

# Light Measurement Report

Print date: 1/7/2026

Measurement date and time: 11/14/2025 10:30:54 AM – Measurement no. VFR-251114-0490-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

8.3 W – PF 0.98 – DPF 0.98

121 V – 0.070 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'-S-835-F-BLX2835

HP1-P-D-4'-S-835-F-BLX2835 –

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

908 lm – 0.92% / 99.08%

110 lm/W

398 cd – 90.8°

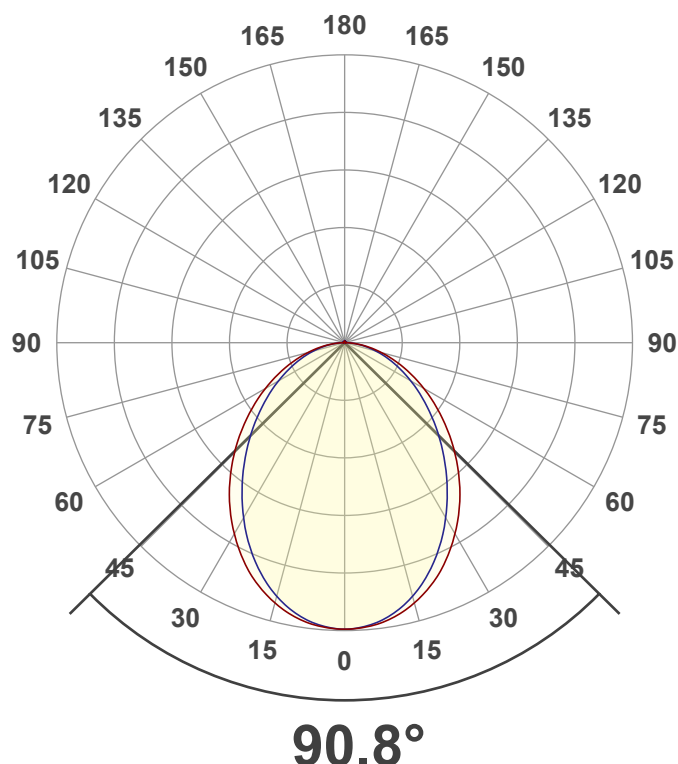
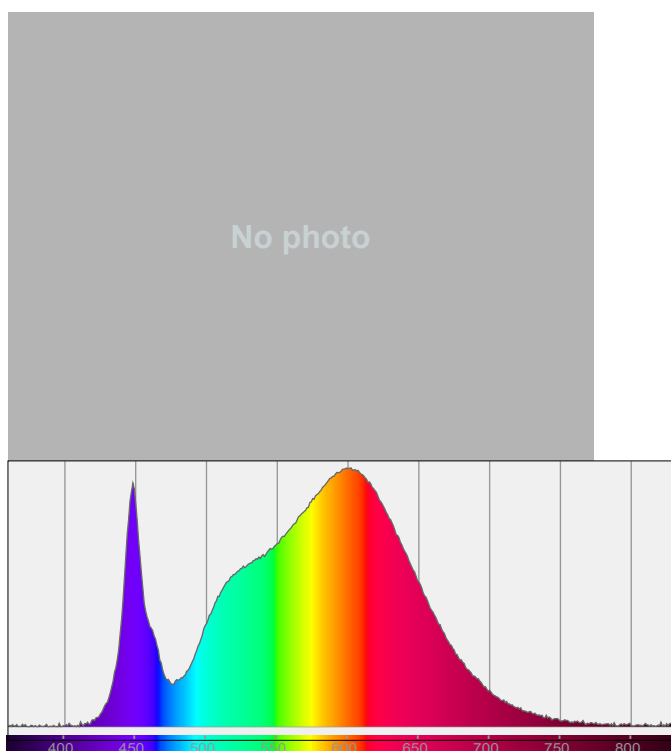
CCT = 3453 K / 3453 K

CRI 82.9

R<sub>f</sub> 84.3 – R<sub>g</sub> 97.3

Duv 0.0010 – SDCM n/a

SVM n/a – PstLM n/a



# Light Measurement Report

Print date: 1/7/2026

Measurement date and time: 11/14/2025 10:30:54 AM – Measurement no. VFR-251114-0490-MS

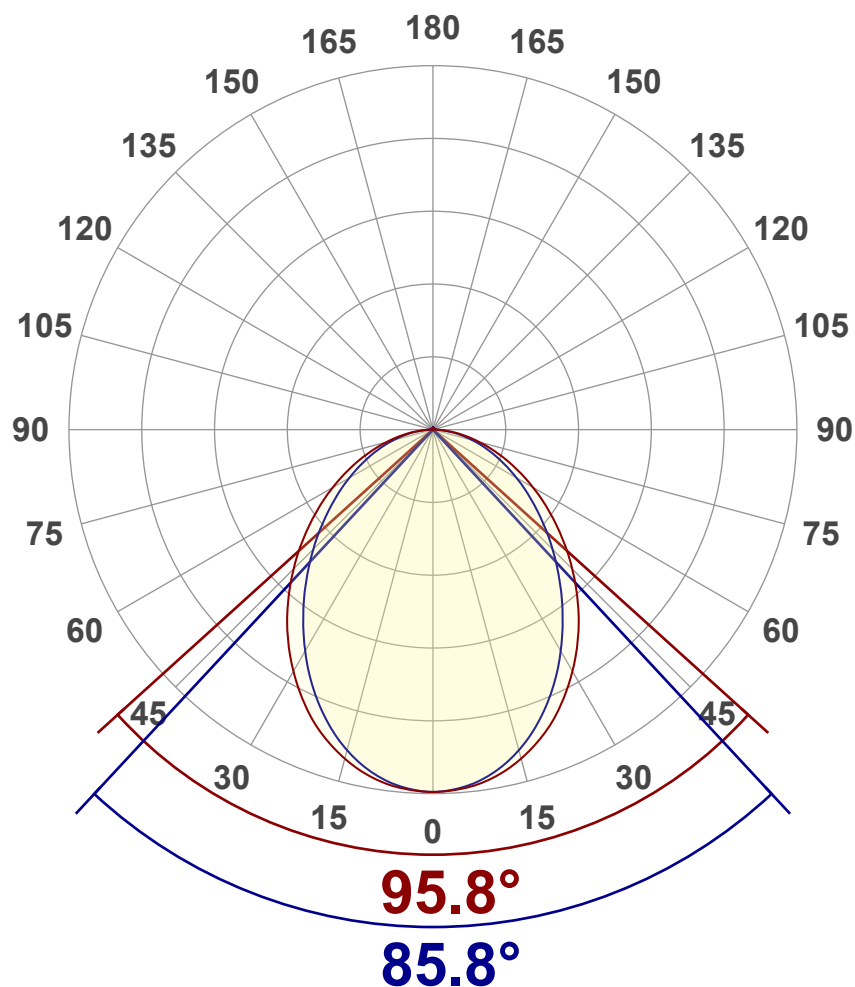
Measurement tracking No. and Link: [n/a](#)

