RAB LIGHTING

NVLAP LAB CODE: 201058-0

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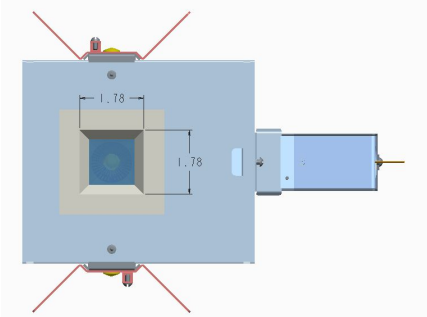
REPORT NUMBER: RAB01215 PAGE: 1 OF 7
ISSUE DATE: 10/16/15 DATE SAMPLE TESTED: 10/16/15
PREPARED FOR: RAB LIGHTING INC.
CATALOG NUMBER: RDLED2S8-WYYHC-TW (2" square recessed wallwasher - >90 High CRI)
LUMINAIRE: FABRICATED METAL UPPER HOUSING AND BALLAST HOUSING, CAST WHITE PAINTED FINNED METAL HEAT SINK, 1 WHITE CIRCUIT BOARD WITH ONE LED, MOLDED PLASTIC REFLECTOR WITH SPECULAR FINISH, HOLOGRAPHIC FLAT PLASTIC LENS, CAST WHITE PAINTED METAL LOWER HOUSING.
LAMP: ONE WHITE MULTI-CHIP LIGHT EMITTING DIODES (LEDS), VERTICAL BASE-UP POSITION.
NOTE: DATA SHOWN IS ABSOLUTE FOR THE SAMPLE PROVIDED.
TOTAL INPUT WATTS: 8.3772 W AT 120.0 VOLTS
TEST PROCEDURE: IESNA LM-79-08
TEST DISTANCE: 28.25 FEET
PREPARED FOR: RAB LIGHTING INC.
LED DRIVER:RD-008-E1-A0200
ACCREDITED LABORATORY CODE 201085-0




CANDELA DISTRIBUTION

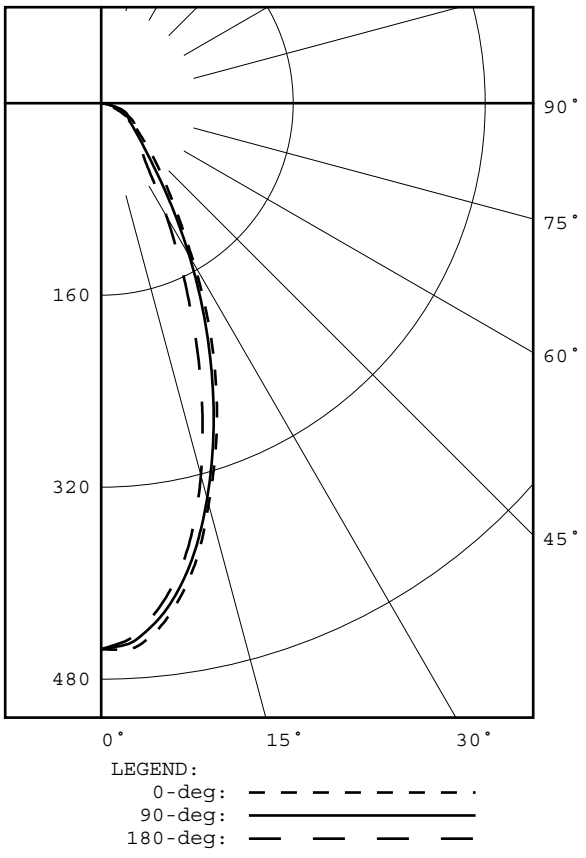
| | 0.0 | 45.0 | 90.0 | 135.0 | 180.0 | FLUX |
|---|---|---|---|---|---|---|
| 0 | 455 | 455 | 455 | 455 | 455 | |
| 5 | 448 | 446 | 441 | 437 | 435 | 41 |
| 15 | 346 | 348 | 341 | 330 | 321 | 94 |
| 25 | 217 | 218 | 207 | 189 | 166 | 92 |
| 35 | 109 | 112 | 99 | 89 | 71 | 62 |
| 45 | 59 | 53 | 49 | 46 | 46 | 40 |
| 55 | 35 | 32 | 31 | 31 | 35 | 29 |
| 65 | 19 | 21 | 24 | 20 | 25 | 22 |
| 75 | 5 | 8 | 14 | 9 | 11 | 10 |
| 85 | 0 | 1 | 1 | 1 | 1 | 1 |
| 90 | 0 | 0 | 0 | 0 | 0 | |

