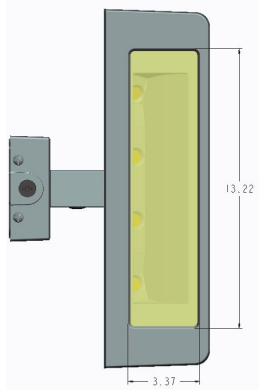


## ISOFOOTCANDLE LINES OF HORIZONTAL ILLUMINATION

Values based on 20 foot mounting height.



REPORT NUMBER: RAB01940  
ISSUE DATE: 05/11/16 PAGE: 1 OF 9  
PREPARED FOR: RAB LIGHTING INC.  
CATALOG NUMBER: WPLED104N / ALED104N  
(15-DEGREE UPTILT)  
LUMINAIRE: CAST FINNED METAL HOUSING,  
2-PIECE EXTRUDED METAL HEAT SINK, 4  
CIRCUIT BOARDS EACH WITH 1 LED,  
MOLDED PLASTIC REFLECTOR WITH  
SPECULAR FINISH AND 1 OPTICAL  
COMPARTMENT WITH 1 APERTURE PER LED,  
CLEAR FLAT GLASS LENS IN CAST BROWN  
PAINTED METAL FRAME.  
LAMPS: FOUR WHITE MULTI-CHIP LIGHT  
EMITTING DIODES (LEDs), TILTED  
45-DEGREES FROM VERTICAL BASE-UP  
POSITION, 2 LEDS CANTED 12-DEGREES  
FROM STRAIGHT AHEAD.

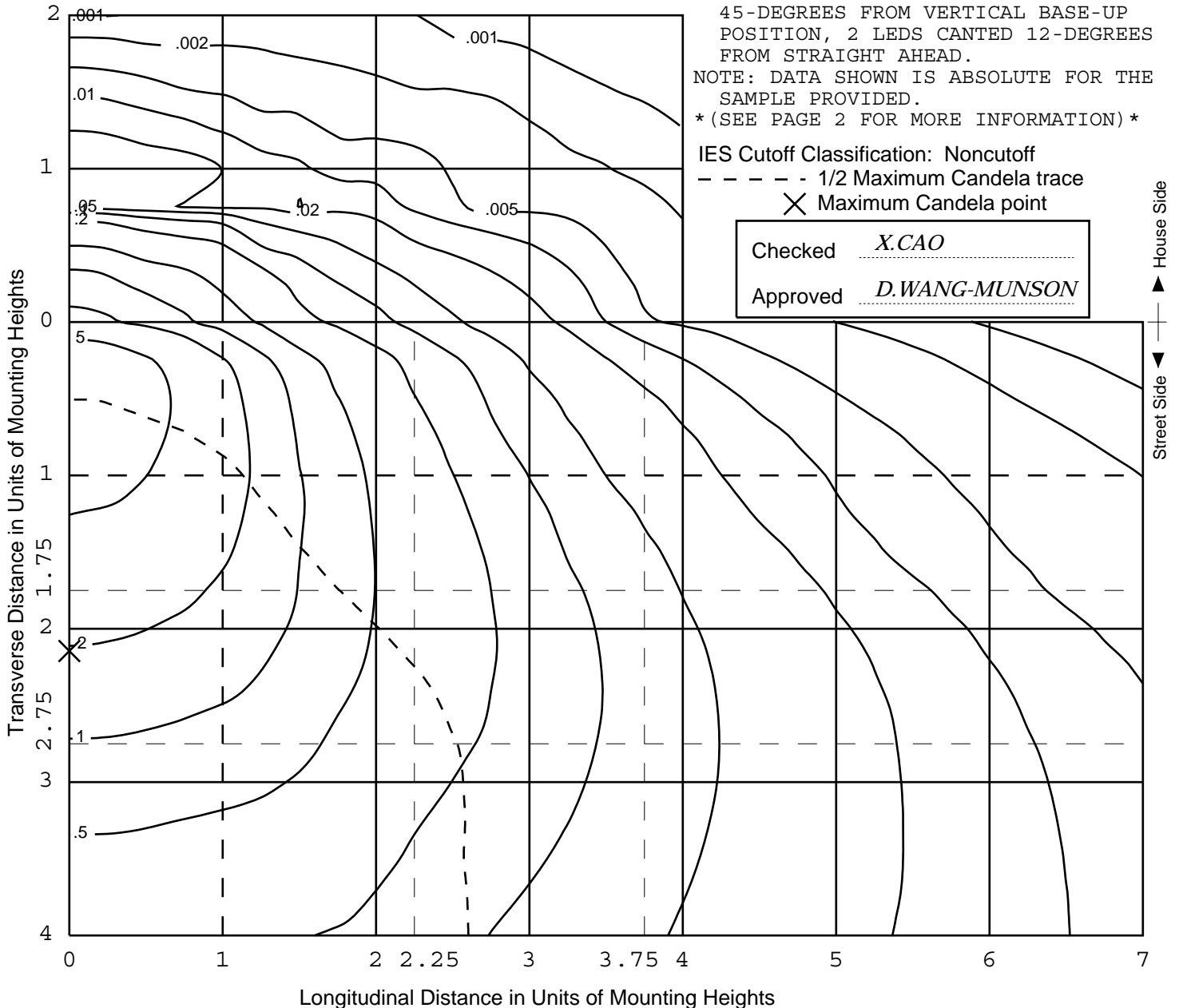
NOTE: DATA SHOWN IS ABSOLUTE FOR THE  
SAMPLE PROVIDED.

\*(SEE PAGE 2 FOR MORE INFORMATION)\*

IES Cutoff Classification: Noncutoff

--- 1/2 Maximum Candela trace

X Maximum Candela point



REPORT NUMBER: RAB01940  
ISSUE DATE: 05/11/16  
PREPARED FOR: RAB LIGHTING INC.

