

Goniophotometry Report

1_PHOT_REFLEKTER-L-4050lmChip-2700K-38Deg_2303
www.factorylux.com



Tested Light Source - 1_PHOT_REFLEKTER-L-4050lmChip-2700K-38Deg_2303

Laboratory and Equipment

Laboratory Owner and Location
Goniospectrometer System and Type
Spectrometer Manufacturer and Model

Factorylux, Greenhill Mills, Hebden Bridge, HX7 5QF, UK
BaseSpion – Type C, horizontal
Ibsen Photonics, Denmark – Freedom VIS (Custom Viso)

Measurement Conditions

Number of C-planes and Resolution
 γ (gamma)-Resolution
Test Distance
Input Power, Power and Displ. Factors
Input RMS Voltage and Current
Frequency of Input Power

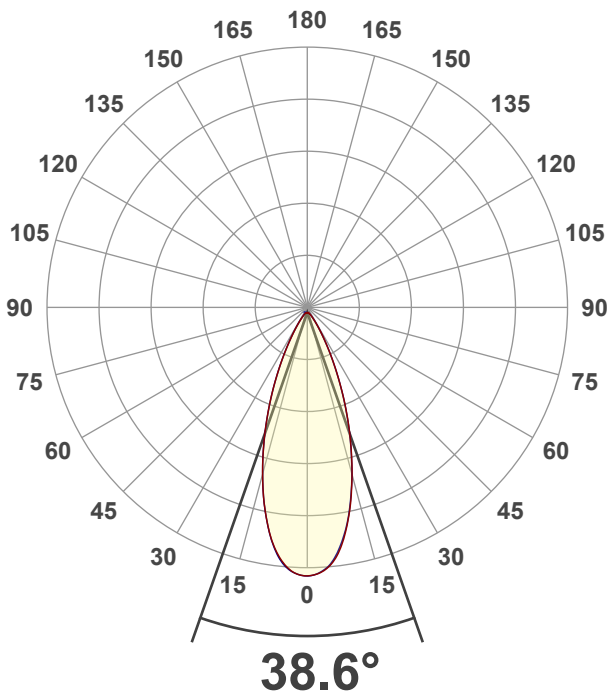
32 planes – 11.25°
1.5°
3.00 m
41.3 W – PF 0.97 – DPF 0.97
242 V – 0.177 A
50 Hz