Operator:



## Luminous Intensity diagram

Unit: 0-100% of peak intensity



## Main Values

Output (total Lumen)	908 lm
Lumen Up% / Down%	0.92% / 99.08%
Peak Intensity	398 cd
Beam Angle (50%)	90.8°
Beam Angle (90%)	85.8°
Beam Angle (10%)	95.8°

## Cut-off Angle

Average 2,5%	173.2°
--------------	--------

## Field Angle

Average 10%	154.9°
-------------	--------

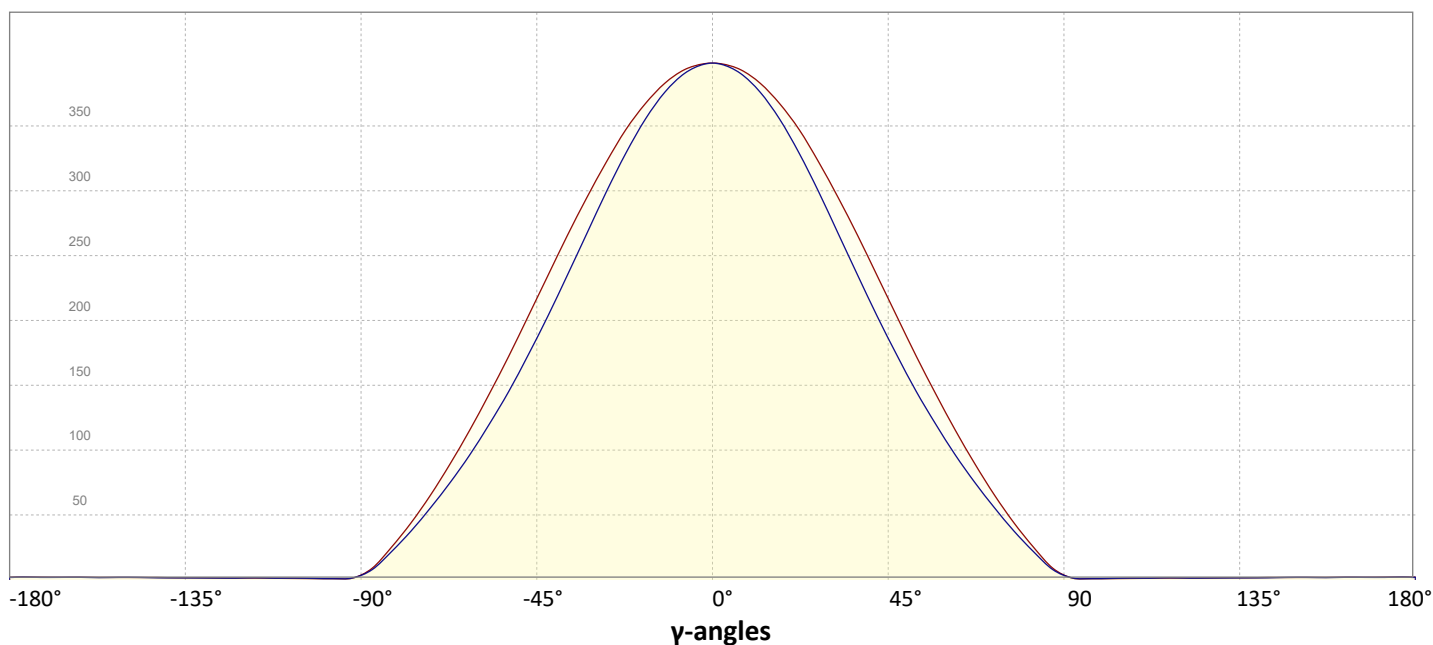
## Intensity Ratio

In 120° cone	81.4%
In 90° cone	59.0%

C000-C180

C090-C270

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

