

Tested Light Source - 1\_PHOT\_NINETY-NINE-2350lmChip-4000K-38Deg-HoneycombLouvre\_2303

Laboratory and Equipment

Laboratory Owner and Location	Factorylux, Greenhill Mills, Hebden Bridge, HX7 5QF, UK
Goniospectrometer System and Type	BaseSpion – Type C, horizontal
Spectrometer Manufacturer and Model	Ibsen Photonics, Denmark – Freedom VIS (Custom Viso)

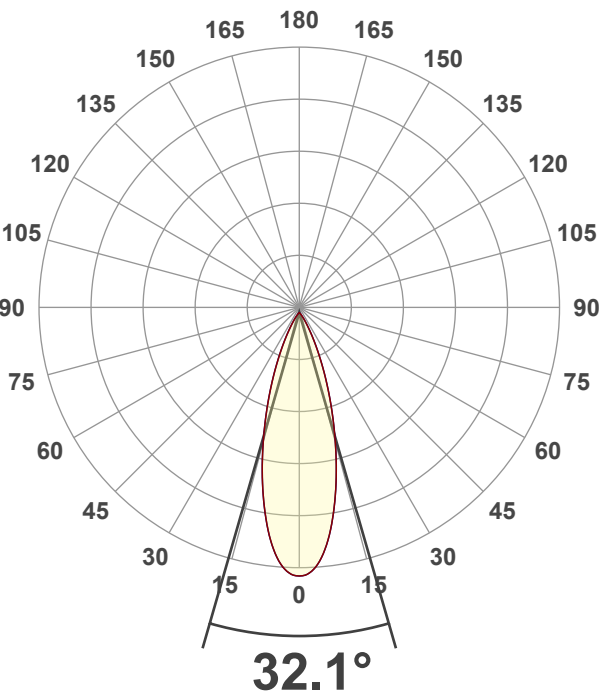
Measurement Conditions

Number of C-planes and Resolution	32 planes – 11.25°
γ (gamma)-Resolution	1°
Test Distance	1.50 m
Input Power, Power and Displ. Factors	15.9 W – PF 0.98 – DPF 0.98
Input RMS Voltage and Current	242 V – 0.067 A
Frequency of Input Power	50 Hz

Main Light Measurement Results

Output	1124 lm
Efficiency	71 lm/W
Peak Intensity and Beam Angle	3156 cd – 32.1°
Color Rendering Index	CRI 92.7

Light Intensity Distribution



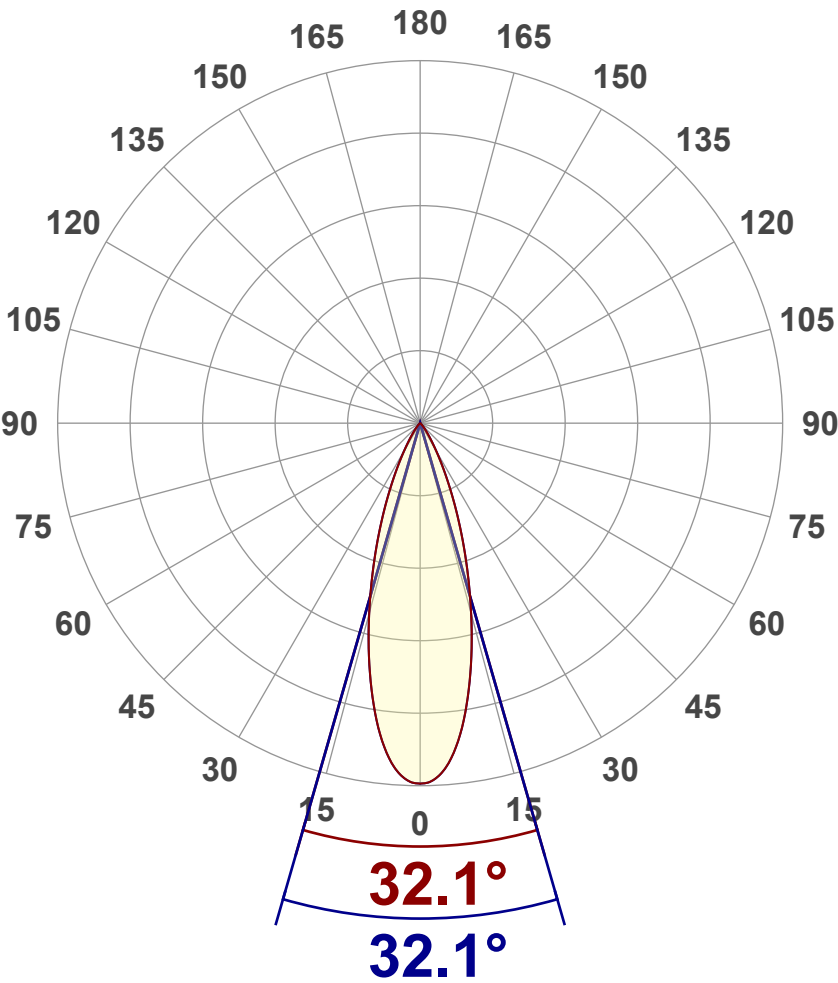
Goniophotometry Report

1\_PHOT\_NINETY-NINE-2350lmChip-4000K-38Deg-HoneycombLouvre\_2303  
www.factorylux.com



Luminous Intensity diagram

Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	1124 lm
Peak Intensity	3156 cd
Beam Angle (50%)	32.1°
Beam Angle (90%)	32.1°
Beam Angle (10%)	32.1°