PAGE: 2 OF 9

ADDITIONAL INFORMATION

TOTAL INPUT WATTS = 105.34 W AT 120.0 VAC.

LED DRIVER: RD-120-A0700

TEST PROCEDURE: IESNA LM-79-08

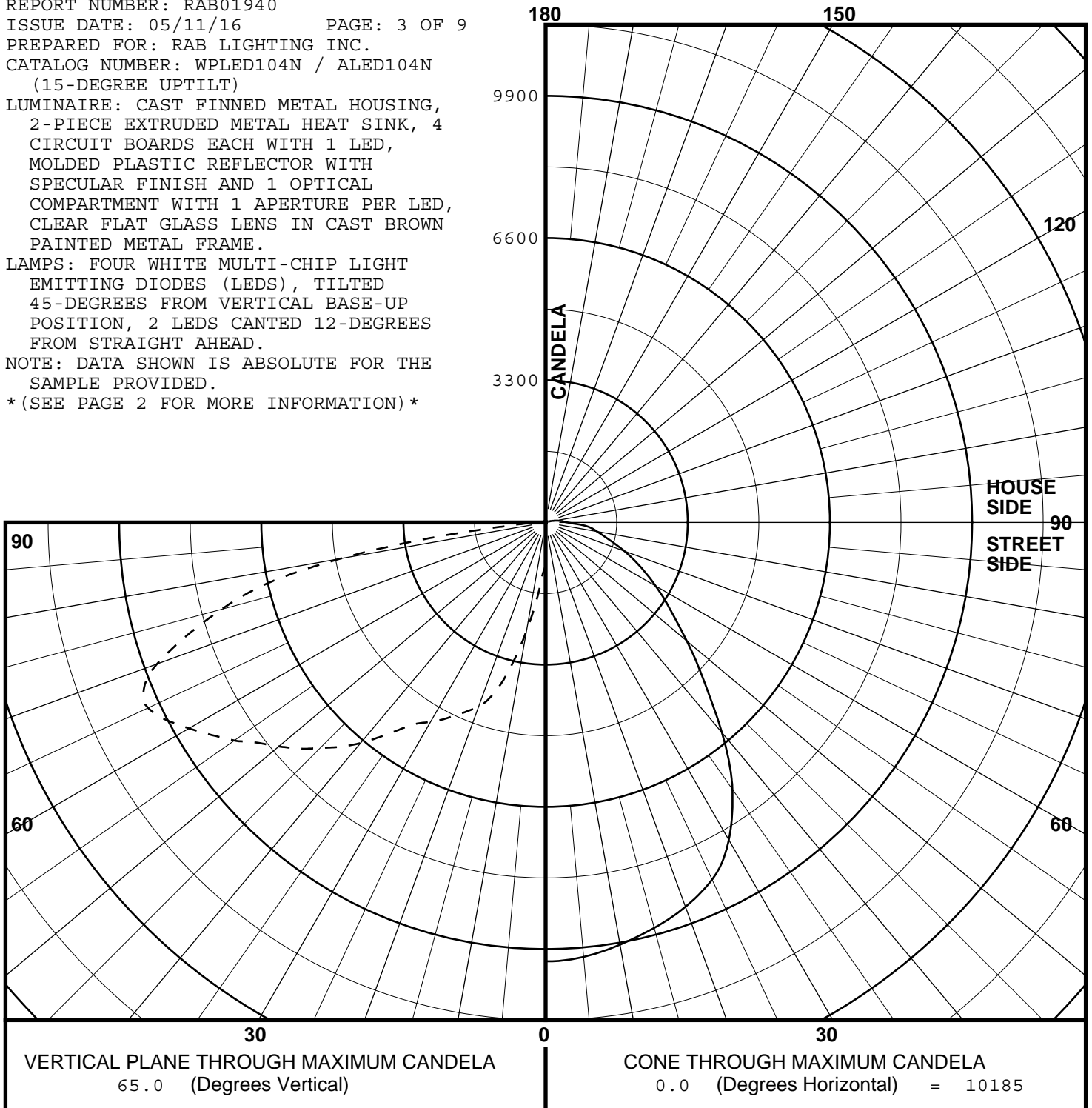
ACCREDITED LABORATORY CODE 201058-0

TEST DISTANCE : 28.25 FEET

NOTE: THIS REPORT WITH THE USE OF THE NVLAP LOGO SHALL NOT BE USED BY  
THE CLIENT TO CLAIM PRODUCT CERTIFICATION, APPROVAL, OR  
ENDORSEMENT BY NVLAP, NIST, OR ANY AGENCY OF THE FEDERAL  
GOVERNMENT.