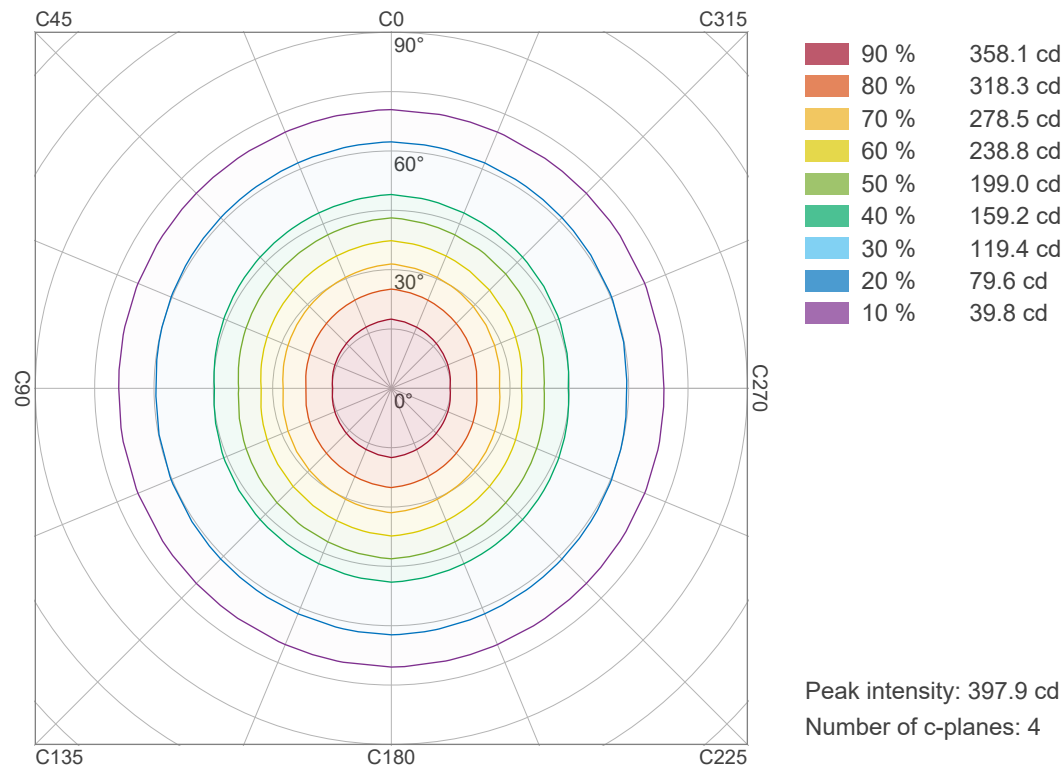


# Light Measurement Report

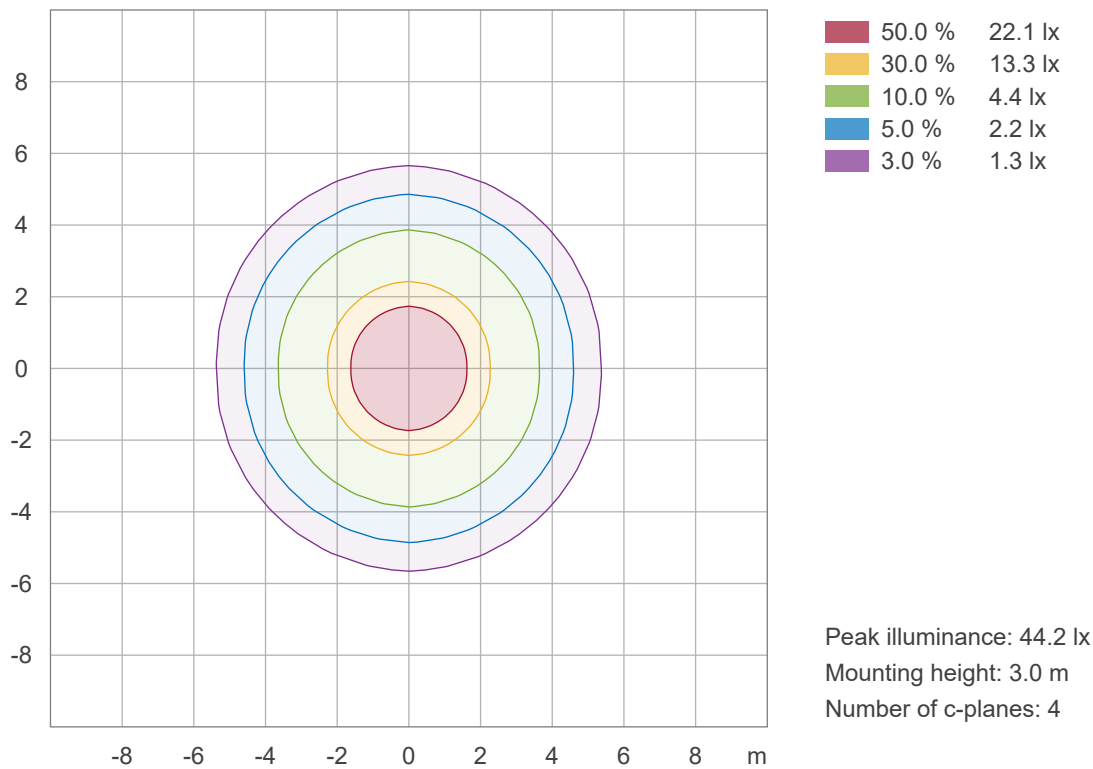
Print date: 1/7/2026  
Measurement date and time: 11/14/2025 10:30:54 AM – Measurement no. VFR-251114-0490-MS  
Measurement tracking No. and Link: [n/a](#)  
Operator:



## Iso-intensity Diagram (Iso-candela)



## Iso-illuminance Diagram (Iso-lux)



# Light Measurement Report

Print date: 1/7/2026

Measurement date and time: 11/14/2025 10:30:54 AM – Measurement no. VFR-251114-0490-MS

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

Operator:

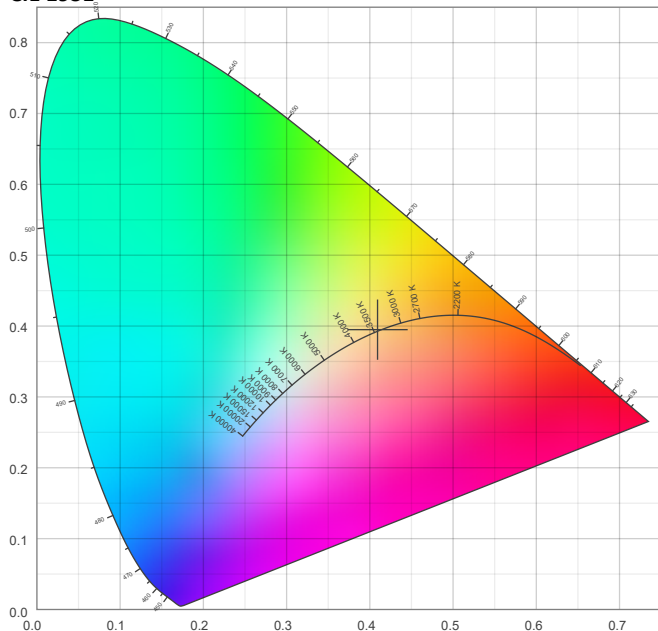


## Color details

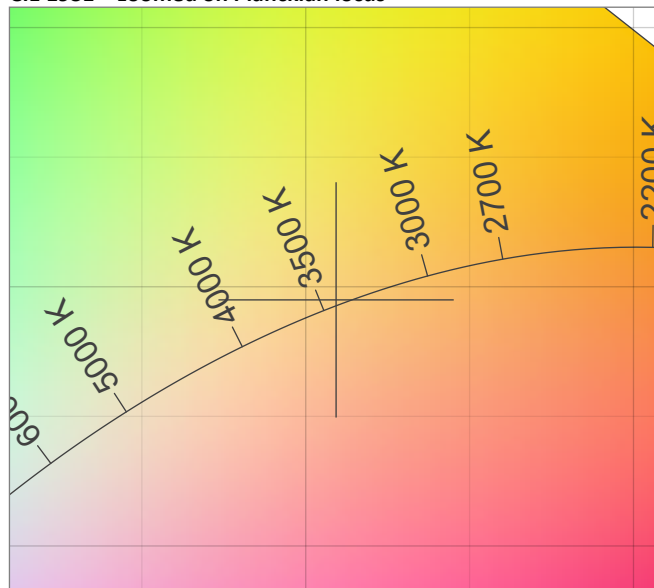
Correlated Color Temperature, Target CCT = 3453 K  
Correlated Color Temperature, Measured CCT = 3453 K  
Color Rendering Index CRI 82.9  
Color Rendering Index, R9 (red component) R9 = 9.2  
Color Rendering TM30-18 R<sub>f</sub> 84.3 – R<sub>g</sub> 97.3  
Color Quality Scale CQS = 82.8

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 = 0.0010  
Color coordinate CIEs 1976 (CIELUV) (u';v') = (0.237;0.514)

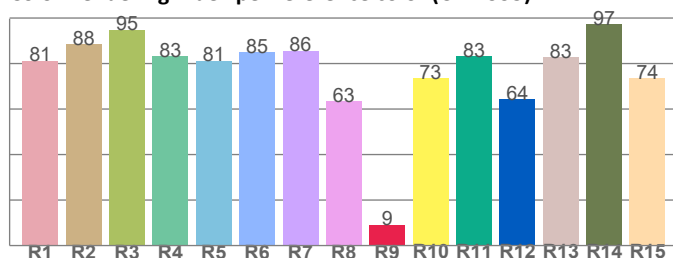
## CIE 1931



## CIE 1931 – zoomed on Planckian locus



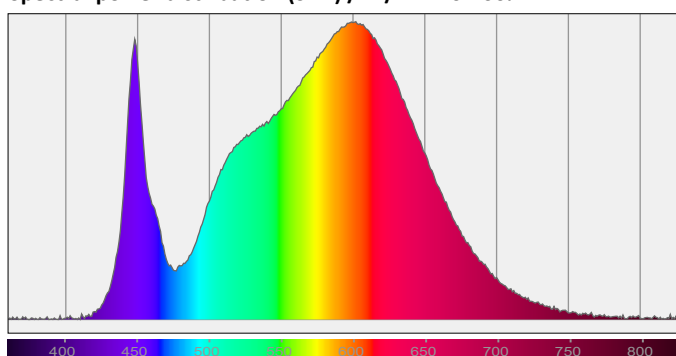
## Color Rendering Index per reference color (CIE 1995)



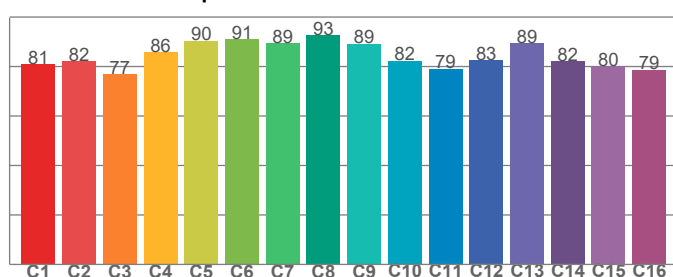
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
81.3	88.4	94.9	83.2	81.3	85.0	85.6	63.5	9.2	73.5	83.2	64.4	82.8	97.2	73.6

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



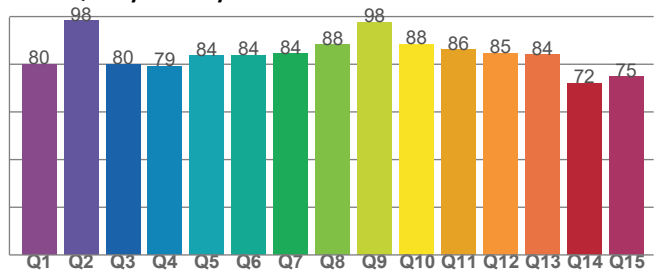
## TM30-18 R<sub>f</sub>-values per hue bin



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
81.0	82.0	77.0	85.8	90.4	91.1	89.4	92.8	89.2	82.3	79.1	82.5	89.3	82.0	80.1	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
79.9	98.2	79.9	79.3	83.6	83.8	84.5	88.2	97.6	88.4	86.2	84.6	83.9	71.9	74.7