Cut-off Angle

Average 2,5%	75.3°
--------------	-------

Field Angle

Average 10%	58.6°
-------------	-------

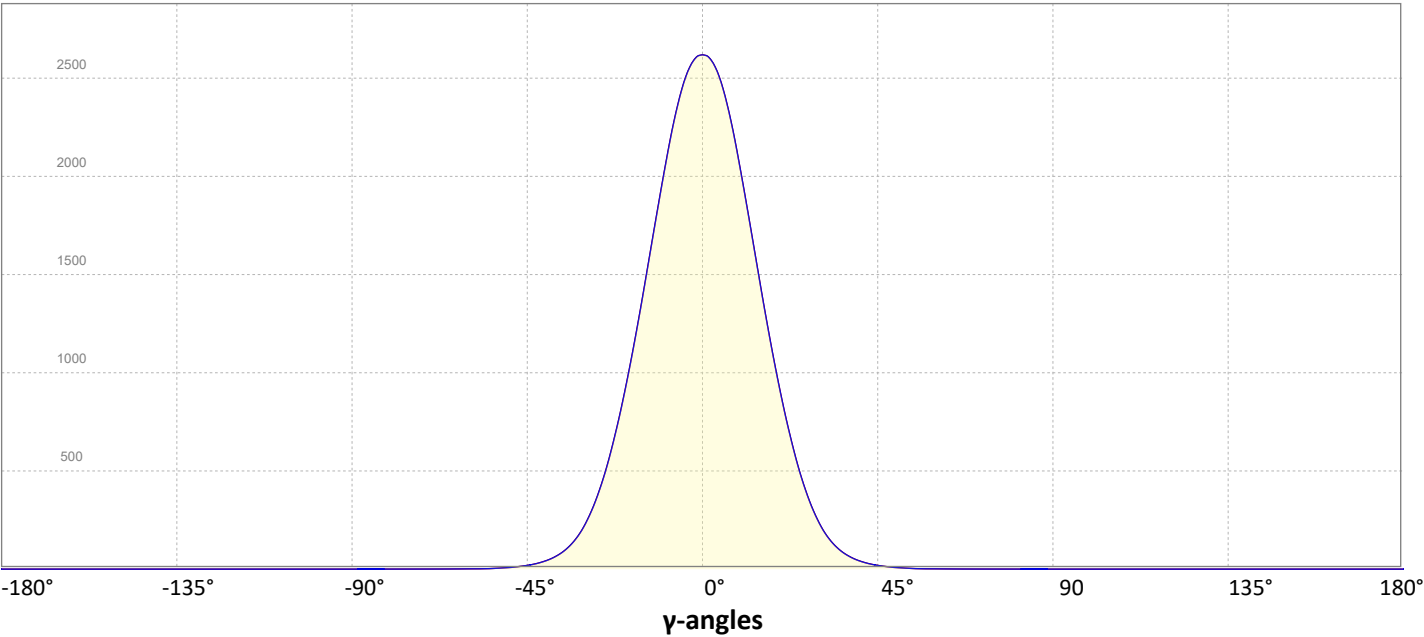
Intensity Ratio

In 120° cone	99.7%
In 90° cone	98.8%

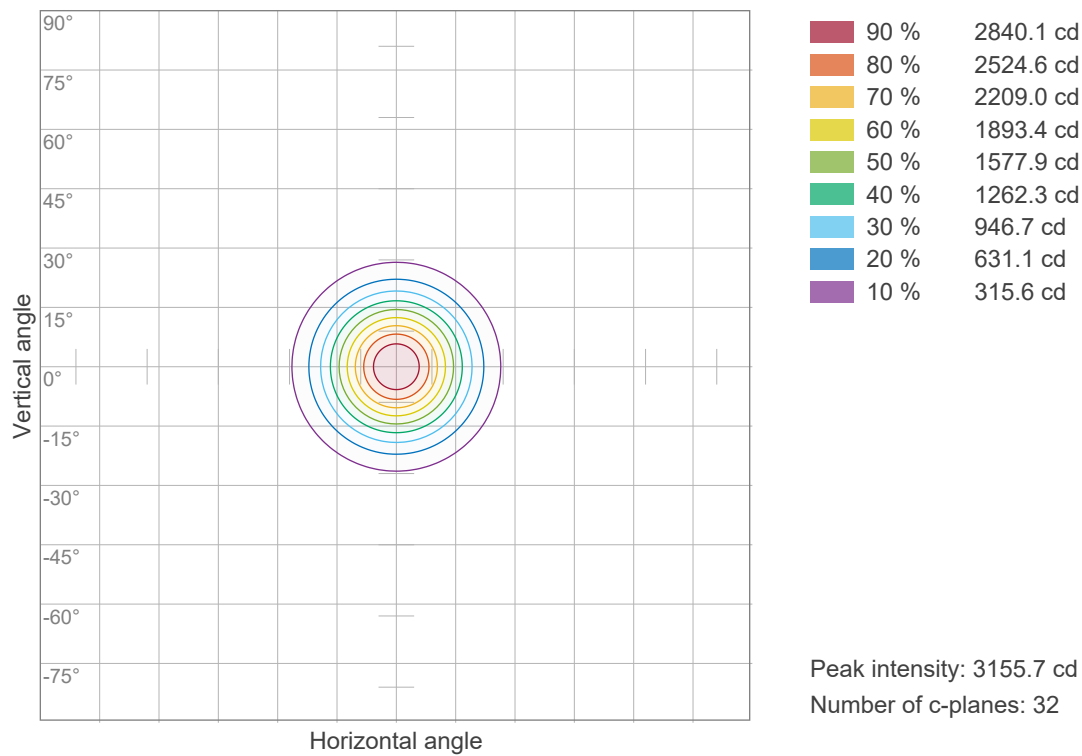
C000-C180

C090-C270

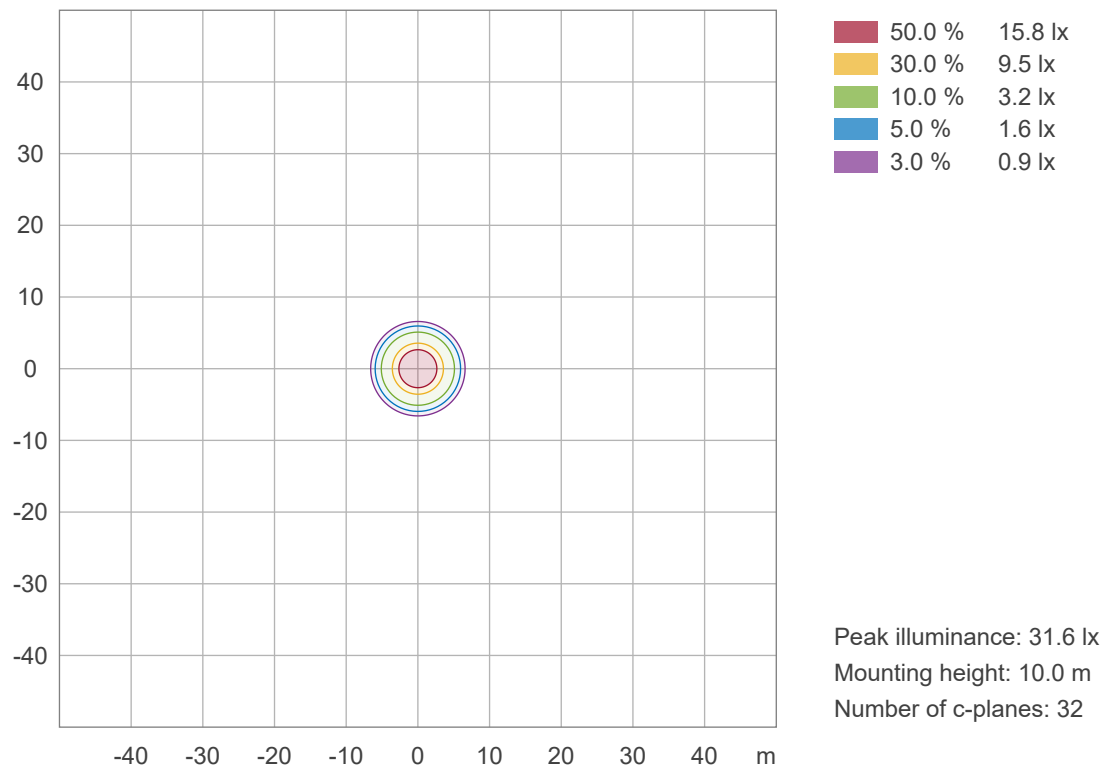
Linear distribution diagram - Intensity (candela) vs γ-angle



Iso-intensity Diagram (Iso-candela)



Iso-illuminance Diagram (Iso-lux)