ZONAL LUMEN SUMMARY

| ZONE | LUMENS | %FIXT |
|---|---|---|
| 0- 30 | 227 | 58.0 |
| 0- 40 | 289 | 73.9 |
| 0- 60 | 357 | 91.5 |
| 0- 90 | 391 | 100.0 |
| 90-180 | 0 | 0.0 |
| 0-180 | 391 | 100.0 |

TOTAL INPUT WATTS = 8.4
EFFICACY = 46.5 Lm/W
CIE TYPE - DIRECT

| PLANE | 0-DEG | 90-DEG | 180-DEG |
|---|---|---|---|
| SPACING CRITERIA : | 0.7 | 0.7 | 0.7 |




| | |
|---|---|
| Checked | X.CAO |
| Approved | D.WANG-MUNSON |

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PREPARED FOR: RAB LIGHTING INC.

| PLANE | : 0-DEG | 90-DEG | |
|---|---|---|---|
| BEAM ANGLE (50%) | : 45.0 | X 46.8 | DEGREES |
| FIELD ANGLE (10%) | : 94.8 | X 92.8 | DEGREES |

RAB LIGHTING

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CANDELA DISTRIBUTION

| | 0.0 | 22.5 | 45.0 | 67.5 | 90.0 | 112.5 | 135.0 | 157.5 | 180.0 |
|---|---|---|---|---|---|---|---|---|---|
| 0.0 | 455 | 455 | 455 | 455 | 455 | 455 | 455 | 455 | 455 |
| 2.5 | 456 | 455 | 454 | 453 | 452 | 450 | 450 | 449 | 449 |
| 5.0 | 448 | 447 | 446 | 443 | 441 | 438 | 437 | 435 | 435 |
| 7.5 | 431 | 431 | 430 | 428 | 424 | 420 | 418 | 415 | 415 |
| 10.0 | 408 | 409 | 408 | 406 | 401 | 396 | 394 | 390 | 390 |
| 12.5 | 380 | 380 | 380 | 379 | 373 | 367 | 365 | 358 | 358 |
| 15.0 | 346 | 348 | 348 | 347 | 341 | 335 | 330 | 322 | 321 |
| 17.5 | 314 | 315 | 315 | 313 | 308 | 301 | 295 | 284 | 281 |
| 20.0 | 282 | 282 | 282 | 280 | 274 | 267 | 259 | 245 | 241 |
| 22.5 | 249 | 250 | 249 | 246 | 240 | 233 | 223 | 207 | 201 |
| 25.0 | 217 | 219 | 218 | 213 | 207 | 200 | 189 | 171 | 166 |
| 27.5 | 185 | 189 | 188 | 181 | 176 | 171 | 158 | 140 | 135 |
| 30.0 | 155 | 160 | 161 | 152 | 147 | 144 | 131 | 115 | 109 |
| 32.5 | 129 | 134 | 135 | 126 | 121 | 120 | 108 | 93 | 88 |
| 35.0 | 109 | 112 | 112 | 103 | 99 | 98 | 89 | 76 | 71 |
| 37.5 | 92 | 94 | 93 | 84 | 81 | 81 | 74 | 65 | 60 |
| 40.0 | 79 | 79 | 76 | 70 | 67 | 66 | 62 | 55 | 53 |
| 42.5 | 68 | 67 | 63 | 59 | 57 | 56 | 53 | 49 | 49 |
| 45.0 | 59 | 57 | 53 | 51 | 49 | 48 | 46 | 45 | 46 |
| 47.5 | 51 | 49 | 45 | 44 | 43 | 42 | 41 | 43 | 43 |
| 50.0 | 44 | 42 | 39 | 39 | 38 | 37 | 37 | 40 | 40 |
| 52.5 | 39 | 37 | 35 | 35 | 34 | 33 | 34 | 38 | 38 |
| 55.0 | 35 | 33 | 32 | 32 | 31 | 30 | 31 | 36 | 35 |
| 57.5 | 31 | 29 | 28 | 29 | 28 | 27 | 28 | 34 | 33 |
| 60.0 | 28 | 26 | 26 | 28 | 27 | 25 | 26 | 32 | 31 |
| 62.5 | 23 | 22 | 23 | 27 | 25 | 23 | 23 | 29 | 28 |
| 65.0 | 19 | 19 | 21 | 26 | 24 | 20 | 20 | 26 | 25 |
| 67.5 | 15 | 15 | 18 | 25 | 23 | 18 | 18 | 23 | 22 |
| 70.0 | 11 | 12 | 15 | 23 | 21 | 15 | 15 | 19 | 19 |
| 72.5 | 8 | 8 | 12 | 19 | 18 | 13 | 12 | 16 | 15 |
| 75.0 | 5 | 6 | 8 | 14 | 14 | 9 | 9 | 11 | 11 |
| 77.5 | 3 | 3 | 5 | 7 | 8 | 6 | 6 | 7 | 7 |
| 80.0 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| 82.5 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 1 |
| 85.0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 87.5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 90.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

