77%	70%	63%	55%	47%	39%	32%	25%	19%	14%	8%	4%	1%	0%	of 0°val

## Intensities in 90° c-plane

0°	5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°	75°	80°	85°	90°	95°	γ
627	624	606	577	539	495	445	394	344	296	250	208	170	135	104	75	48	25	9	5	cd
100%	100%	97%	92%	86%	79%	71%	63%	55%	47%	40%	33%	27%	22%	17%	12%	8%	4%	1%	1%	of 0°val

## Intensities in 180° c-plane

0°	5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°	75°	80°	85°	90°	95°	γ
627	626	614	591	563	528	486	440	392	343	294	247	202	159	120	85	53	25	5	2	cd
100%	100%	98%	94%	90%	84%	77%	70%	63%	55%	47%	39%	32%	25%	19%	14%	8%	4%	1%	0%	of 0°val

## Intensities in 270° c-plane

0°	5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°	75°	80°	85°	90°	95°	γ
627	624	606	577	539	495	445	394	344	296	250	208	170	135	104	75	48	25	9	5	cd
100%	100%	97%	92%	86%	79%	71%	63%	55%	47%	40%	33%	27%	22%	17%	12%	8%	4%	1%	1%	of 0°val



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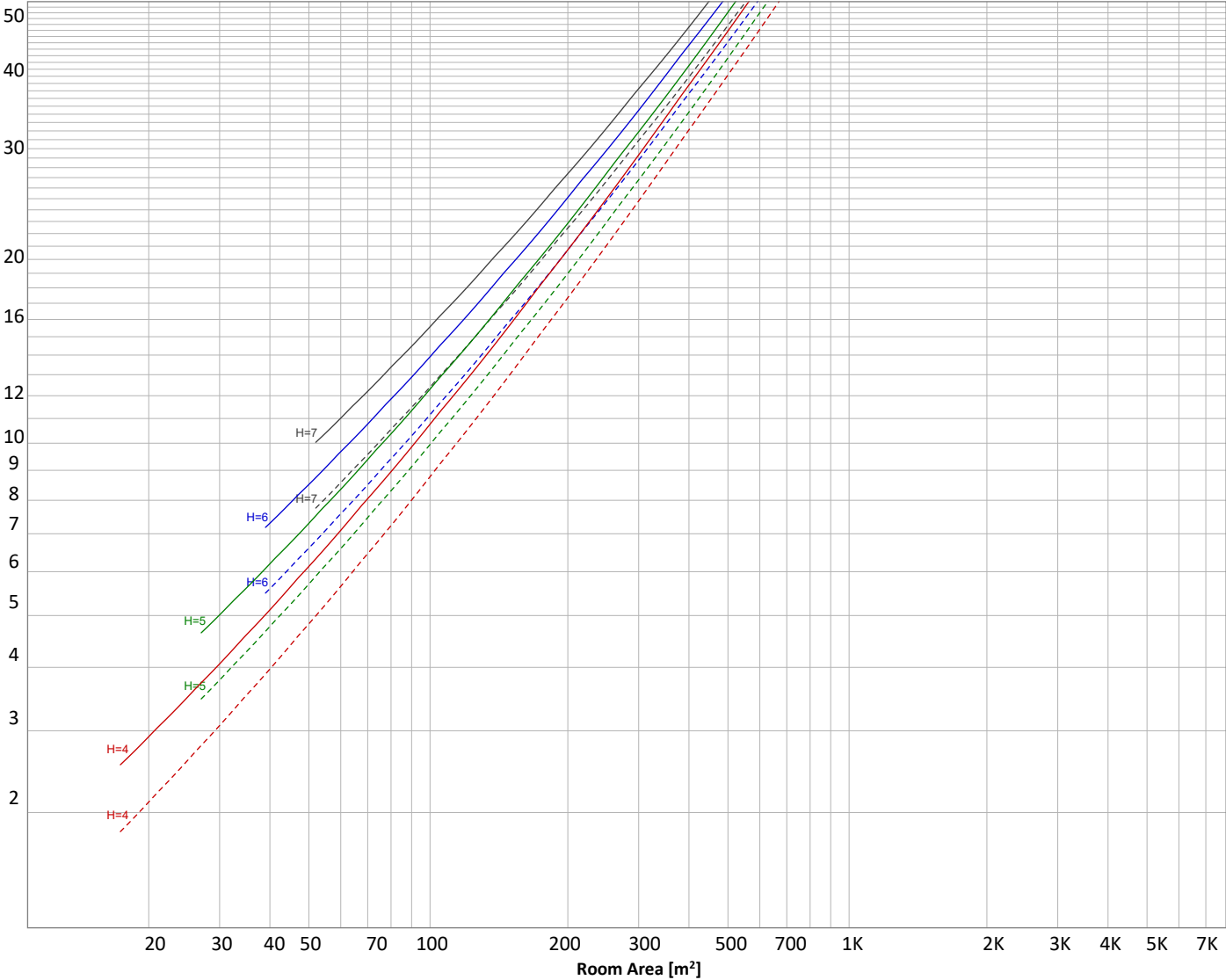
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## Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