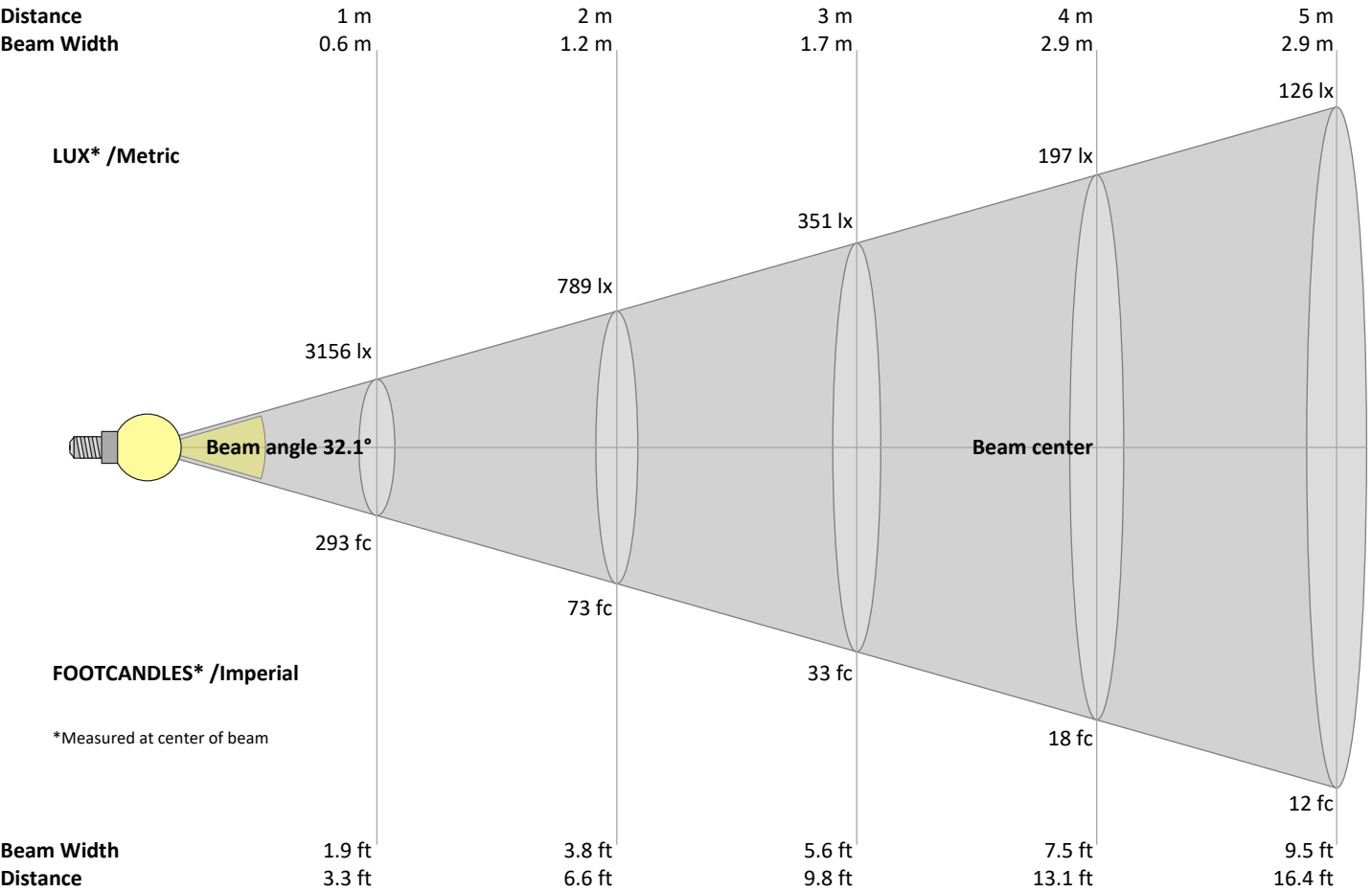


Goniophotometry Report

1\_PHOT\_NINETY-NINE-2350lmChip-4000K-38Deg-HoneycombLouvre\_2303  
www.factorylux.com



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
3156	789	351	197	126	88	64	49	39	32	26	22	19	16	14	12	11	10	9	8	lux
293.2	73.3	32.6	18.3	11.7	8.1	6	4.6	3.6	2.9	2.4	2	1.7	1.5	1.3	1.1	1	0.9	0.8	0.7	fc

Intensities in 0° c-plane

0°	2°	4°	6°	8°	10°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	32°	34°	36°	38°	γ
3156	3130	3039	2882	2670	2416	2144	1864	1588	1327	1086	870	680	519	387	283	203	146	104	75	cd
100%	99%	96%	91%	85%	77%	68%	59%	50%	42%	34%	28%	22%	16%	12%	9%	6%	5%	3%	2%	of 0°val

Intensities in 90° c-plane

0°	2°	4°	6°	8°	10°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	32°	34°	36°	38°	γ
3156	3130	3039	2882	2670	2416	2144	1864	1588	1327	1086	870	680	519	387	283	203	146	104	75	cd
100%	99%	96%	91%	85%	77%	68%	59%	50%	42%	34%	28%	22%	16%	12%	9%	6%	5%	3%	2%	of 0°val

Intensities in 180° c-plane

0°	2°	4°	6°	8°	10°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	32°	34°	36°	38°	γ
3156	3130	3039	2882	2670	2416	2144	1864	1588	1327	1086	870	680	519	387	283	203	146	104	75	cd
100%	99%	96%	91%	85%	77%	68%	59%	50%	42%	34%	28%	22%	16%	12%	9%	6%	5%	3%	2%	of 0°val

Intensities in 270° c-plane

0°	2°	4°	6°	8°	10°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	32°	34°	36°	38°	γ
3156	3130	3039	2882	2670	2416	2144	1864	1588	1327	1086	870	680	519	387	283	203	146	104	75	cd
100%	99%	96%	91%	85%	77%	68%	59%	50%	42%	34%	28%	22%	16%	12%	9%	6%	5%	3%	2%	of 0°val