## MAXIMUM PLANE AND MAXIMUM CONE PLOTS OF CANDELA

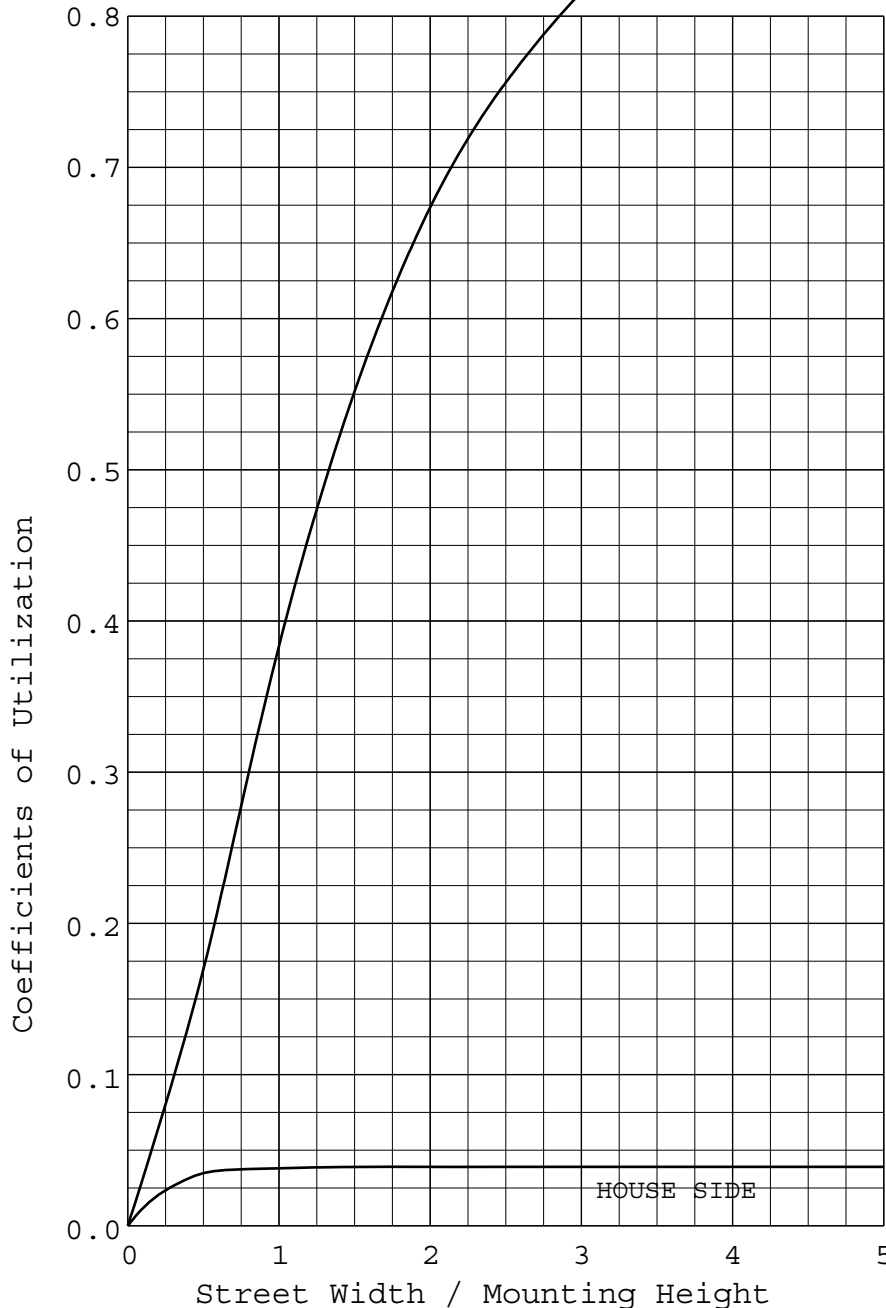
REPORT NUMBER: RAB01940  
 ISSUE DATE: 05/11/16 PAGE: 3 OF 9  
 PREPARED FOR: RAB LIGHTING INC.  
 CATALOG NUMBER: WPLED104N / ALED104N  
 (15-DEGREE UPTILT)  
 LUMINAIRE: CAST FINNED METAL HOUSING,  
 2-PIECE EXTRUDED METAL HEAT SINK, 4  
 CIRCUIT BOARDS EACH WITH 1 LED,  
 MOLDED PLASTIC REFLECTOR WITH  
 SPECULAR FINISH AND 1 OPTICAL  
 COMPARTMENT WITH 1 APERTURE PER LED,  
 CLEAR FLAT GLASS LENS IN CAST BROWN  
 PAINTED METAL FRAME.  
 LAMPS: FOUR WHITE MULTI-CHIP LIGHT  
 EMITTING DIODES (LEDs), TILTED  
 45-DEGREES FROM VERTICAL BASE-UP  
 POSITION, 2 LEDS CANTED 12-DEGREES  
 FROM STRAIGHT AHEAD.  
 NOTE: DATA SHOWN IS ABSOLUTE FOR THE  
 SAMPLE PROVIDED.  
 \*(SEE PAGE 2 FOR MORE INFORMATION)\*



REPORT NUMBER: RAB01940  
ISSUE DATE: 05/11/16  
PREPARED FOR: RAB LIGHTING INC.

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COEFFICIENTS OF UTILIZATION AND FLUX DISTRIBUTION



	LUMENS	PERCENT OF FIXTURE
DOWNWARD STREET SIDE	12524.	95.3
DOWNWARD HOUSE SIDE	525.	4.0
DOWNWARD TOTAL	13048.	99.3
UPWARD STREET SIDE	36.	0.3
UPWARD HOUSE SIDE	50.	0.4
UPWARD TOTAL	87.	0.7
TOTAL FLUX	13135.	100.0
TOTAL INPUT WATTS = 105.3		
EFFICACY = 124.7 Lm/W		

ALL CANDELA AND LUMENS IN THIS REPORT ARE BASED ON ABSOLUTE PHOTOMETRY.  
THE COEFFICIENT OF UTILIZATION VALUES ARE BASED ON THE TOTAL ABSOLUTE  
LUMEN OUTPUT OF THIS LUMINAIRE SAMPLE.

REPORT NUMBER: RAB01940  
 ISSUE DATE: 05/11/16  
 PREPARED FOR: RAB LIGHTING INC.