# Light Measurement Report

Print date: 1/7/2026

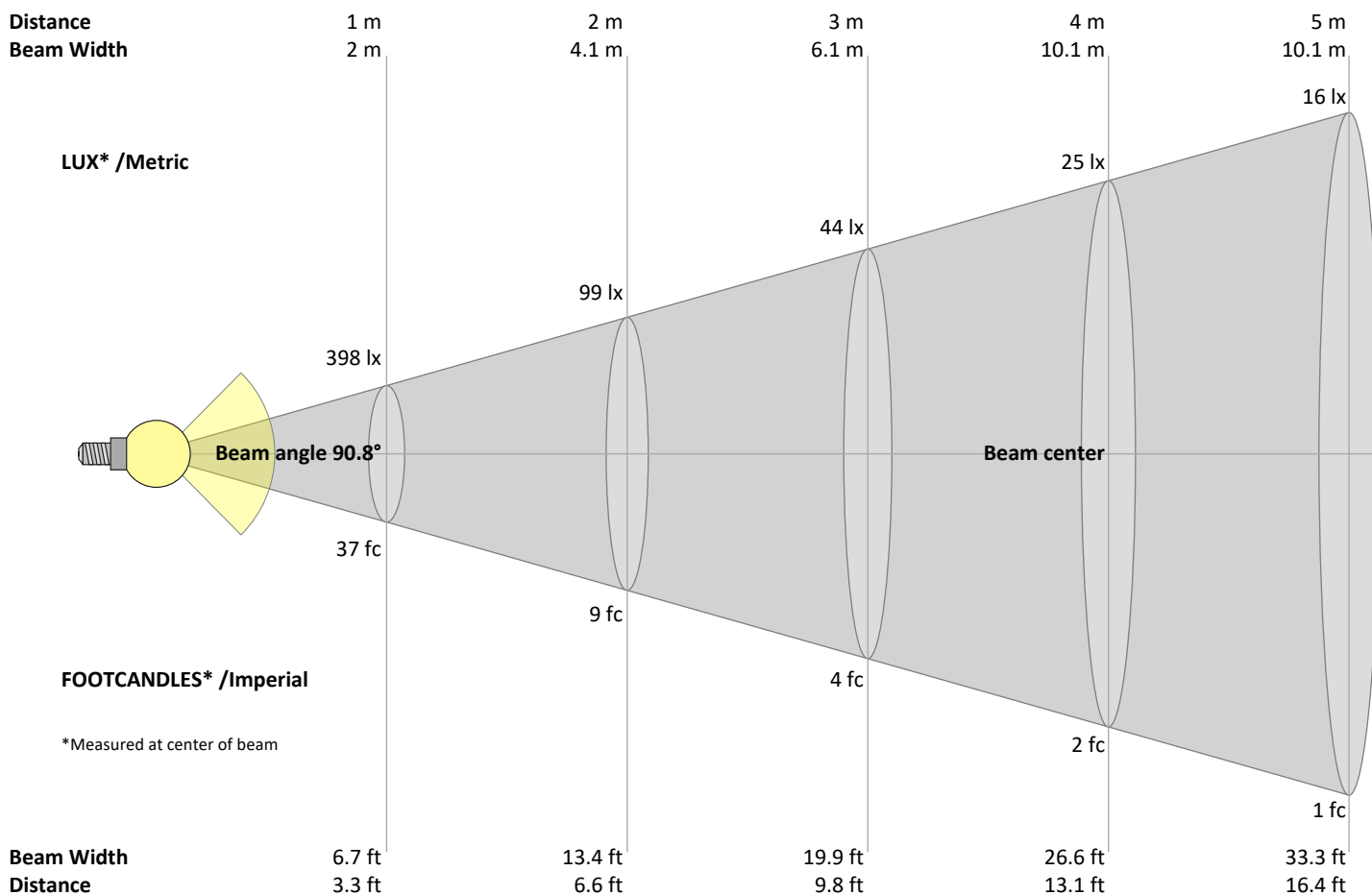
Measurement date and time: 11/14/2025 10:30:54 AM – Measurement no. VFR-251114-0490-MS

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

Operator:



## 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
398	99	44	25	16	11	8	6	5	4	3	3	2	2	2	2	1	1	1	1	lux
37	9.2	4.1	2.3	1.5	1	0.8	0.6	0.5	0.4	0.3	0.3	0.2	0.2	0.2	0.1	0.1	0.1	0.1	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
398	395	388	374	356	333	307	278	248	217	186	156	127	101	76	53	33	16	5	1	cd
100%	99%	97%	94%	89%	84%	77%	70%	62%	55%	47%	39%	32%	25%	19%	13%	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
398	394	382	364	340	312	281	249	217	186	157	131	107	84	64	45	29	14	4	1	cd
100%	99%	96%	92%	86%	78%	71%	63%	55%	47%	40%	33%	27%	21%	16%	11%	7%	3%	1%	0%	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
398	395	388	374	356	333	307	278	248	217	186	156	127	101	76	53	33	16	5	1	cd
100%	99%	97%	94%	89%	84%	77%	70%	62%	55%	47%	39%	32%	25%	19%	13%	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
398	394	382	364	340	312	281	249	217	186	157	131	107	84	64	45	29	14	4	1	cd
100%	99%	96%	92%	86%	78%	71%	63%	55%	47%	40%	33%	27%	21%	16%	11%	7%	3%	1%	0%	of 0°val