# Goniophotometry Report

1\_PHOT\_NINETY-NINE-2350lmChip-4000K-38Deg-HoneycombLouvre\_2303  
www.factorylux.com



## Light Planning – UGR table

Uncorrected, comprehensive UGR table according to 117-1995

Reflectances											
	p Ceiling	70	70	50	50	30	70	70	50	50	30
	p Walls	50	30	50	30	30	50	30	50	30	30
	p Floor	20	20	20	20	20	20	20	20	20	20
Room size		Viewed Crosswise					Viewed Endwise				
H = mounting height above eye level		(Viewing direction orthogonal to lamp length axis)					(Viewing direction parallel to lamp length axis)				
X	Y										
2H	2H	12.9	13.3	12.9	13.5	13.7	12.9	13.3	12.9	13.5	13.7
	3H	12.6	13.2	12.9	13.4	13.6	12.6	13.2	12.9	13.4	13.6
	4H	12.5	13.1	12.9	13.3	13.6	12.5	13.1	12.9	13.3	13.6
	6H	12.5	13.0	12.8	13.3	13.6	12.5	13.0	12.8	13.3	13.6
	8H	12.4	12.9	12.8	13.3	13.6	12.4	12.9	12.8	13.3	13.6
	12H	12.4	12.9	12.7	13.2	13.6	12.4	12.9	12.7	13.2	13.6
4H	2H	12.5	13.1	12.9	13.3	13.5	12.5	13.1	12.9	13.3	13.5
	3H	12.4	12.9	12.7	13.2	13.6	12.4	12.9	12.7	13.2	13.6
	4H	12.3	12.7	12.7	13.1	13.6	12.3	12.7	12.7	13.1	13.6
	6H	12.2	12.7	12.7	13.0	13.3	12.2	12.7	12.7	13.0	13.3
	8H	12.1	12.6	12.6	12.9	13.3	12.1	12.6	12.6	12.9	13.3
	12H	12.1	12.4	12.6	12.8	13.3	12.1	12.4	12.6	12.8	13.3
8H	4H	12.1	12.6	12.6	12.9	13.3	12.1	12.6	12.6	12.9	13.3
	6H	12.1	12.4	12.6	12.8	13.3	12.1	12.4	12.6	12.8	13.3
	8H	12.1	12.3	12.6	12.8	13.4	12.1	12.3	12.6	12.8	13.4
	12H	12.0	12.2	12.6	12.7	13.3	12.0	12.2	12.6	12.7	13.3
12H	4H	12.0	12.4	12.5	12.8	13.3	12.0	12.4	12.5	12.8	13.3
	6H	12.1	12.3	12.6	12.8	13.4	12.1	12.3	12.6	12.8	13.4
	8H	12.0	12.2	12.6	12.7	13.3	12.0	12.2	12.6	12.7	13.3