### Conditions

H = Room height	Flux = 1446 lm	p(%)		
H <sub>down</sub> = Lamp distance from ceiling =	0.00 m	Line type	Ceiling reflectance	Wall reflectance
H <sub>work</sub> = Work area height from floor =	0.00 m	-----	70	50
E <sub>work</sub> = Average lux on work area =	100 lx	-----	50	30
				Floor reflectance
				20

## Zonal Lumen Summary

0°-10°	10°-20°	20°-30°	30°-40°	40°-50°	50°-60°	60°-70°	70°-80°	80°-90°
59.1 lm	164 lm	235 lm	261 lm	246 lm	204 lm	146 lm	84.7 lm	29.1 lm
90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
4.16 lm	2.66 lm	2.44 lm	2.08 lm	1.78 lm	1.46 lm	1.17 lm	0.767 lm	0.274 lm

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## Outdoor Light Planning

### Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	59 lm	4.1%
10-20°	164 lm	11.4%
20-30°	235 lm	16.2%
30-40°	261 lm	18.0%
40-50°	246 lm	17.0%
50-60°	204 lm	14.1%
60-70°	146 lm	10.1%
70-80°	85 lm	5.9%
80-90°	29 lm	2.0%
90-100°	4 lm	0.3%
100-110°	3 lm	0.2%
110-120°	2 lm	0.2%
120-130°	2 lm	0.1%
130-140°	2 lm	0.1%
140-150°	1 lm	0.1%
150-160°	1 lm	0.1%
160-170°	1 lm	0.1%
170-180°	0 lm	0.0%
<b>Total</b>	<b>1446 lm</b>	<b>100.0%</b>

### Intensity peaks

Max intensity	628 cd
Intensity, 90°	5 cd
Intensity, 0°	627 cd

### Zonal Lumen summary

Zone (γ)	Lumen	% Total
0-30°	458 lm	31.7%
0-40°	718 lm	49.7%
0-60°	1169 lm	80.8%
60-90°	260 lm	18.0%
70-100°	118 lm	8.2%
90-120°	9 lm	0.6%
0-90°	1429 lm	98.8%
90-180°	17 lm	1.2%
0-180°	1446 lm	100.0%

### BUG rating

	Lumen	% Total
<b>Forward light</b>		
Low(0-30°)	229 lm	15.8%
Medium(30-60°)	355 lm	24.6%
High(60-80°)	116 lm	8.0%
Very high(80-90°)	15 lm	1.0%
<b>Back light</b>		
Low(0-30°)	229 lm	15.8%
Medium(30-60°)	355 lm	24.6%
High(60-80°)	116 lm	8.0%
Very high(80-90°)	15 lm	1.0%