# Light Measurement Report

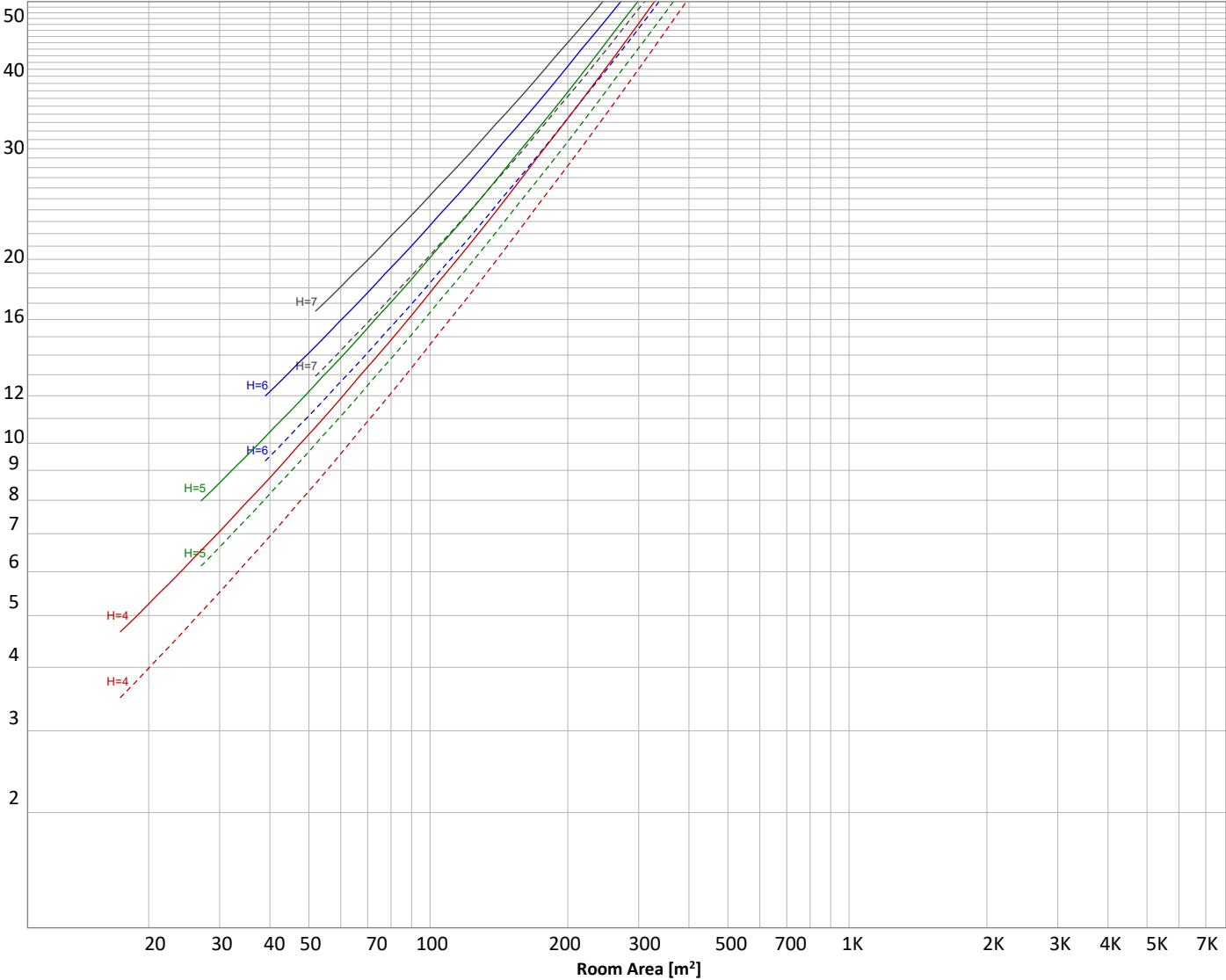
Print date: 1/7/2026  
Measurement date and time: 11/14/2025 10:30:54 AM – Measurement no. VFR-251114-0490-MS  
Measurement tracking No. and Link: [n/a](#)  
Operator:



## Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



### Conditions

H = Room height	Flux = 908 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°
37.5 lm	104 lm	149 lm	165 lm	156 lm	128 lm	91.6 lm	52.2 lm	16.5 lm
90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
1.15 lm	1.10 lm	1.24 lm	1.12 lm	1.12 lm	1.07 lm	0.829 lm	0.541 lm	0.187 lm

# Light Measurement Report

Print date: 1/7/2026

Measurement date and time: 11/14/2025 10:30:54 AM – Measurement no. VFR-251114-0490-MS

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

Operator:



## Outdoor Light Planning

### Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	37 lm	4.1%
10-20°	104 lm	11.5%
20-30°	149 lm	16.4%
30-40°	165 lm	18.2%
40-50°	156 lm	17.1%
50-60°	128 lm	14.1%
60-70°	92 lm	10.1%
70-80°	52 lm	5.7%
80-90°	17 lm	1.8%
90-100°	1 lm	0.1%
100-110°	1 lm	0.1%
110-120°	1 lm	0.1%
120-130°	1 lm	0.1%
130-140°	1 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>908 lm</b>	<b>100.0%</b>

### Intensity peaks

Max intensity	398 cd
Intensity, 90°	5 cd
Intensity, 0°	398 cd

### Zonal Lumen summary

Zone (γ)	Lumen	% Total
0-30°	290 lm	32.0%
0-40°	455 lm	50.1%
0-60°	739 lm	81.4%
60-90°	160 lm	17.7%
70-100°	70 lm	7.7%
90-120°	3 lm	0.4%
0-90°	899 lm	99.1%
90-180°	8 lm	0.9%
0-180°	908 lm	100.0%

### BUG rating

	Lumen	% Total
<b>Forward light</b>		
Low(0-30°)	145 lm	15.9%
Medium(30-60°)	224 lm	24.7%
High(60-80°)	72 lm	7.9%
Very high(80-90°)	9 lm	0.9%
<b>Back light</b>		
Low(0-30°)	145 lm	15.9%
Medium(30-60°)	224 lm	24.7%
High(60-80°)	72 lm	7.9%
Very high(80-90°)	9 lm	0.9%