### Variations with the observer position for the luminaire spacings, S:

S = 1.0H	5.5 / -9.8	5.5 / -9.8
S = 1.5H	8.2 / -10.7	8.2 / -10.7
S = 2.0H	10.1 / -11.2	10.1 / -11.2

## Coefficients of Utilization

Ceiling reflectance	80			70			50			30			10			0		
Wall reflectance	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10	0
Floor reflectance	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	0
RCR		(RCR: Room Cavity Ratio) Room Values are expressed as percentage of Lumen delivered to the task surface																
0	119	119	119	119	116	116	116	116	111	111	111	106	106	106	102	102	102	100
1	114	112	110	108	112	110	108	106	106	105	103	102	101	100	99	98	97	95
2	110	106	103	100	108	104	101	99	101	99	97	98	96	95	96	94	93	91
3	106	101	97	93	104	99	96	93	97	94	91	95	92	90	92	90	88	87
4	102	96	91	88	100	95	91	88	93	89	87	91	88	86	89	87	85	83
5	98	92	87	83	97	91	86	83	89	85	82	87	84	82	86	83	81	80
6	95	88	83	79	93	87	82	79	85	82	79	84	81	78	83	80	78	76
7	91	84	79	76	90	83	79	76	82	78	75	81	78	75	80	77	75	73
8	88	81	76	73	87	80	76	73	79	75	72	78	75	72	77	74	72	71
9	85	78	73	70	84	77	73	70	76	72	69	76	72	69	75	71	69	68
10	82	75	70	67	82	74	70	67	74	70	67	73	69	67	72	69	66	65

Goniophotometry Report

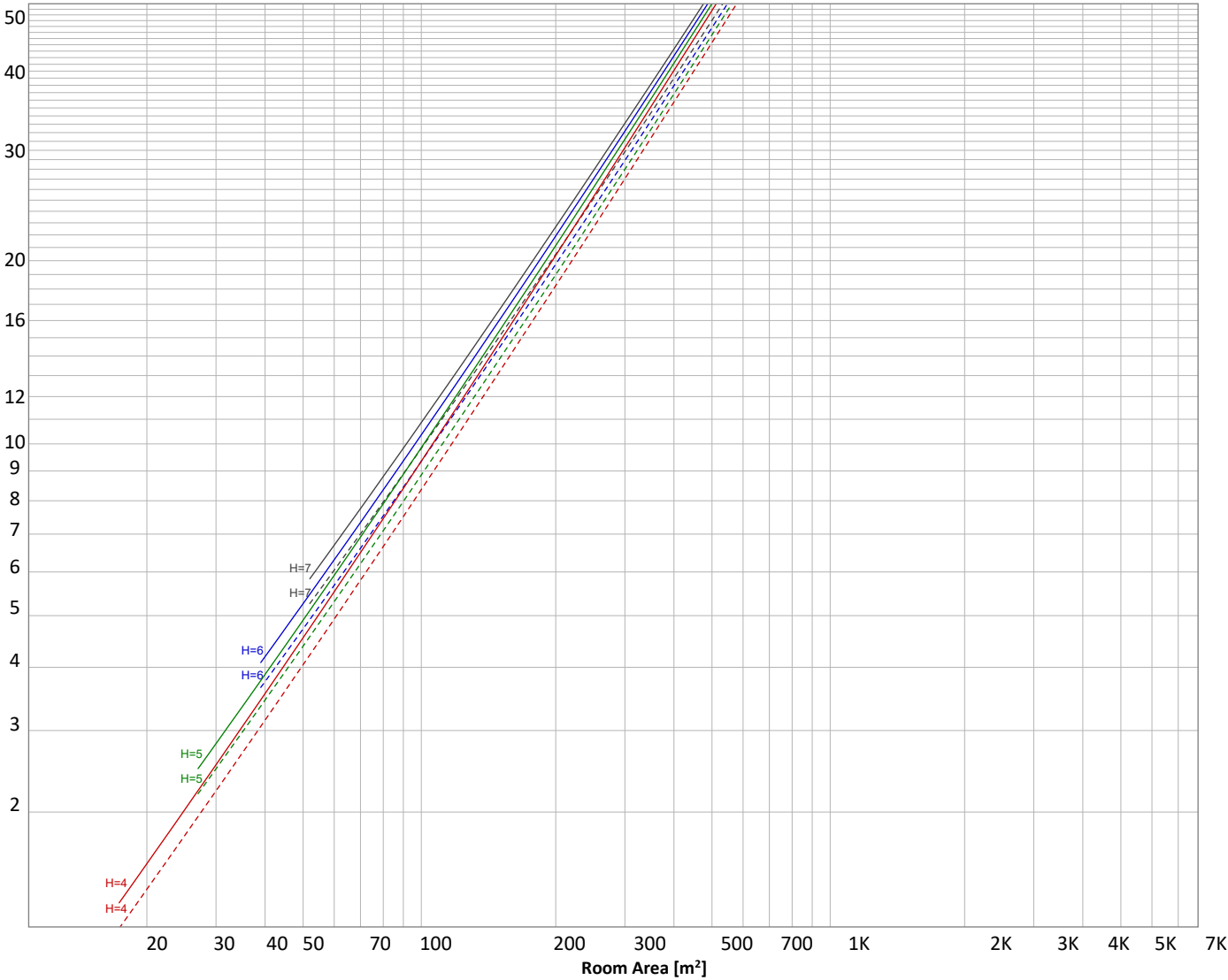
1\_PHOT\_NINETY-NINE-2350lmChip-4000K-38Deg-HoneycombLouvre\_2303  
www.factorylux.com



Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



Conditions

H = Room height	Flux = 1124 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°
265 lm	471 lm	278 lm	83.4 lm	19.5 lm	3.81 lm	1.13 lm	0.604 lm	0.372 lm
90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
0.200 lm	0.194 lm	0.182 lm	0.165 lm	0.142 lm	0.115 lm	0.085 lm	0.052 lm	0.018 lm

Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	265 lm	23.6%
10-20°	471 lm	41.9%
20-30°	278 lm	24.7%
30-40°	83 lm	7.4%
40-50°	19 lm	1.7%
50-60°	4 lm	0.3%
60-70°	1 lm	0.1%
70-80°	1 lm	0.1%
80-90°	0 lm	0.0%
90-100°	0 lm	0.0%
100-110°	0 lm	0.0%
110-120°	0 lm	0.0%
120-130°	0 lm	0.0%
130-140°	0 lm	0.0%
140-150°	0 lm	0.0%
150-160°	0 lm	0.0%
160-170°	0 lm	0.0%
170-180°	0 lm	0.0%
Total	1124 lm	100.0%

Intensity peaks

Max intensity	3156 cd
Intensity, 90°	0 cd
Intensity, 0°	3156 cd

Zonal Lumen summary

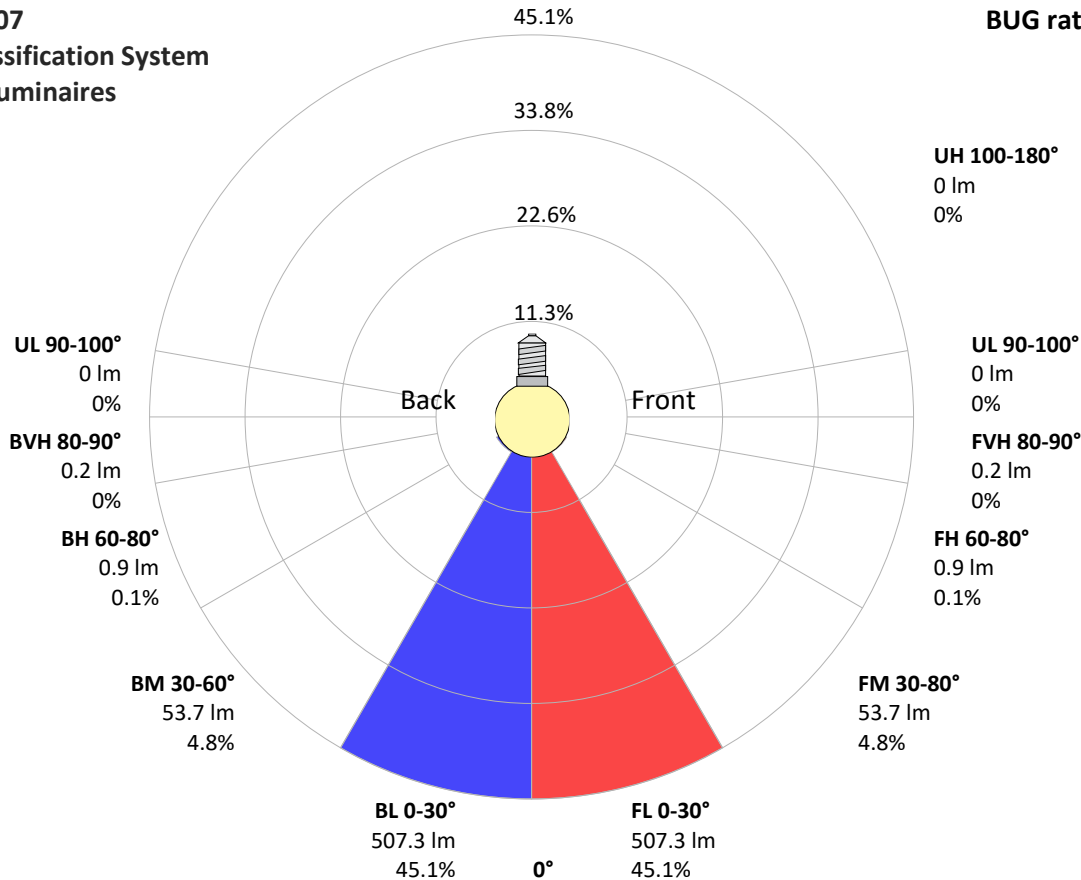
Zone (γ)	Lumen	% Total
0-30°	1014 lm	90.2%
0-40°	1097 lm	97.6%
0-60°	1121 lm	99.7%
60-90°	2 lm	0.2%
70-100°	1 lm	0.1%
90-120°	1 lm	0.1%
0-90°	1123 lm	99.9%
90-180°	1 lm	0.1%
0-180°	1124 lm	100.0%