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PREPARED FOR: RAB LIGHTING INC.

ZONAL LUMEN SUMMARY

| | |
|---|---|
| 0- 5 | 11. |
| 5- 10 | 30. |
| 10- 15 | 44. |
| 15- 20 | 50. |
| 20- 25 | 49. |
| 25- 30 | 43. |
| 30- 35 | 35. |
| 35- 40 | 27. |
| 40- 45 | 22. |
| 45- 50 | 18. |
| 50- 55 | 16. |
| 55- 60 | 14. |
| 60- 65 | 12. |
| 65- 70 | 10. |
| 70- 75 | 7. |
| 75- 80 | 3. |
| 80- 85 | 1. |
| 85- 90 | 0. |

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PREPARED FOR: RAB LIGHTING INC.

5-DEGREE ZONAL LUMEN SUMMARY

| | |
|---|---|
| 0- 5 | 11 |
| 5- 10 | 30 |
| 10- 15 | 44 |
| 15- 20 | 50 |
| 20- 25 | 49 |
| 25- 30 | 43 |
| 30- 35 | 35 |
| 35- 40 | 27 |
| 40- 45 | 22 |
| 45- 50 | 18 |
| 50- 55 | 16 |
| 55- 60 | 14 |
| 60- 65 | 12 |
| 65- 70 | 10 |
| 70- 75 | 7 |
| 75- 80 | 3 |
| 80- 85 | 1 |
| 85- 90 | 0 |
| 90- 95 | 0 |
| 95-100 | 0 |
| 100-105 | 0 |
| 105-110 | 0 |
| 110-115 | 0 |
| 115-120 | 0 |
| 120-125 | 0 |
| 125-130 | 0 |
| 130-135 | 0 |
| 135-140 | 0 |
| 140-145 | 0 |
| 145-150 | 0 |
| 150-155 | 0 |
| 155-160 | 0 |
| 160-165 | 0 |
| 165-170 | 0 |
| 170-175 | 0 |
| 175-180 | 0 |

10-DEGREE ZONAL LUMEN SUMMARY

| | |
|---|---|
| 0- 10 | 41 |
| 0- 20 | 134 |
| 0- 30 | 227 |
| 0- 40 | 289 |
| 0- 50 | 328 |
| 0- 60 | 357 |
| 0- 70 | 379 |
| 0- 80 | 390 |
| 0- 90 | 391 |
| 0-100 | 391 |
| 0-110 | 391 |
| 0-120 | 391 |
| 0-130 | 391 |
| 0-140 | 391 |
| 0-150 | 391 |
| 0-160 | 391 |
| 0-170 | 391 |
| 0-180 | 391 |

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PREPARED FOR: RAB LIGHTING INC.