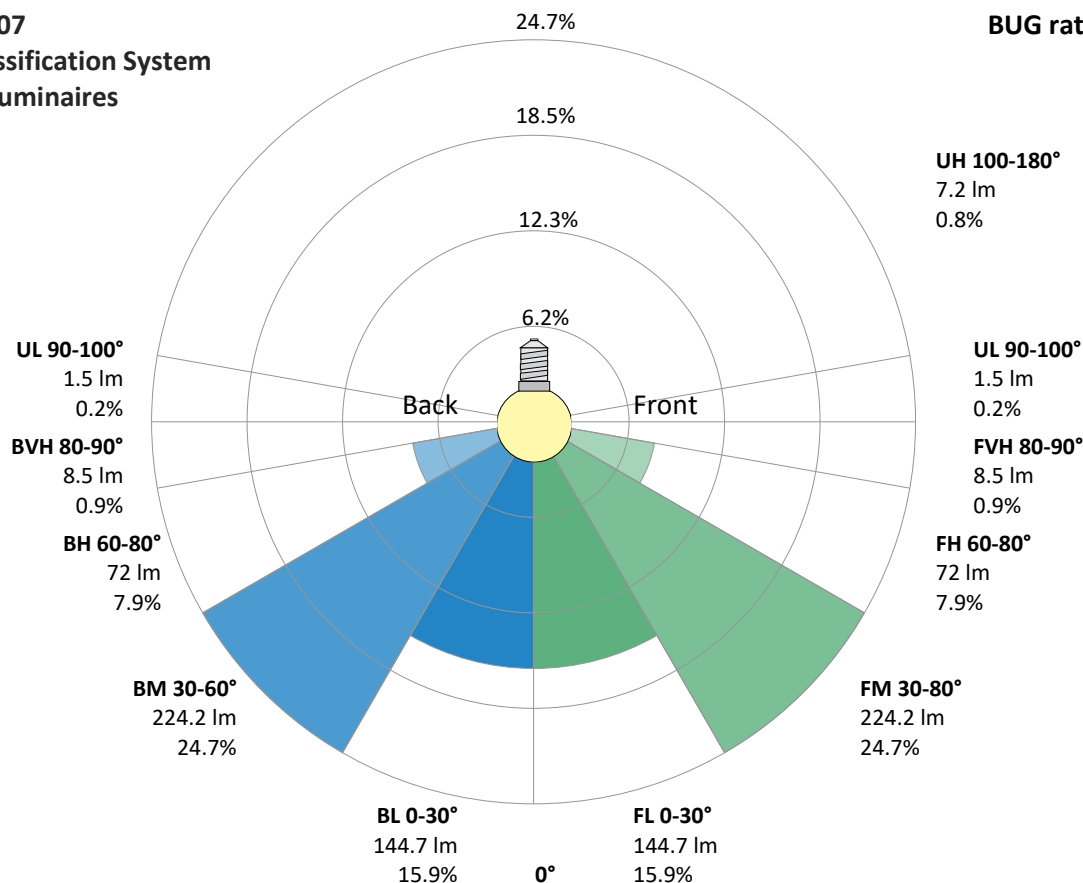
### Uplight

Low(90-100°)	2 lm	0.2%
High(100-180°)	7 lm	0.8%

## IESNA TM-15-07

### Luminaire Classification System For Outdoor Luminaires

### BUG rating B1 U1 G0





Light Measurement Report

Print date: 1/7/2026  
Measurement date and time: 11/14/2025 10:30:54 AM – Measurement no. VFR-251114-0490-MS  
Measurement tracking No. and Link: [n/a](#)  
Operator:

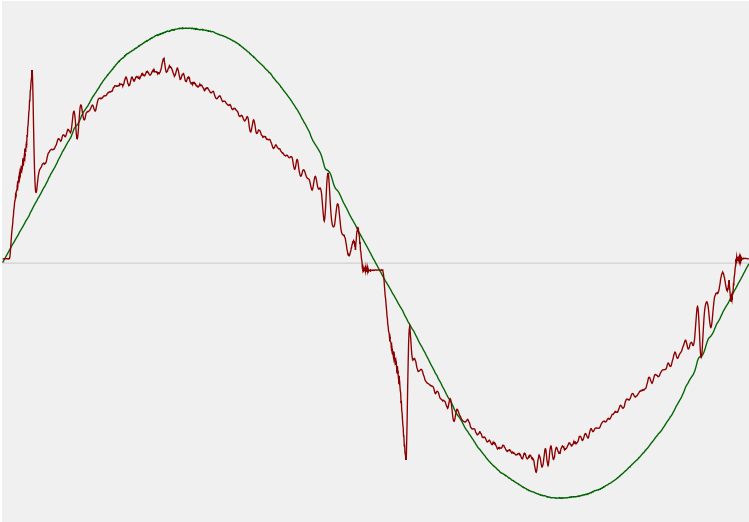


Power Details

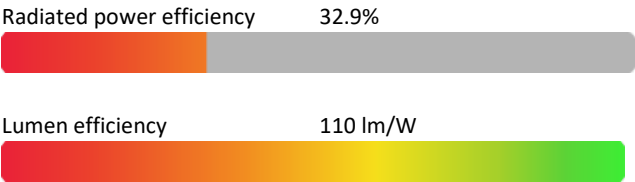
Input Power

Power feed to light source	8.3 W
Frequency of input power	60 Hz
RMS Input voltage feed, $V_{RMS}$	121 V
RMS Input current feed, $I_{RMS}$	0.070 A
Volt-Ampere or apparent power = $V_{RMS} \cdot I_{RMS}$	8.45 VA
Displacement factor of AC power feed	0.98
Power factor of AC current feed	0.98
Total harmonic distortion of the current	11.69%
Total harmonic distortion of the voltage	1.87%