Main Light Measurement Results

Output
Efficiency
Peak Intensity and Beam Angle
Color Rendering Index

3409 lm
82 lm/W
6525 cd – 38.6°
CRI 92.6

Light Intensity Distribution



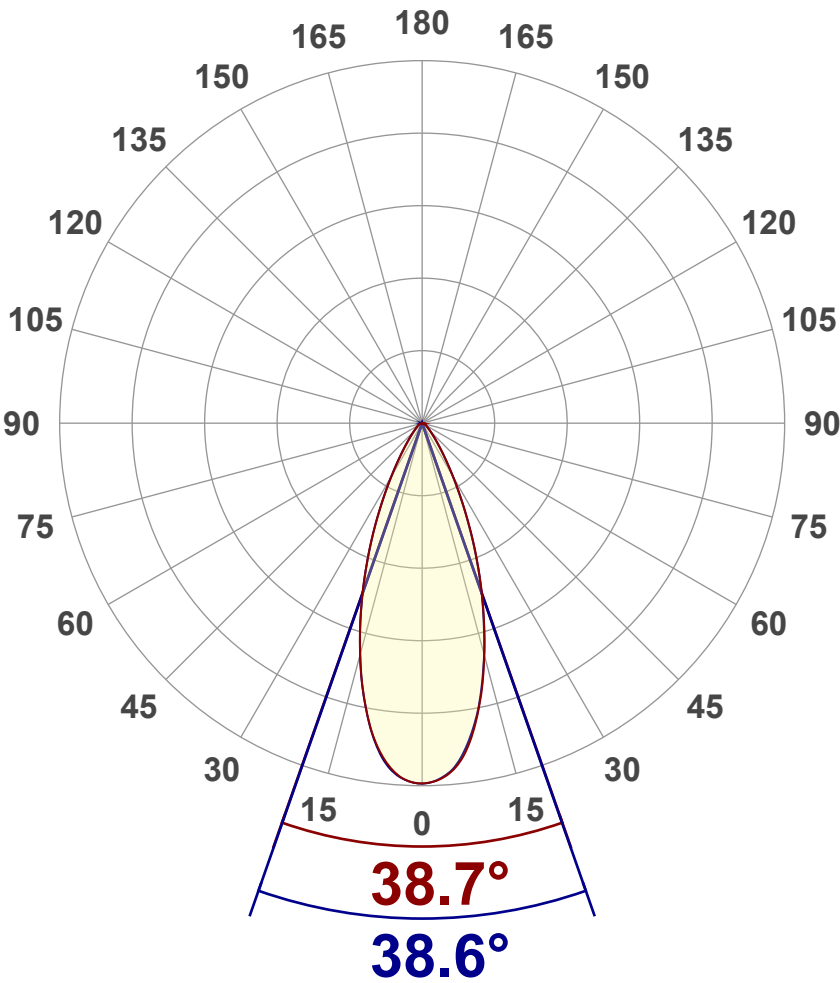
Goniophotometry Report

1_PHOT_REFLEKTER-L-4050lmChip-2700K-38Deg_2303
www.factorylux.com



Luminous Intensity diagram

Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	3409 lm
Peak Intensity	6525 cd
Beam Angle (50%)	38.6°
Beam Angle (90%)	38.6°
Beam Angle (10%)	38.6°