BUG rating

	Lumen	% Total
<b>Forward light</b>		
Low(0-30°)	507 lm	45.1%
Medium(30-60°)	54 lm	4.8%
High(60-80°)	1 lm	0.1%
Very high(80-90°)	0 lm	0.0%
<b>Back light</b>		
Low(0-30°)	507 lm	45.1%
Medium(30-60°)	54 lm	4.8%
High(60-80°)	1 lm	0.1%
Very high(80-90°)	0 lm	0.0%
<b>Uplight</b>		
Low(90-100°)	0 lm	0.0%
High(100-180°)	0 lm	0.0%

IESNA TM-15-07  
Luminaire Classification System  
For Outdoor Luminaires

BUG rating B2 U1 G0



# Goniophotometry Report

1\_PHOT\_NINETY-NINE-2350lmChip-4000K-38Deg-HoneycombLouvre\_2303  
www.factorylux.com

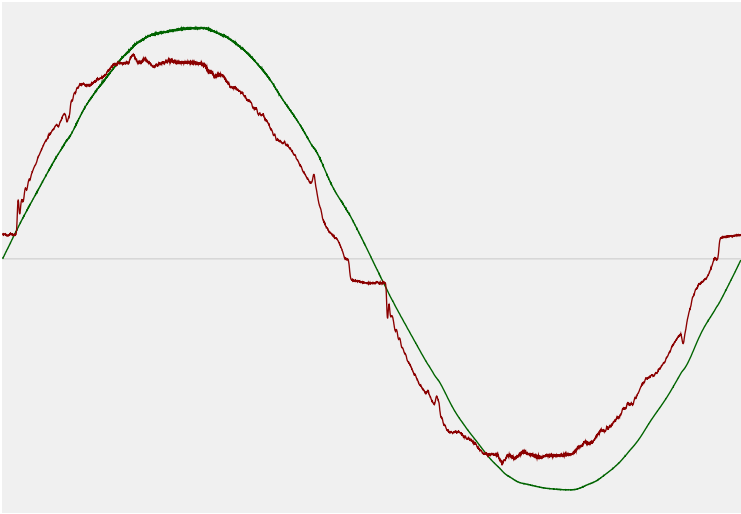


## Power Details

### Input Power

Power feed to light source	15.9 W
Frequency of input power	50 Hz
RMS Input voltage feed, $V_{RMS}$	242 V
RMS Input current feed, $I_{RMS}$	0.067 A
Volt-Ampere or apparent power = $V_{RMS} * I_{RMS}$	16.19 VA
Displacement factor of AC power feed	0.98
Power factor of AC current feed	0.98
Total harmonic distortion of the current	6.26%
Total harmonic distortion of the voltage	1.1%

### Input Power Curve



### Efficiency

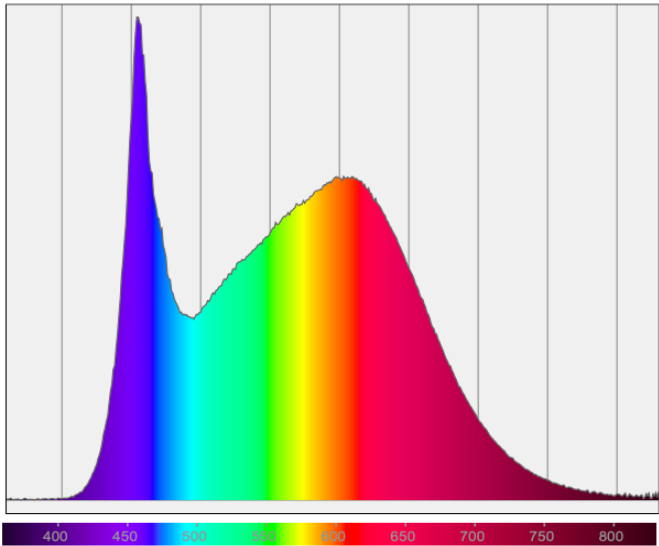
Radiated power efficiency	25.9%
Lumen efficiency	71 lm/W



Color Measurements

Correlated Color Temperature	CCT = 4000 K
Color Rendering TM30-18	R <sub>f</sub> 88.9 – R <sub>g</sub> 98.5
Color Shift, CIE duv	Duv ±0.0003