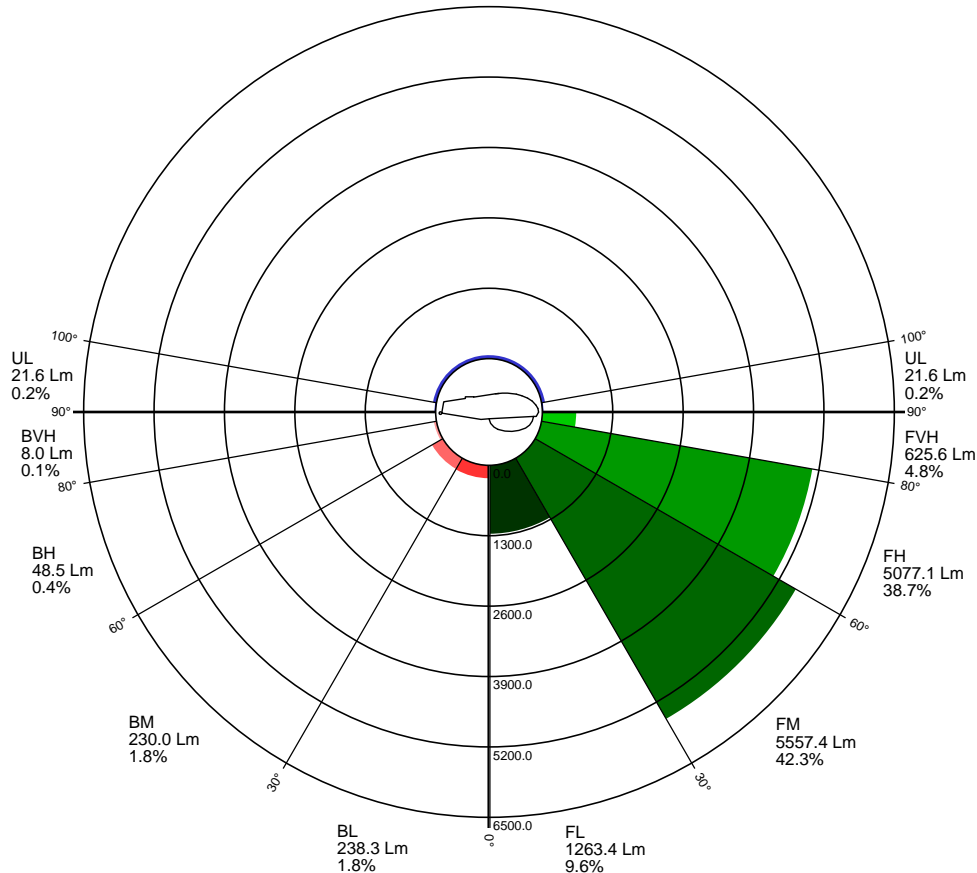
PAGE: 5 OF 9

BUG Rating:				B1 U3 G4		
Zonal Summary		Lumens	% of Fixture	Zone Ratings		
				B	U	G
Forward		12524	95.3			
FL	(0° - 30°)	1263.4	9.6			
FM	(30° - 60°)	5557.4	42.3			
FH	(60° - 80°)	5077.1	38.7			G3
FVH	(80° - 90°)	625.6	4.8			G4
Backward		525	4.0			
BL	(0° - 30°)	238.3	1.8	B1		
BM	(30° - 60°)	230.0	1.8	B1		
BH	(60° - 80°)	48.5	0.4	B0		G0
BVH	(80° - 90°)	8.0	0.1			G0
Upward		87	0.7			
UL	(90° - 100°)	21.6	0.2		U2	
UH	(100° - 180°)	64.9	0.5		U3	
Trapped Light		0	0.0			
Total Flux		13135	100.0			

### Zonal Lumen Summary

(Linear scale)

UH  
64.9 Lm  
0.5%

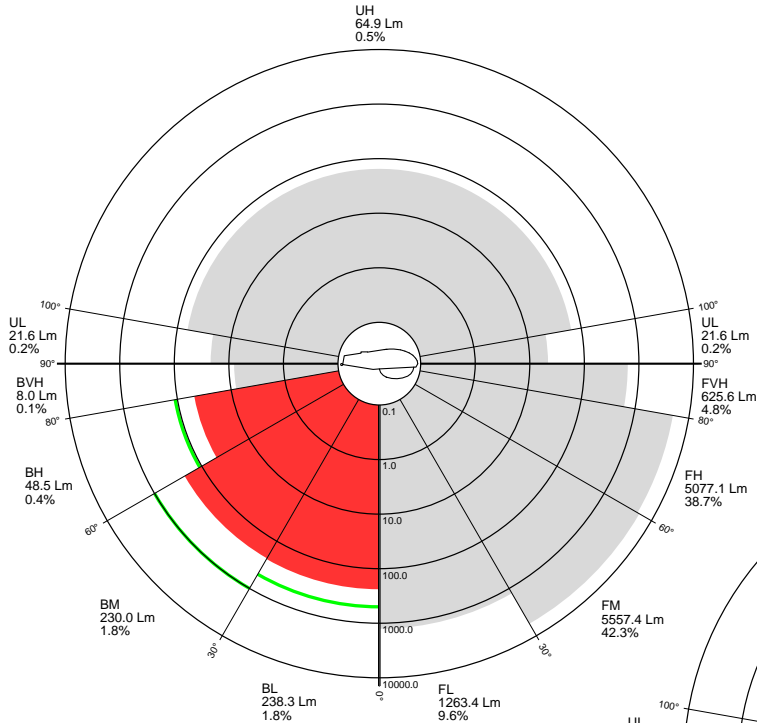


REPORT NUMBER: RAB01940  
 ISSUE DATE: 05/11/16  
 PREPARED FOR: RAB LIGHTING INC.