COEFFICIENTS OF UTILIZATION - ZONAL CAVITY METHOD

EFFECTIVE FLOOR CAVITY REFLECTANCE 0.20

| RC | 80 | | | | 70 | | | | 50 | | | 30 | | | 10 | | | 0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| RW | 70 | 50 | 30 | 10 | 70 | 50 | 30 | 10 | 50 | 30 | 10 | 50 | 30 | 10 | 50 | 30 | 10 | 0 |
| 0 | 119 | 119 | 119 | 119 | 116 | 116 | 116 | 116 | 111 | 111 | 111 | 106 | 106 | 106 | 102 | 102 | 102 | 100 |
| 1 | 112 | 109 | 105 | 103 | 109 | 106 | 104 | 101 | 102 | 100 | 98 | 98 | 97 | 95 | 95 | 94 | 92 | 90 |
| 2 | 105 | 99 | 94 | 90 | 103 | 97 | 93 | 89 | 94 | 90 | 87 | 91 | 88 | 85 | 88 | 85 | 83 | 81 |
| 3 | 98 | 91 | 84 | 80 | 96 | 89 | 83 | 79 | 86 | 82 | 78 | 84 | 80 | 76 | 81 | 78 | 75 | 73 |
| 4 | 92 | 83 | 77 | 72 | 90 | 82 | 76 | 71 | 80 | 75 | 70 | 78 | 73 | 70 | 76 | 72 | 69 | 67 |
| 5 | 87 | 77 | 70 | 65 | 85 | 76 | 70 | 65 | 74 | 69 | 64 | 73 | 68 | 64 | 71 | 67 | 63 | 61 |
| 6 | 82 | 72 | 65 | 60 | 80 | 71 | 64 | 60 | 69 | 64 | 59 | 68 | 63 | 59 | 66 | 62 | 58 | 57 |
| 7 | 78 | 67 | 60 | 55 | 76 | 66 | 60 | 55 | 65 | 59 | 55 | 64 | 58 | 55 | 63 | 58 | 54 | 53 |
| 8 | 74 | 63 | 56 | 52 | 72 | 62 | 56 | 51 | 61 | 55 | 51 | 60 | 55 | 51 | 59 | 54 | 51 | 49 |
| 9 | 70 | 59 | 53 | 48 | 69 | 59 | 52 | 48 | 58 | 52 | 48 | 57 | 51 | 48 | 56 | 51 | 48 | 46 |
| 10 | 67 | 56 | 50 | 45 | 66 | 55 | 49 | 45 | 55 | 49 | 45 | 54 | 49 | 45 | 53 | 48 | 45 | 43 |

ALL CANDELA, LUMENS, LUMINANCE, AND VCP VALUES 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: RAB01215
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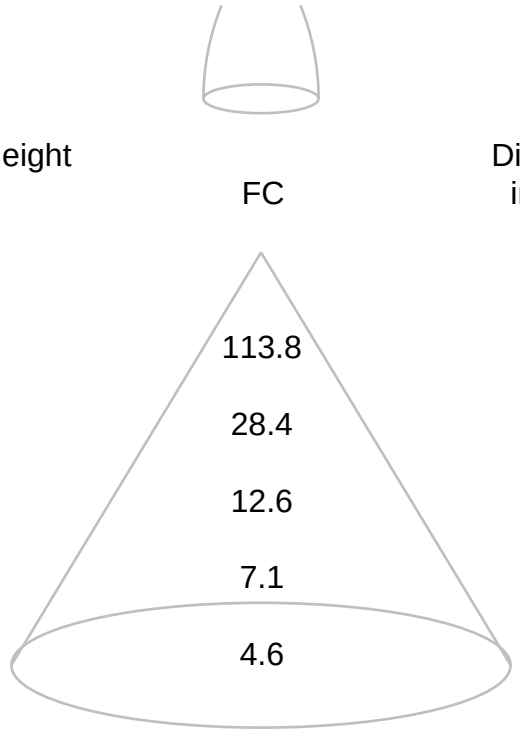
DATE SAMPLE TESTED: 10/16/15

# CONE OF LIGHT DIAGRAM

(diameter shown is where fc value is half the fc at nadir)



| Mounting Height in feet | FC | Diameter in feet |
|---|---|---|
| 2.0 | 113.8 | 1.4 |
| 4.0 | 28.4 | 2.9 |
| 6.0 | 12.6 | 4.3 |
| 8.0 | 7.1 | 5.7 |
| 10.0 | 4.6 | 7.2 |

Note: The candela values used to generate this diagram were obtained by averaging the photometric data into a single plane.

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NVLAP LAB CODE: 201058-0

REPORT NUMBER: RAB01216 
DATE: 9/29/2015
PREPARED FOR: RAB LIGHTING INC.
CATALOG NUMBER: RDLED2S8-WYYHC-TW (2" square recessed wallwasher - >90 High CRI)

ADDRESS: 170 LUDLOW AVE, NORTHVALE, NJ 07647

LUMINAIRE: FABRICATED METAL UPPER HOUSING AND BALLAST HOUSING, CAST WHITE PAINTED FINNED METAL HEAT SINK, 1 WHITE CIRCUIT BOARD WITH ONE LED, MOLDED PLASTIC REFLECTOR WITH SPECULAR FINISH, HOLOGRAPHIC FLAT PLASTIC LENS, CAST WHITE PAINTED METAL LOWER HOUSING.