Cut-off Angle

Average 2,5%	97.1°
--------------	-------

Field Angle

Average 10%	68.9°
-------------	-------

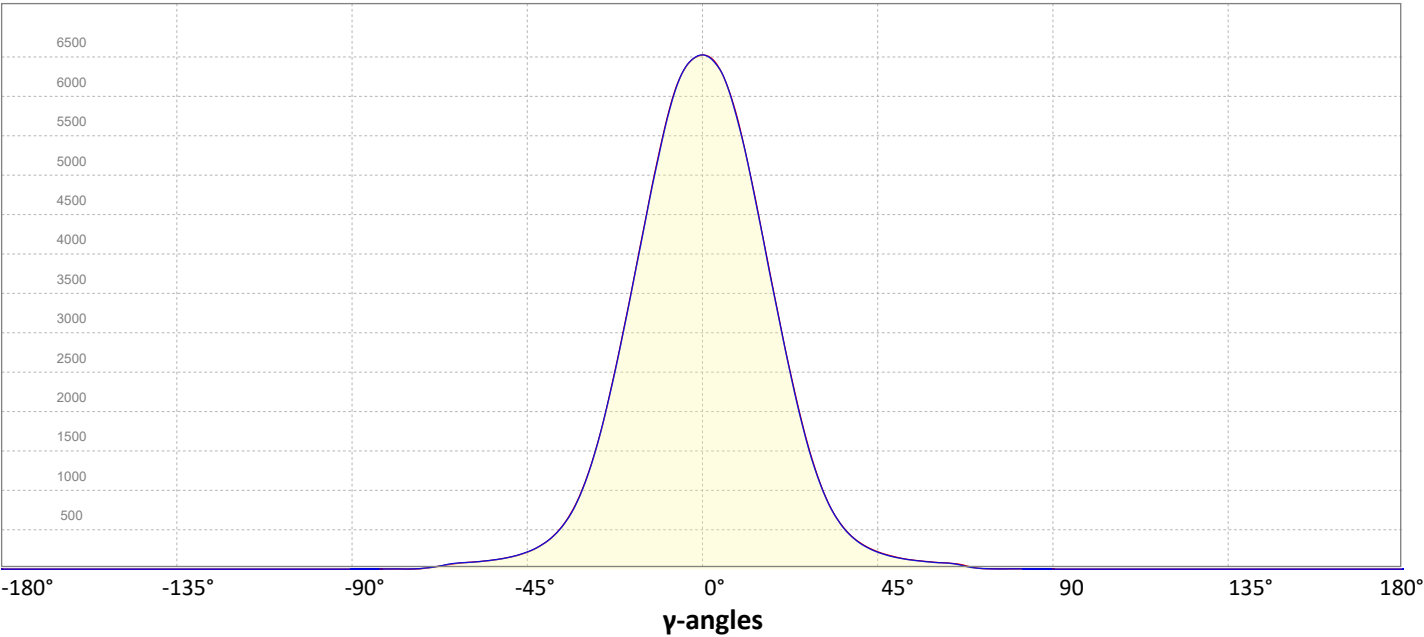
Intensity Ratio

In 120° cone	98.1%
In 90° cone	93.1%

C000-C180

C090-C270

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

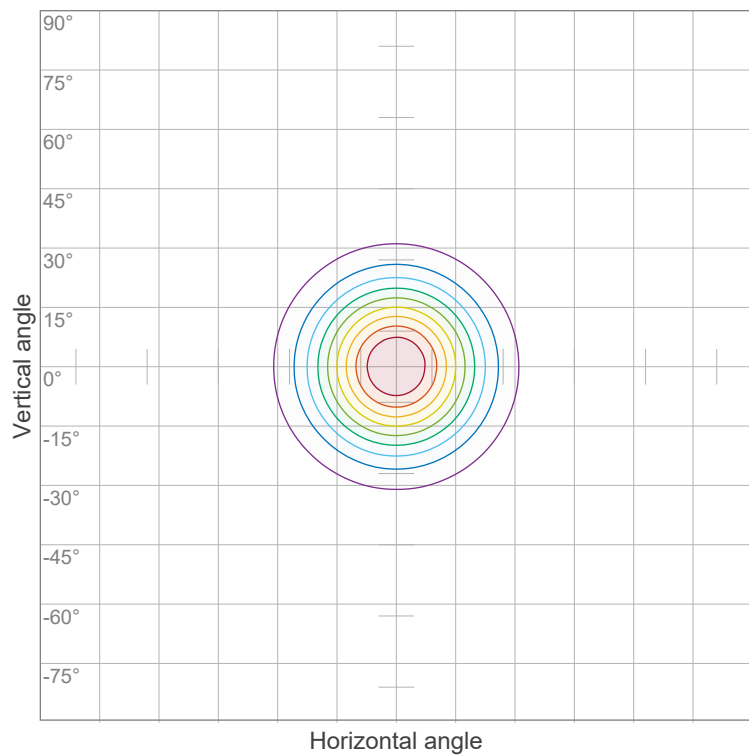


Goniophotometry Report

1_PHOT_REFLEKTER-L-4050lmChip-2700K-38Deg_2303
www.factorylux.com



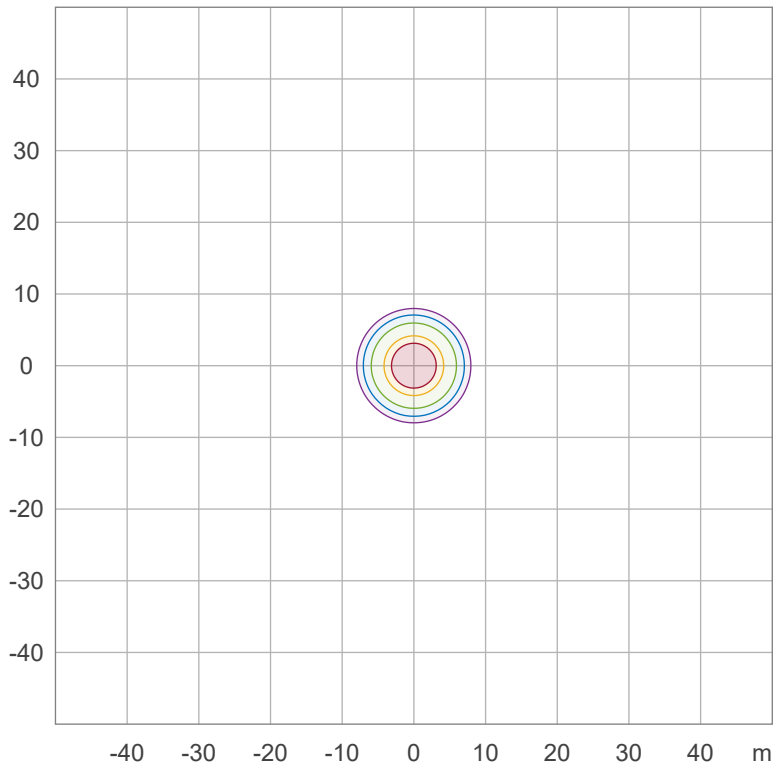
Iso-intensity Diagram (Iso-candela)