PAGE: 6 OF 9

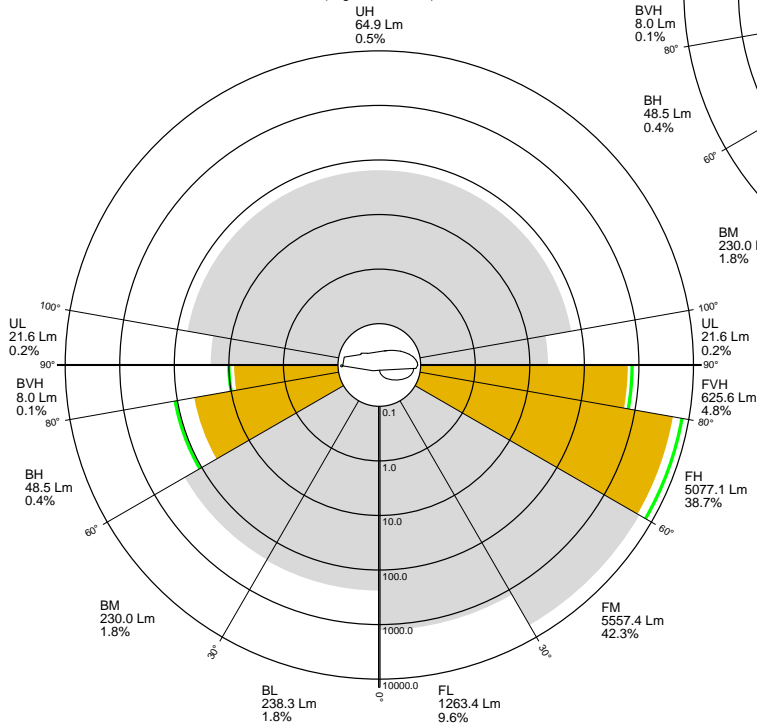
## Backlight Rating Details

(Logarithmic scale)



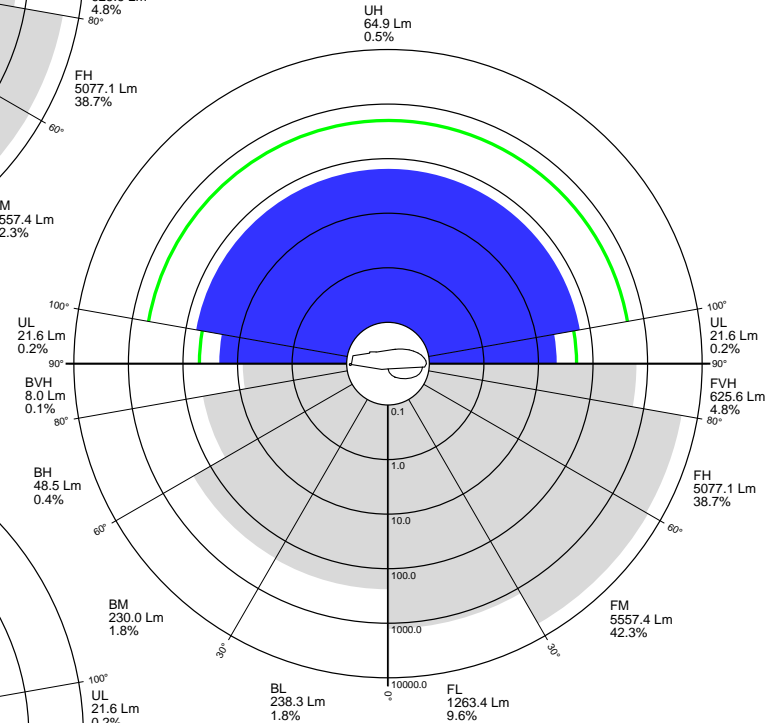
## Glare Rating Details

(Logarithmic scale)



## Uplight Rating Details

(Logarithmic scale)



REPORT NUMBER: RAB01940  
 ISSUE DATE: 05/11/16  
 PREPARED FOR: RAB LIGHTING INC.

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### CANDELA TABULATION

	STREET SIDE	LATERAL ANGLE								
		0.0	5.0	15.0	25.0	35.0	45.0	55.0	65.0	75.0 85.0
	180.0	9.	9.	9.	9.	9.	9.	9.	9.	9.
	175.0	1.	1.	3.	6.	8.	10.	12.	14.	17.
	165.0	0.	1.	3.	6.	8.	10.	12.	14.	17.
	155.0	0.	1.	3.	5.	8.	10.	12.	14.	17.
	145.0	0.	1.	3.	5.	8.	10.	12.	14.	17.
	135.0	0.	1.	3.	5.	8.	10.	12.	13.	15. 16.
	125.0	0.	1.	3.	5.	8.	10.	12.	13.	15. 15.
	115.0	0.	1.	3.	5.	8.	10.	12.	13.	15. 16.
	105.0	0.	1.	3.	5.	8.	10.	12.	13.	15. 16.
	95.0	25.	22.	20.	15.	14.	14.	14.	14.	15. 16.
	90.0	85.	105.	117.	96.	84.	81.	56.	39.	18. 16.
	87.5	396.	402.	368.	325.	258.	208.	224.	266.	184. 26.
	85.0	845.	888.	858.	918.	932.	1136.	1233.	921.	378. 57.
V	82.5	2526.	2611.	2741.	2822.	2637.	2662.	2136.	1324.	525. 159.
E	80.0	4837.	4916.	5046.	5025.	4164.	3570.	2696.	1771.	597. 227.
R	77.5	6706.	6774.	6698.	6654.	5043.	4259.	3239.	1895.	786. 277.
T	75.0	7792.	7835.	7680.	7842.	5874.	4856.	3498.	1981.	952. 405.
I	72.5	8738.	8781.	8644.	8796.	6733.	5106.	3554.	2083.	1097. 527.
C	70.0	9602.	9622.	9405.	9344.	7249.	5151.	3545.	2208.	1227. 716.
A	67.5	10095.	10069.	9736.	9397.	7503.	5117.	3507.	2335.	1371. 865.
L	65.0 <	10185.	10119.	9740.	9145.	7560.	5198.	3537.	2427.	1515. 947.
	62.5	9930.	9861.	9513.	8753.	7494.	5322.	3628.	2494.	1668. 1017.
A	60.0	9560.	9488.	9147.	8388.	7370.	5483.	3806.	2549.	1820. 1045.
N	57.5	9183.	9148.	8829.	8015.	7095.	5631.	3991.	2628.	1972. 1021.
G	55.0	8823.	8793.	8383.	7667.	6829.	5693.	4150.	2788.	2159. 1081.
L	52.5	8401.	8371.	8003.	7387.	6576.	5676.	4257.	2985.	2323. 1165.
E	50.0	8084.	8027.	7682.	7134.	6291.	5565.	4311.	3174.	2505. 1189.
	47.5	7768.	7689.	7363.	6843.	6067.	5343.	4345.	3364.	2580. 1196.
	45.0	7405.	7337.	7050.	6594.	5840.	5071.	4359.	3552.	2623. 1171.
	42.5	7060.	7021.	6762.	6280.	5585.	4830.	4282.	3707.	2608. 1139.
	40.0	6684.	6665.	6429.	5959.	5331.	4715.	4191.	3719.	2522. 1133.
	37.5	6255.	6249.	6073.	5655.	5150.	4682.	4132.	3651.	2381. 1149.
	35.0	5849.	5873.	5734.	5416.	5028.	4582.	4144.	3519.	2269. 1162.
	30.0	5338.	5346.	5284.	5084.	4737.	4453.	4028.	3201.	2065. 1142.
	25.0	4934.	4929.	4873.	4709.	4493.	4117.	3496.	2608.	1743. 1025.
	20.0	4550.	4542.	4495.	4319.	4057.	3543.	2843.	2098.	1435. 951.
	15.0	3780.	3742.	3666.	3414.	3133.	2687.	2265.	1768.	1308. 1023.
	10.0	2547.	2506.	2469.	2308.	2155.	1906.	1662.	1382.	1164. 1032.
	5.0	1490.	1466.	1464.	1391.	1337.	1244.	1185.	1109.	1066. 1013.
	0.0	991.	991.	991.	991.	991.	991.	991.	991.	991.