Spectral distribution



Color details

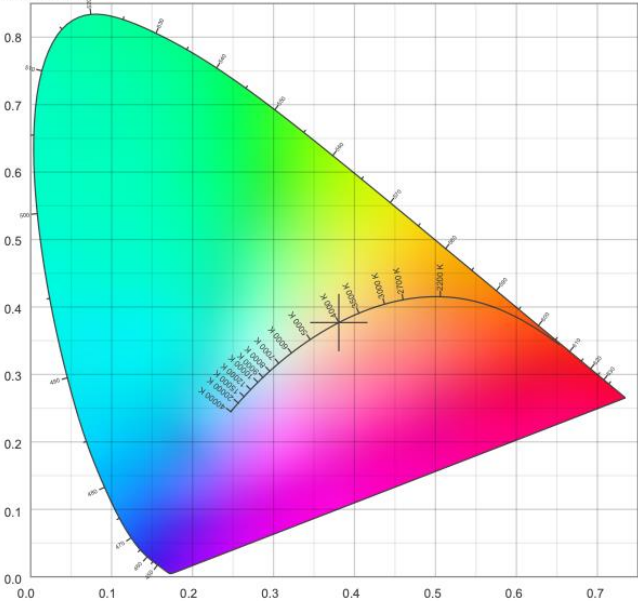
Correlated Color Temperature	CCT = 4000 K	Color coordinates CIE 1931	(x;y) = (0.381;0.377)
Color Rendering Index	CRI 92.6	Color coordinate CIEs 1960	(u;v) = (0.225;0.334)
Color Rendering Index, R9 (red component)	R9 = 72.2	Color deviation from BBL	Duv = ±0.0003
Color Rendering TM30-18	R <sub>f</sub> 88.9 – R <sub>g</sub> 98.5	Color coordinate CIEs 1976 (CIELUV)	(u';v') = (0.225;0.225)
Color Quality Scale	CQS = 88.9		

Goniophotometry Report

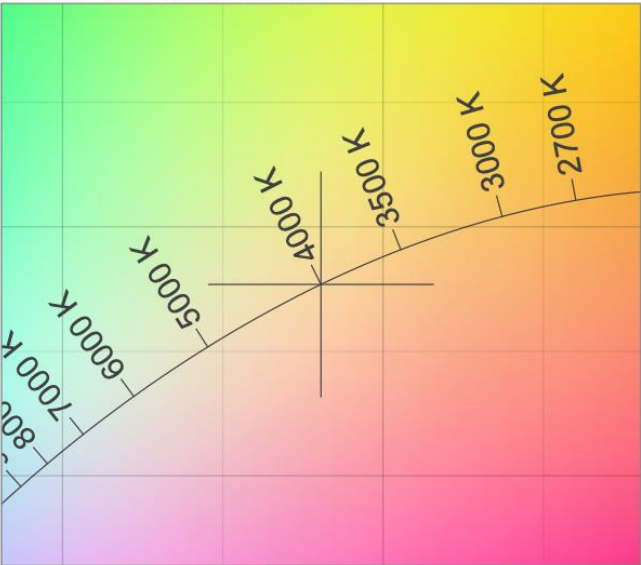
1\_PHOT\_NINETY-NINE-2350lmChip-4000K-38Deg-HoneycombLouvre\_2303  
www.factorylux.com



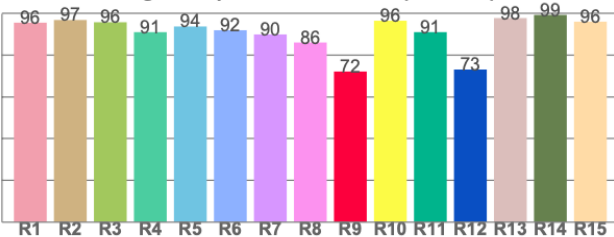
CIE 1931



CIE 1931 – zoomed on Planckian locus



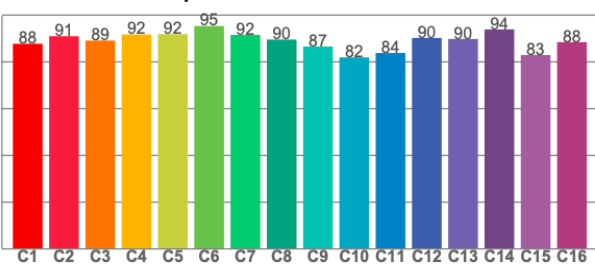
Color Rendering Index per reference color (CIE 1995)



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
95.5	96.8	95.7	91.0	93.7	91.9	89.9	86.0	72.2	96.4	91.0	73.1	97.7	99.2	96.0

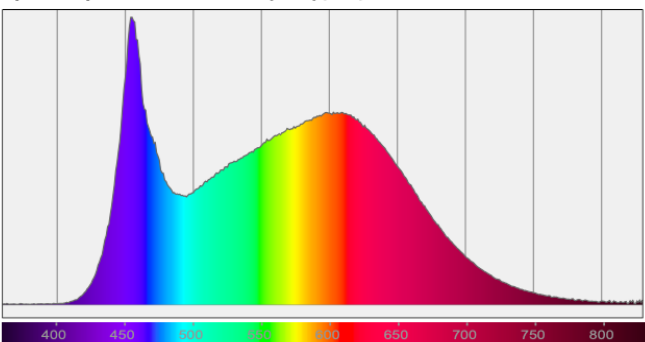
TM30-18 Rf-values per hue bin



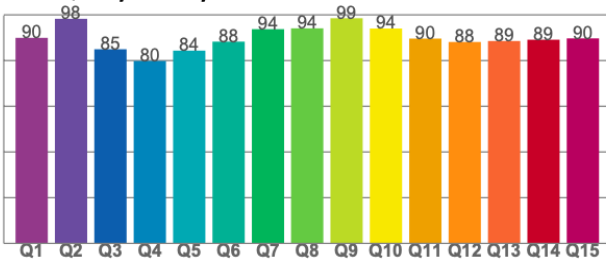
TM30 C values, 16 binned values out of total of 99 C values

C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16
87.8	91.0	89.1	91.7	91.9	95.3	91.5	89.6	86.6	81.9	83.8	90.3	89.8	93.9	83.0	88.4

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



Color Quality Scale by reference color



CQS Q values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
89.9	98.3	84.9	79.8	84.3	88.3	93.7	94.1	98.5	94.0	89.6	88.1	88.6	89.1	89.7