90 %	5869.7 cd
80 %	5217.5 cd
70 %	4565.3 cd
60 %	3913.2 cd
50 %	3261.0 cd
40 %	2608.8 cd
30 %	1956.6 cd
20 %	1304.4 cd
10 %	652.2 cd

Peak intensity: 6521.9 cd
Number of c-planes: 32

Iso-illuminance Diagram (Iso-lux)



50.0 %	32.6 lx
30.0 %	19.6 lx
10.0 %	6.5 lx
5.0 %	3.3 lx
3.0 %	2.0 lx

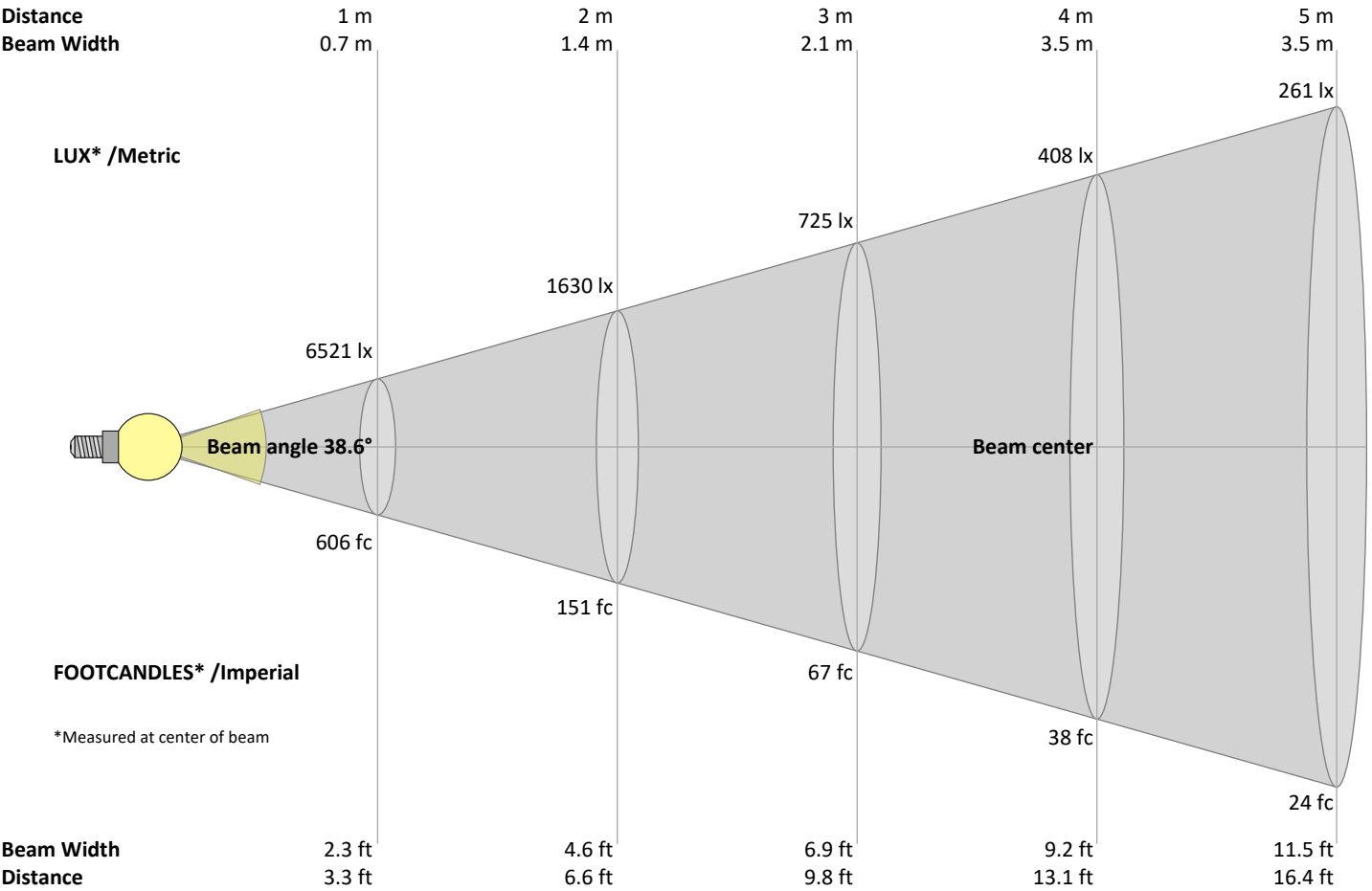
Peak illuminance: 65.2 lx
Mounting height: 10.0 m
Number of c-planes: 32