||  
 PLANE OF MAXIMUM CANDELA

CONE OF MAXIMUM CANDELA

REPORT NUMBER: RAB01940  
 ISSUE DATE: 05/11/16  
 PREPARED FOR: RAB LIGHTING INC.

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### CANDELA TABULATION

HOUSE SIDE

### LATERAL ANGLE

	90.0	95.0	105.0	115.0	125.0	135.0	145.0	155.0	165.0	175.0	180.0
180.0	9.	9.	9.	9.	9.	9.	9.	9.	9.	9.	9.
175.0	17.	17.	16.	15.	13.	12.	10.	7.	5.	4.	4.
165.0	17.	18.	17.	16.	14.	13.	11.	9.	8.	7.	7.
155.0	18.	18.	17.	16.	15.	14.	12.	11.	11.	11.	11.
145.0	17.	17.	17.	16.	15.	14.	13.	13.	13.	13.	13.
135.0	16.	16.	16.	16.	15.	14.	14.	14.	14.	14.	14.
125.0	16.	16.	16.	15.	15.	14.	15.	16.	16.	17.	17.
115.0	16.	16.	16.	16.	16.	16.	17.	18.	19.	19.	19.
105.0	17.	17.	17.	17.	17.	17.	19.	19.	20.	21.	21.
95.0	17.	17.	17.	17.	17.	17.	18.	18.	19.	19.	19.
90.0	16.	17.	17.	17.	16.	15.	15.	15.	15.	15.	15.
87.5	17.	17.	16.	16.	16.	15.	14.	14.	13.	13.	13.
85.0	21.	18.	16.	16.	15.	14.	13.	11.	11.	11.	11.
V 82.5	49.	24.	16.	15.	14.	13.	12.	10.	8.	8.	8.
E 80.0	91.	39.	19.	15.	14.	13.	11.	9.	6.	6.	6.
R 77.5	119.	57.	31.	16.	14.	12.	10.	8.	5.	4.	4.
T 75.0	128.	88.	47.	22.	13.	12.	10.	7.	5.	2.	2.
I 72.5	299.	196.	41.	33.	14.	12.	10.	7.	5.	2.	2.
C 70.0	368.	244.	45.	41.	16.	12.	10.	7.	5.	3.	3.
A 67.5	453.	284.	57.	48.	21.	13.	9.	7.	5.	3.	3.
L 65.0<<	494.	369.	108.	46.	24.	15.	11.	7.	5.	3.	3.
62.5	563.	389.	179.	35.	37.	19.	13.	9.	6.	5.	4.
A 60.0	568.	395.	229.	24.	42.	22.	20.	12.	10.	10.	10.
N 57.5	556.	416.	273.	32.	38.	32.	24.	20.	17.	16.	16.
G 55.0	613.	469.	313.	54.	29.	41.	31.	23.	25.	26.	26.
L 52.5	736.	569.	397.	122.	21.	42.	43.	28.	28.	30.	30.
E 50.0	775.	610.	459.	240.	25.	35.	46.	37.	35.	35.	35.
47.5	795.	624.	488.	354.	39.	25.	42.	41.	46.	49.	48.
45.0	795.	634.	512.	421.	93.	21.	33.	38.	47.	53.	52.
42.5	796.	654.	536.	447.	196.	33.	22.	30.	41.	47.	47.
40.0	822.	688.	564.	466.	288.	58.	23.	21.	30.	37.	38.
37.5	859.	722.	587.	481.	359.	136.	37.	20.	21.	25.	25.
35.0	896.	752.	603.	488.	386.	233.	79.	34.	28.	22.	21.
30.0	931.	770.	615.	491.	408.	354.	288.	206.	126.	87.	83.
25.0	875.	712.	590.	496.	443.	429.	445.	445.	405.	373.	369.
20.0	846.	704.	622.	578.	547.	541.	533.	509.	491.	478.	480.
15.0	952.	833.	753.	704.	667.	624.	597.	578.	565.	552.	549.
10.0	983.	912.	806.	764.	730.	705.	690.	672.	661.	649.	653.
5.0	981.	952.	876.	826.	802.	787.	777.	767.	764.	757.	762.
0.0	991.	991.	991.	991.	991.	991.	991.	991.	991.	991.	991.