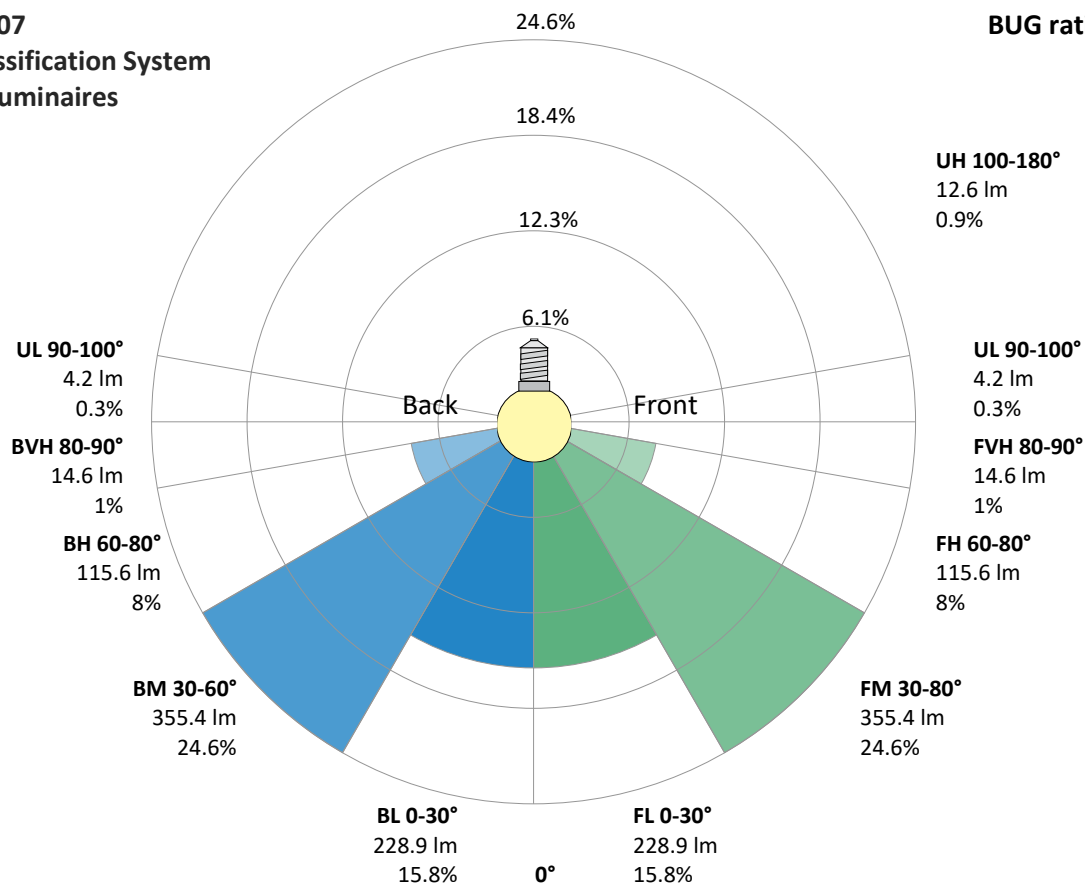
### Uplight

Low(90-100°)	4 lm	0.3%
High(100-180°)	13 lm	0.9%

## IESNA TM-15-07

### Luminaire Classification System For Outdoor Luminaires

### BUG rating B1 U2 G1





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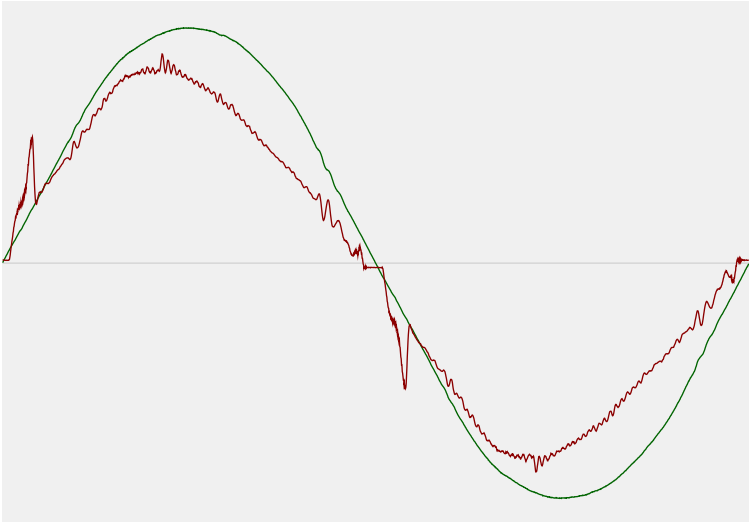