Goniophotometry Report

1_PHOT_REFLEKTER-L-4050lmChip-2700K-38Deg_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
6521	1630	725	408	261	181	133	102	81	65	54	45	39	33	29	25	23	20	18	16	lux
605.8	151.4	67.3	37.9	24.2	16.8	12.4	9.5	7.5	6.1	5	4.2	3.6	3.1	2.7	2.4	2.1	1.9	1.7	1.5	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
6521	6485	6391	6207	5919	5535	5086	4598	4099	3591	3102	2623	2182	1772	1420	1128	884	695	549	437	cd
100%	99%	98%	95%	91%	85%	78%	71%	63%	55%	48%	40%	33%	27%	22%	17%	14%	11%	8%	7%	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
6521	6484	6370	6172	5872	5496	5062	4577	4079	3576	3089	2612	2164	1760	1408	1114	871	684	538	428	cd
100%	99%	98%	95%	90%	84%	78%	70%	63%	55%	47%	40%	33%	27%	22%	17%	13%	10%	8%	7%	of 0°val

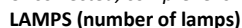
Intensities in 180° c-plane

0°	2°	4°	6°	8°	10°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	32°	34°	36°	38°	γ
6521	6491	6376	6175	5887	5510	5069	4595	4091	3588	3099	2624	2182	1776	1423	1120	877	687	542	433	cd
100%	100%	98%	95%	90%	84%	78%	70%	63%	55%	48%	40%	33%	27%	22%	17%	13%	11%	8%	7%	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
6521	6489	6394	6201	5905	5519	5066	4586	4081	3582	3089	2615	2175	1768	1418	1120	875	687	545	433	cd
100%	100%	98%	95%	91%	85%	78%	70%	63%	55%	47%	40%	33%	27%	22%	17%	13%	11%	8%	7%	of 0°val

1_PHOT_REFLEKTER-L-4050lmChip-2700K-38Deg_2303
www.factorylux.com



Zonal Lumen Summary

[illegible]

Goniophotometry Report

1_PHOT_REFLEKTER-L-4050lmChip-2700K-38Deg_2303
www.factorylux.com



Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	577 lm	16.9%
10-20°	1189 lm	34.9%
20-30°	905 lm	26.5%
30-40°	400 lm	11.7%
40-50°	174 lm	5.1%
50-60°	98 lm	2.9%
60-70°	57 lm	1.7%
70-80°	6 lm	0.2%
80-90°	3 lm	0.1%
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	3409 lm	100.0%