CONE OF MAXIMUM CANDELA

REPORT NUMBER: RAB01940  
 ISSUE DATE: 05/11/16  
 PREPARED FOR: RAB LIGHTING INC.

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### 5-DEGREE ZONAL LUMEN SUMMARY

0- 5	24
5- 10	83
10- 15	172
15- 20	287
20- 25	406
25- 30	529
30- 35	646
35- 40	770
40- 45	909
45- 50	1043
50- 55	1158
55- 60	1262
60- 65	1359
65- 70	1407
70- 75	1314
75- 80	1045
80- 85	535
85- 90	99
90- 95	13
95-100	8
100-105	7
105-110	7
110-115	7
115-120	6
120-125	6
125-130	5
130-135	5
135-140	4
140-145	4
145-150	4
150-155	3
155-160	2
160-165	2
165-170	1
170-175	1
175-180	0

### 10-DEGREE ZONAL LUMEN SUMMARY

0- 10	107
0- 20	567
0- 30	1502
0- 40	2918
0- 50	4869
0- 60	7289
0- 70	10056
0- 80	12415
0- 90	13048
0-100	13070
0-110	13085
0-120	13097
0-130	13109
0-140	13118
0-150	13125
0-160	13131
0-170	13134
0-180	13135

REPORT NUMBER: RAB01943  
DATE: 5/10/2016  
PREPARED FOR: RAB LIGHTING INC.  
CATALOG NUMBER: WPLEDC104N / ALEDC104N (7.5-DEGREE UPTILT)

ADDRESS: 170 LUDLOW AVE, NORTHVALE, NJ 07647

LUMINAIRE: CAST FINNED METAL HOUSING, 2-PIECE EXTRUDED METAL HEAT SINK, 4  
CIRCUIT BOARDS EACH WITH 1 LED, MOLDED PLASTIC REFLECTOR WITH  
SPECULAR FINISH AND 1 OPTICAL COMPARTMENT WITH 1 APERTURE PER LED,  
CLEAR FLAT GLASS LENS IN CAST BROWN PAINTED METAL FRAME.

LAMP: FOUR WHITE MULTI-CHIP LIGHT EMITTING DIODES (LEDs), TILTED  
37.5-DEGREES FROM VERTICAL BASE-UP POSITION, 2 LEDS CANTED  
12-DEGREES FROM STRAIGHT AHEAD.

DRIVER: RD-120-A0700

OBJECT OF TEST: DATA SHOWN IS ABSOLUTE FOR THE SAMPLE PROVIDED AT THE RATED INPUT  
VOLTAGES (120.0 AND 277.0 VAC, 60Hz) TO THE TEST SAMPLE.

INSTRUMENTS:	GWINSTEK PROGRAMMABLE AC POWER SOURCE APS-7100	Calibration Due: N/A
	CHROMA PROGRAMMABLE DIGITAL POWER METER MODEL 66202	2/26/17
	OCEAN OPTICS QE65PRO Spectroradiometer	4/4/17
	RAB 2.0 meter Diameter Integrating Sphere, 4PI Geometry	4/4/17

OBJECT OF TEST: Measure the Absolute Flux in lumens\*, Total Radiant Flux\*, Spectral  
Power Distribution (SPD), Correlated Color Temperature (CCT), Color  
Rendering Indices (CRIa,1-14), Chromaticity Coordinates (x,y; u'v'),  
ANSI C78.377 Duv, and electrical data including ANSI C82.77-2002  
Power Factor (PF), and Total Harmonic Distortion (THD) to the test  
sample. Measure electrical data including Total Harmonic Distortion  
(THD) at maximum nominal rated input voltage. Report Off-State Power.

PROCEDURE: The test sample was mounted inside the integrating sphere, energized,  
and allowed to stabilize. After stabilization occurred, measurements  
were taken. In order to measure mean performance, multiple data sets  
were recorded and averaged. Readings were taken with the test sample  
operating at 60 HZ input in a 25 +/-1 degree Celsius  
free air ambient and in accordance with IESNA LM-79-08. Electrical  
data was also recorded at maximum nominal rated input voltage  
(277.0 VAC). All data are traceable to the National  
Institute of Standards and Technology. Off-State Power was reported  
with no voltage applied to the sample.

\*NOTE: Proper calibration of integrating spheres for measuring total flux  
output of non-directional samples will produce reliable, repeatable  
results within the calibration tolerances of the equipment used.  
However, measurement of test samples with significant self absorption  
and/or directional output, even when these effects are compensated  
for, are likely to have a greater variation in results compared to  
the flux output calculated from a goniophotometric exploration since  
these artifacts do not affect the goniophotometric results.

RESULTS: (continued subsequent pages)

Checked	<u>X.CAO</u>
Approved	<u>D.WANG-MUNSON</u> Lighting Engineer

REPORT NUMBER: RAB01943  
 DATE: 5/10/2016  
 PREPARED FOR: RAB LIGHTING INC.  
 CATALOG NUMBER: WPLEDC104N / ALEDC104N (7.5-DEGREE UPTILT)

Page 2 of 4

### RESULTS:

<b>PHOTOMETRIC</b>	
Total Integrated Flux (lumens)	13135 *
<b>SPECTRORADIOMETRIC</b>	
Observer	CIE 1931 2 degree
Chromaticity Ordinate x	0.3832
Chromaticity Ordinate y	0.3875
Observer	CIE 1976 2 degree
Chromaticity Ordinate u'	0.2227
Chromaticity Ordinate v'	0.5066
Correlated Color Temp CCT (K)	4004
ANSI C78.377-2008 Duv	0.004
Total Radiant Flux (milliWatts)	37240 *
<b>ELECTRICAL</b>	
Input Voltage (Volts AC)	120.0
Input Current (Amps AC)	0.882
Input Power (Watts)	105.3
Input Power Factor (%)	99.5
Input Current THD (%)	5.8
Input Voltage THD (%)	0.2
<b>EFFICACY (Lumens/Watt)</b>	
	124.7
<b>ELECTRICAL AT MAX NONIMAL INPUT</b>	
Input Voltage (Volts AC)	277.0
Input Current (Amps AC)	0.408
Input Power (Watts)	103.6
Input Power Factor (%)	91.7
Input Current THD (%)	10.9
Input Voltage THD (%)	0.2
<b>Off-State Power (Watts)</b>	
	0.0