Power Details

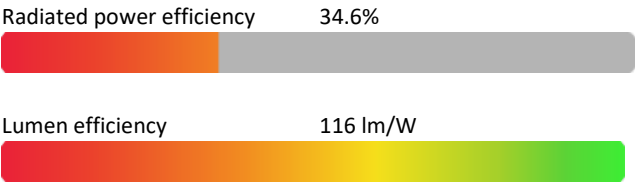
Input Power

Power feed to light source	12.5 W
Frequency of input power	60 Hz
RMS Input voltage feed, $V_{RMS}$	121 V
RMS Input current feed, $I_{RMS}$	0.105 A
Volt-Ampere or apparent power = $V_{RMS} \cdot I_{RMS}$	12.67 VA
Displacement factor of AC power feed	0.99
Power factor of AC current feed	0.99
Total harmonic distortion of the current	8.66%
Total harmonic distortion of the voltage	1.73%

Input Power Curve



Efficiency



Stabilization Details

Warmup Conditions

Stable period	15 min
Stable change max	2.0%
Minimum time	15 min

Color Temperature Change

CCT start	3456 K
CCT shift	+0 K
CCT end	3456 K

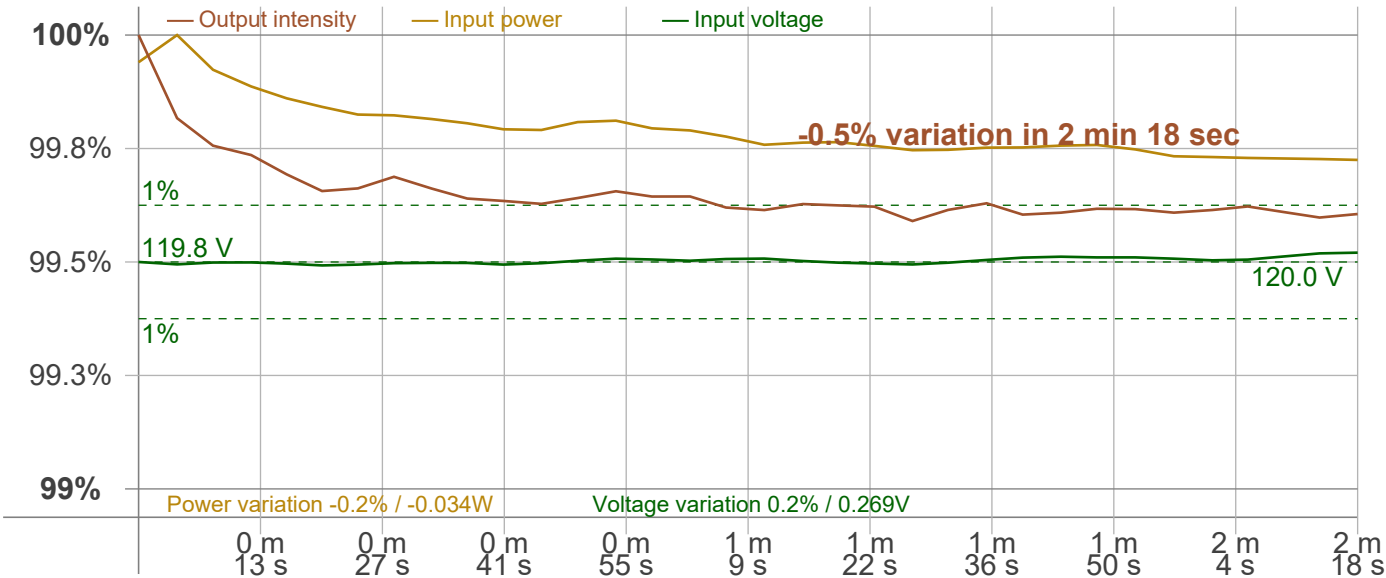
Warmup Result

Total warmup time	Not completed
Warmup variation	-0.5%

Output Change

Output start	1449 lm
Output change	-3 lm
Output end	1446 lm

Stabilization Curve



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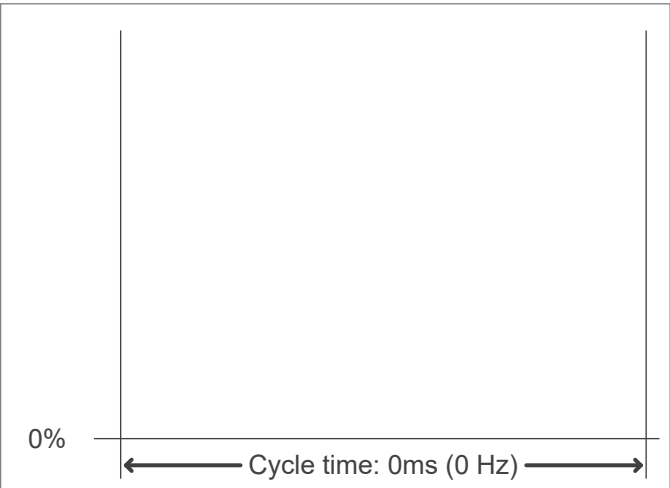