LAMP: ONE WHITE MULTI-CHIP LIGHT EMITTING DIODES (LEDS), VERTICAL BASE-UP POSITION.

DRIVER: RD-008-E1-A0200

NOTE: DATA SHOWN IS ABSOLUTE FOR THE SAMPLE PROVIDED AT RATED INPUT VOLTAGE (120.0 VAC , 60Hz) TO THE TEST SAMPLE.

| INSTRUMENTS: | | Calibration Due: |
|---|---|---|
| | CHROMA PROGRAMMABLE AC POWER SOURCE MODEL 61602 | N/A |
| | CHROMA PROGRAMMABLE DIGITAL POWER METER MODEL 66202 | 3/9/16 |
| | OCEAN OPTICS QE65PRO Spectroradiometer | 8/21/16 |
| | RAB 2.0 meter Diameter Integrating Sphere, 4PI Geometry | 8/21/16 |

OBJECT OF TEST: Measure the 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. Report Off-State Power.

PROCEDURE: The test sample was provided by the customer and had an unknown number of burn hours. The test sample was mounted inside the integrating sphere 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 120.0 VAC input in a 25 +/-1 degree Celsius free air ambient and in accordance with IESNA LM-79-08. 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 X.CAO
Approved D.WANG-MUNSON
Lighting Engineer

REPORT NUMBER: RAB01216 Page 2 of 4
DATE: 9/29/2015
PREPARED FOR: RAB LIGHTING INC.
CATALOG NUMBER: RDLED2S8-WYYHC-TW (2" square recessed wallwasher - >90 High CRI)

RESULTS:

| SPECTRORADIOMETRIC | |
|---|---|
| Observer | CIE 1931 2 degree |
| Chromaticity Ordinate x | 0.4594 |
| Chromaticity Ordinate y | 0.4120 |
| Observer | CIE 1976 2 degree |
| Chromaticity Ordinate u' | 0.2616 |
| Chromaticity Ordinate v' | 0.5278 |
| Correlated Color Temp CCT (K) | 2717 |
| Color Rendering Index (CRIa) | 92 |
| Color Rendering Index 1 (Light greyish red) | 92 |
| Color Rendering Index 2 (Dark greyish yellow) | 97 |
| Color Rendering Index 3 (Strong yellowish green) | 98 |
| Color Rendering Index 4 (Moderate yellowish green) | 90 |
| Color Rendering Index 5 (Light bluish green) | 92 |
| Color Rendering Index 6 (Light blue) | 97 |
| Color Rendering Index 7 (Light violet) | 89 |
| Color Rendering Index 8 (Light reddish purple) | 78 |
| Color Rendering Index 9 (Strong red) | 54 |
| Color Rendering Index 10 (Strong yellow) | 93 |
| Color Rendering Index 11 (Strong green) | 90 |
| Color Rendering Index 12 (Strong blue) | 83 |
| Color Rendering Index 13 (Light yellowish pink (skin)) | 93 |
| Color Rendering Index 14 (Moderate olive green (leaf)) | 100 |
| ANSI C78.377-2008 Duv | 0.001 |
| Total Radiant Flux (milliWatts) | 1364 * |
| | |
| ELECTRICAL FOR SPECTRORADIOMETRIC TEST | |
| Input Voltage (Volts AC ) | 120.0 |
| Input Current (Amps AC ) | 0.072 |
| Input Power (Watts) | 8.38 |
| Input Power Factor (%) | 97.5 |
| Input Current THD (%) | 0.2 |
| Input Voltage THD (%) | 19.7 |
| Off-State Power (Watts) | 0.0 |

*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.