COLOR RENDERING INDICES	CRI
Ra (Average 1-8)	71
R1 Light greyish red	68
R2 Dark greyish yellow	77
R3 Strong yellowish green	85
R4 Moderate yellowish green	70
R5 Light bluish green	67
R6 Light blue	68
R7 Light violet	82
R8 Light reddish purple	52
R9 Strong red	-33
R10 Strong yellow	46
R11 Strong green	65
R12 Strong blue	39
R13 Light yellowish pink (skin)	69
R14 Moderate olive green (leaf)	91

### \*NOTE:

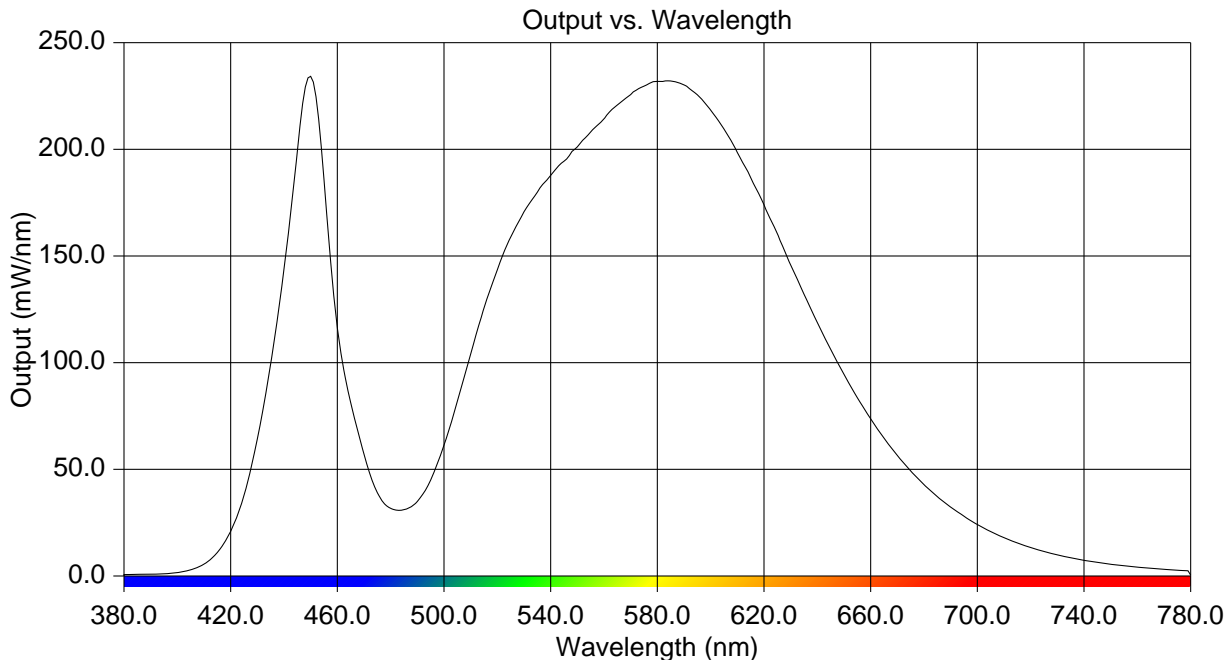
Proper calibration of integrating spheres for measuring total flux output of non-directional samples will produce reliable, repeatable results within the calibration tolerances of the equipment used. However, measurement of test samples with significant self absorption and/or directional output, even when these effects are compensated for, are likely to have a greater variation in results compared to the flux output calculated from a goniophotometric exploration since these artifacts do not affect the goniophotometric results.

REPORT NUMBER: RAB01943  
 DATE: 5/10/2016  
 PREPARED FOR: RAB LIGHTING INC.  
 CATALOG NUMBER: WPLED104N / ALED104N (7.5-DEGREE UPTILT)

Page 3 of 4

### RESULTS:

Wavelength	mW per nm	Wavelength	mW per nm	Wavelength	mW per nm
380	0.638	515	125.489	650	94.514
385	0.719	520	143.519	655	83.566
390	0.815	525	159.088	660	73.642
395	1.054	530	170.732	665	64.639
400	1.616	535	179.897	670	56.507
405	2.848	540	187.823	675	49.177
410	5.601	545	194.427	680	42.826
415	11.021	550	201.145	685	37.184
420	20.904	555	208.135	690	32.257
425	37.959	560	214.349	695	28.029
430	64.239	565	220.878	700	24.055
435	99.700	570	225.651	705	20.782
440	143.395	575	229.616	710	17.934
445	200.142	580	231.794	715	15.545
450	234.215	585	231.952	720	13.279
455	185.837	590	230.295	725	11.481
460	116.406	595	225.572	730	9.869
465	81.318	600	218.297	735	8.516
470	57.051	605	209.438	740	7.392
475	39.058	610	198.517	745	6.394
480	31.732	615	186.754	750	5.534
485	31.055	620	174.024	755	4.788
490	34.933	625	160.401	760	4.158
495	44.966	630	145.765	765	3.587
500	61.398	635	132.099	770	3.114
505	81.890	640	118.807	775	2.720
510	103.951	645	106.301	780	0.416



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## CIE Chromaticity Diagram