Zonal Lumen summary

Zone (γ)	Lumen	% Total
0-30°	2670 lm	78.3%
0-40°	3070 lm	90.1%
0-60°	3342 lm	98.1%
60-90°	66 lm	1.9%
70-100°	9 lm	0.3%
90-120°	0 lm	0.0%
0-90°	3408 lm	100.0%
90-180°	0 lm	0.0%
0-180°	3409 lm	100.0%

BUG rating

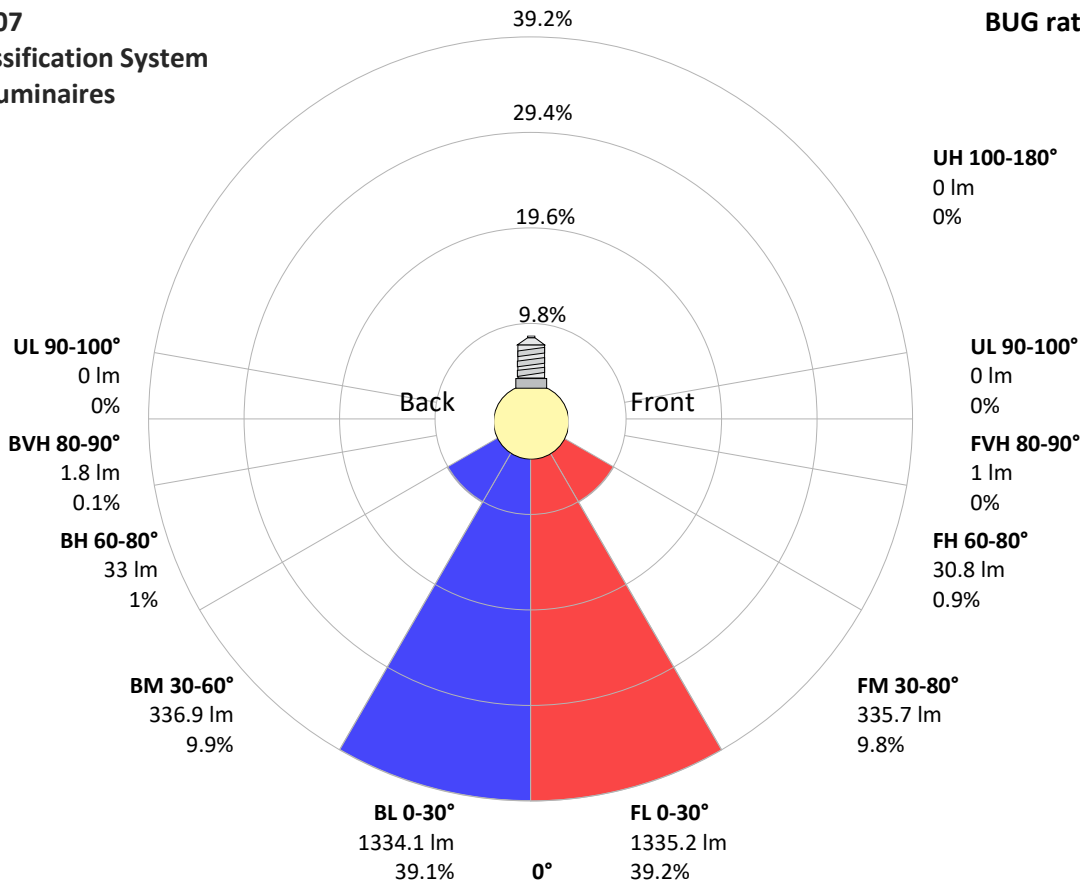
	Lumen	% Total
Forward light		
Low(0-30°)	1335 lm	39.2%
Medium(30-60°)	336 lm	9.8%
High(60-80°)	31 lm	0.9%
Very high(80-90°)	1 lm	0.0%
Back light		
Low(0-30°)	1334 lm	39.1%
Medium(30-60°)	337 lm	9.9%
High(60-80°)	33 lm	1.0%
Very high(80-90°)	2 lm	0.1%
Uplight		
Low(90-100°)	0 lm	0.0%
High(100-180°)	0 lm	0.0%