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	3453 K
CCT shift	0 K
CCT end	3453 K

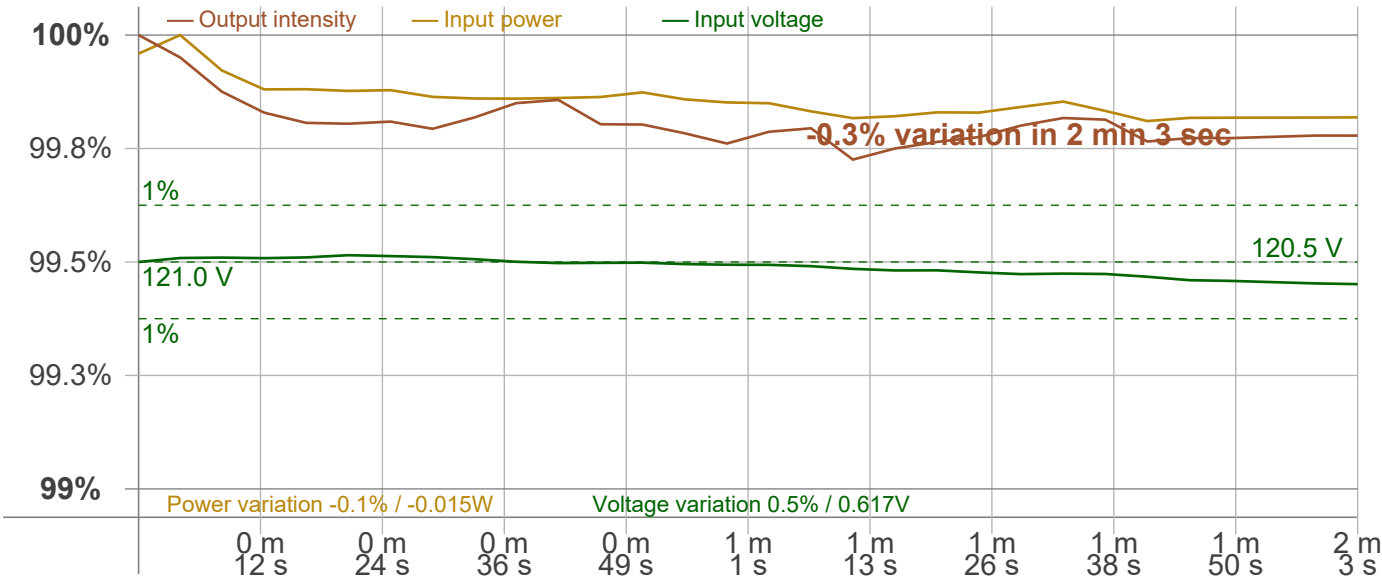
Warmup Result

Total warmup time	Not completed
Warmup variation	-0.3%

Output Change

Output start	909 lm
Output change	-1 lm
Output end	908 lm

Stabilization Curve



# Light Measurement Report

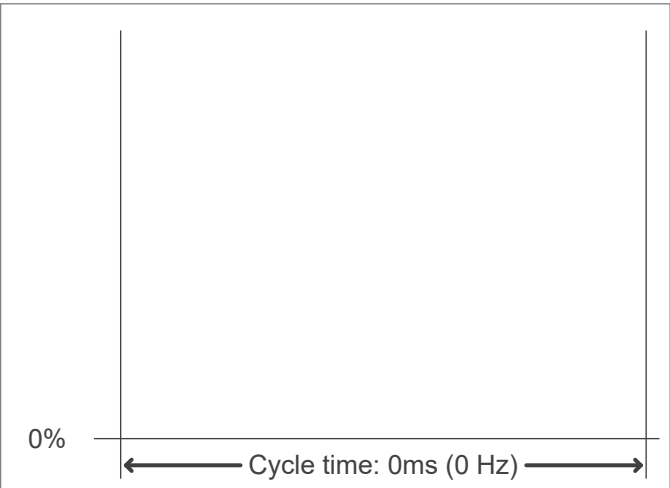
Print date: 1/7/2026  
Measurement date and time: 11/14/2025 10:30:54 AM – Measurement no. VFR-251114-0490-MS  
Measurement tracking No. and Link: [n/a](#)  
Operator:



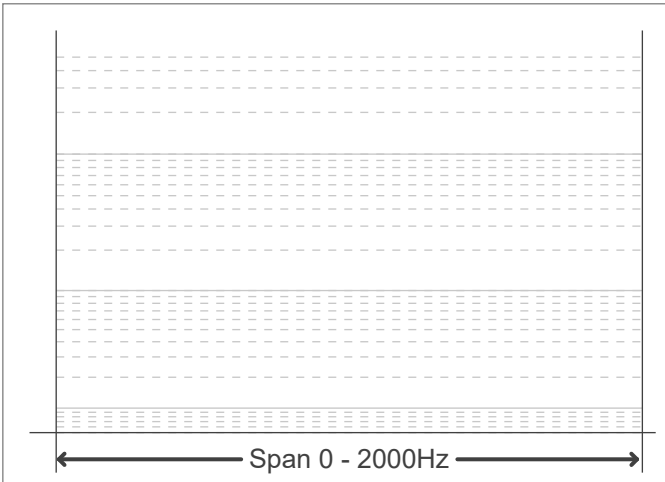
## Flicker /TLA details

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 %
TLA indices (re IEC TR 61547-1, IEC 61000-3-3 and IEC 61000-4-15)		JA8/10 400 Hz	n/a %
PstLM value (F < 80 Hz)	n/a	JA8/10 1000 Hz	n/a %
SVM value (80 < F < 2000 Hz)	n/a	Flicker indices according to Lighting Research Center (2015)	
		Perception metric, Assist Mp	n/a

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



Flicker FFT (flicker curve in frequency domain)



IEEE 1789 Frequency/modulation plot