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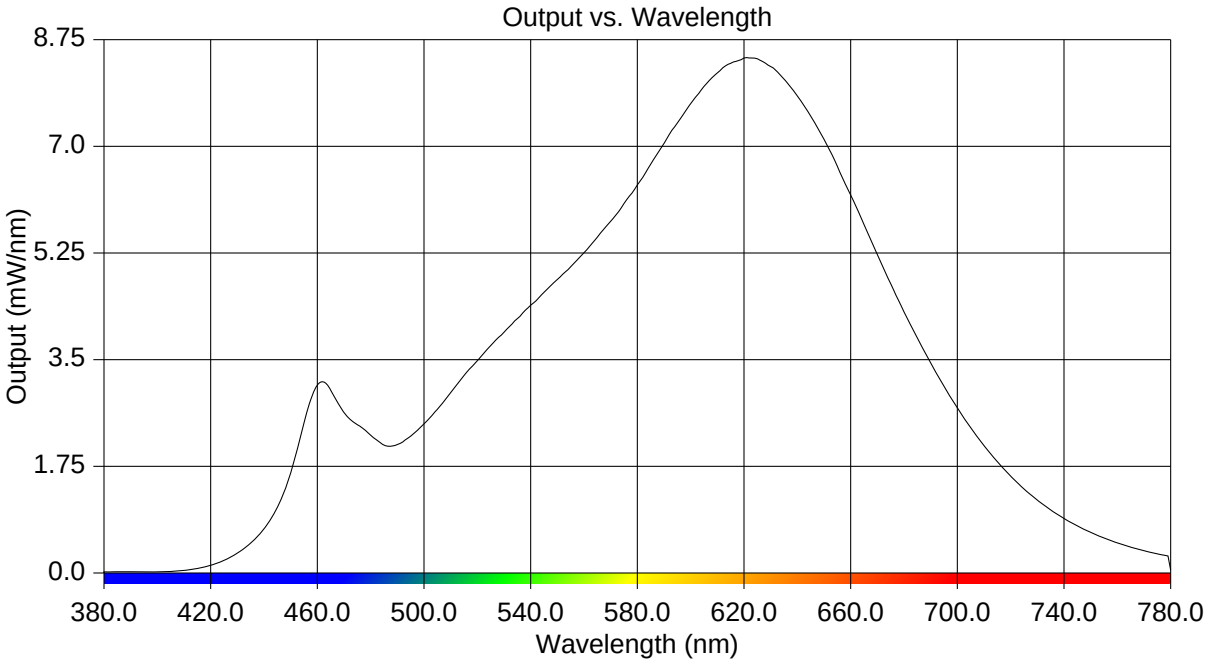
CATALOG NUMBER: RDLED2S8-WYYHC-TW (2" square recessed wallwasher - >90 High CRI)

RESULTS:

| Wavelength | mW per nm | Wavelength | mW per nm | Wavelength | mW per nm |
|---|---|---|---|---|---|
| 380 | 0.018 | 515 | 3.240 | 650 | 7.117 |
| 385 | 0.021 | 520 | 3.481 | 655 | 6.673 |
| 390 | 0.018 | 525 | 3.730 | 660 | 6.202 |
| 395 | 0.019 | 530 | 3.950 | 665 | 5.717 |
| 400 | 0.019 | 535 | 4.173 | 670 | 5.226 |
| 405 | 0.026 | 540 | 4.393 | 675 | 4.748 |
| 410 | 0.042 | 545 | 4.609 | 680 | 4.284 |
| 415 | 0.073 | 550 | 4.815 | 685 | 3.854 |
| 420 | 0.125 | 555 | 5.024 | 690 | 3.446 |
| 425 | 0.208 | 560 | 5.253 | 695 | 3.063 |
| 430 | 0.327 | 565 | 5.509 | 700 | 2.707 |
| 435 | 0.493 | 570 | 5.763 | 705 | 2.383 |
| 440 | 0.724 | 575 | 6.062 | 710 | 2.092 |
| 445 | 1.078 | 580 | 6.366 | 715 | 1.821 |
| 450 | 1.644 | 585 | 6.707 | 720 | 1.589 |
| 455 | 2.462 | 590 | 7.049 | 725 | 1.381 |
| 460 | 3.081 | 595 | 7.379 | 730 | 1.197 |
| 465 | 3.000 | 600 | 7.704 | 735 | 1.035 |
| 470 | 2.632 | 605 | 7.983 | 740 | 0.893 |
| 475 | 2.431 | 610 | 8.204 | 745 | 0.772 |
| 480 | 2.260 | 615 | 8.362 | 750 | 0.667 |
| 485 | 2.100 | 620 | 8.450 | 755 | 0.572 |
| 490 | 2.109 | 625 | 8.437 | 760 | 0.493 |
| 495 | 2.242 | 630 | 8.309 | 765 | 0.426 |
| 500 | 2.448 | 635 | 8.108 | 770 | 0.365 |
| 505 | 2.685 | 640 | 7.828 | 775 | 0.314 |
| 510 | 2.958 | 645 | 7.497 | 780 | 0.047 |



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DATE: 9/29/2015
PREPARED FOR: RAB LIGHTING INC.
CATALOG NUMBER: RDLED2S8-WYYHC-TW (2" square recessed wallwasher - >90 High CRI)

## CIE Chromaticity Diagram