Intensity peaks

Max intensity	6525 cd
Intensity, 90°	0 cd
Intensity, 0°	6521 cd

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

BUG rating B3 U1 G0



Goniophotometry Report

1_PHOT_REFLEKTER-L-4050lmChip-2700K-38Deg_2303
www.factorylux.com



Power Details

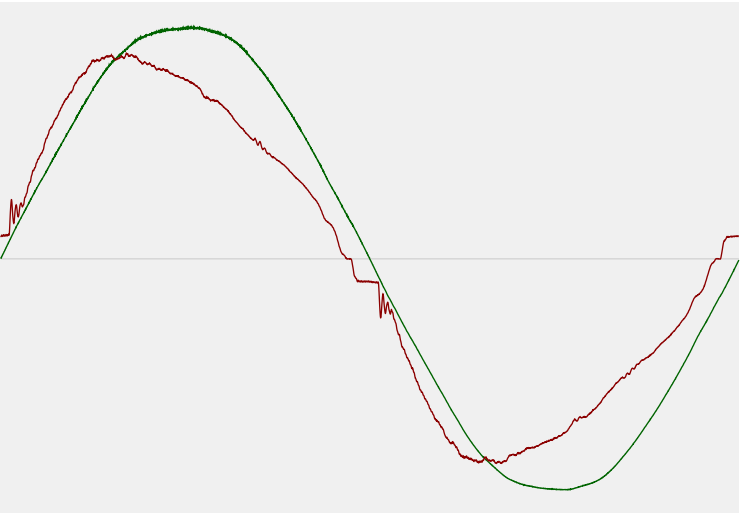
Input Power

Power feed to light source	41.3 W
Frequency of input power	50 Hz
RMS Input voltage feed, V_{RMS}	242 V
RMS Input current feed, I_{RMS}	0.177 A
Volt-Ampere or apparent power = $V_{RMS} * I_{RMS}$	42.78 VA
Displacement factor of AC power feed	0.97
Power factor of AC current feed	0.97
Total harmonic distortion of the current	11.22%
Total harmonic distortion of the voltage	1.42%

Efficiency

Radiated power efficiency	29.9%
<div><div></div></div>	
Lumen efficiency	82 lm/W
<div><div></div></div>	

Input Power Curve



Goniophotometry Report

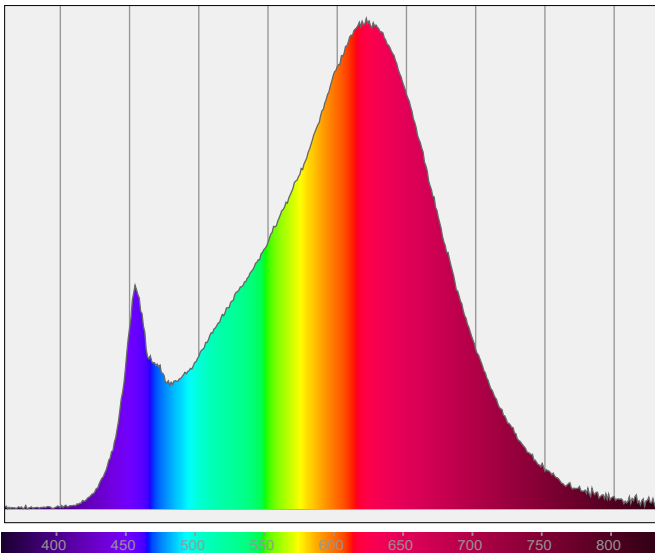
1_PHOT_REFLEKTER-L-4050lmChip-2700K-38Deg_2303
www.factorylux.com



Color Measurements

Correlated Color Temperature	CCT = 2700 K
Color Rendering TM30-18	R _f 91.5 — R _g 99.5
Color Shift, CIE duv	Duv ±0.0003