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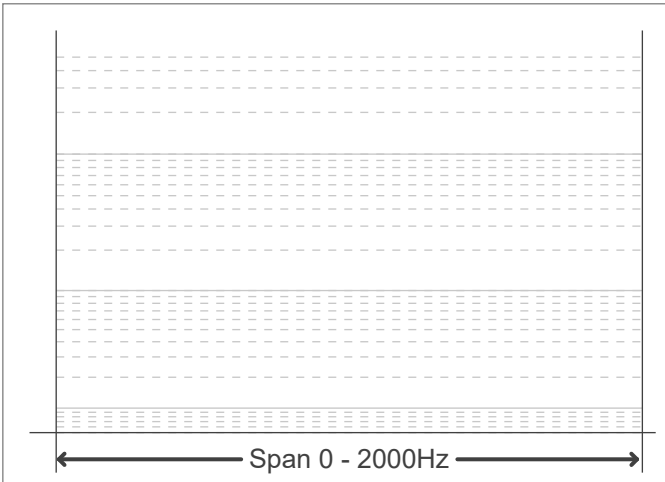
Flicker /TLA details

Flicker Meter Type	Viso Systems LabFlicker	Measurement time	
Frequency of input power	60 Hz	PstLM	180 sec
Flicker/TLA sample rate	n/a samples/s	All other indices	1,2 sec
Flicker indices according to Illuminating Engineering Society (IES)		Flicker indices according to California Energy Commission (CEC) 2016b	
Flicker frequency	n/a Hz	JA8/10 40 Hz	n/a %
Percent Flicker	n/a %	JA8/10 90 Hz	n/a %
Flicker index	n/a	JA8/10 200 Hz	n/a %
		JA8/10 400 Hz	n/a %
		JA8/10 1000 Hz	n/a %
TLA indices (re IEC TR 61547-1, IEC 61000-3-3 and IEC 61000-4-15)		Flicker indices according to Lighting Research Center (2015)	
PstLM value (F < 80 Hz)	n/a	Perception metric, Assist Mp	n/a
SVM value (80 < F < 2000 Hz)	n/a		

Flicker frame (frame of one flicker period in time domain)



Flicker FFT (flicker curve in frequency domain)



IEEE 1789 Frequency/modulation plot