Spectral distribution



Color details

Correlated Color Temperature	CCT = 2700 K	Color coordinates CIE 1931	(x;y) = (0.460;0.411)
Color Rendering Index	CRI 92.6	Color coordinate CIEs 1960	(u;v) = (0.263;0.352)
Color Rendering Index, R9 (red component)	R9 = 61.3	Color deviation from BBL	Duv = ±0.0003
Color Rendering TM30-18	R _f 91.5 — R _g 99.5	Color coordinate CIEs 1976 (CIELUV)	(u';v') = (0.263;0.263)
Color Quality Scale	CQS = 89.9		

Goniophotometry Report

1_PHOT_REFLEKTER-L-4050lmChip-2700K-38Deg_2303
www.factorylux.com



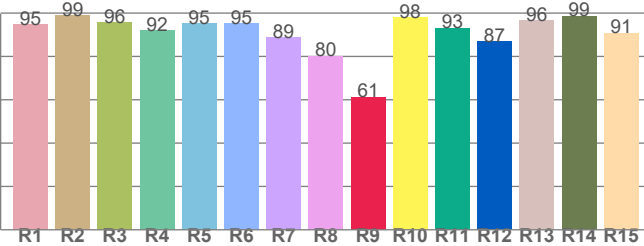
CIE 1931



CIE 1931 – zoomed on Planckian locus



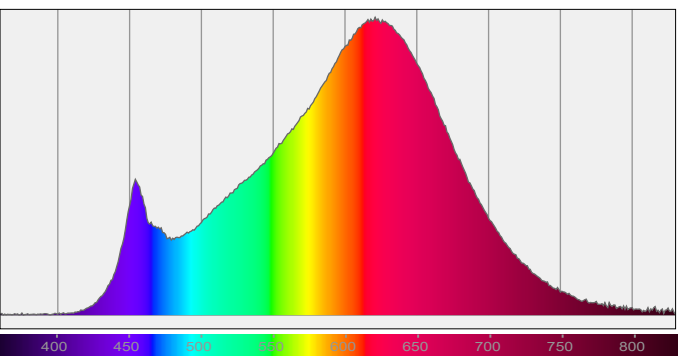
Color Rendering Index per reference color (CIE 1995)



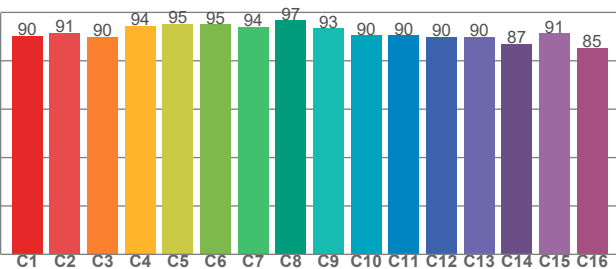
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
94.6	98.8	95.6	92.2	95.1	95.4	88.6	80.3	61.3	98.0	93.2	86.9	96.5	98.7	90.9

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



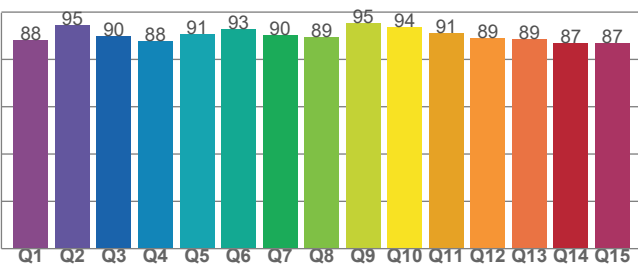
TM30-18 Rf-values per hue bin



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
90.3	91.4	89.7	94.4	95.3	94.9	93.8	96.6	93.3	90.4	90.4	89.7	89.7	86.9	91.3	85.4

Color Quality Scale by reference color



CQS Q values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
88.0	94.5	89.7	87.8	90.7	92.8	90.2	89.4	95.3	93.7	91.0	89.0	88.7	86.9	87.0