



Report No.: BLC1910037E-D

LM-79-08 Test Report

For

ASmart LIGHT CO., LTD

(Brand Name: ASmart)

506 N GARFIELD AVE SUITE#210 ALHAMBRA CA 91801

Architectural Flood and Spot Luminaires

Model name(s): AST-SP01B-1200WSCS4H1-abcdef

Remark: "a" can be any two letters to represent lamp colors; "b" can be "C" for light shield or blank for no light shield; "c" can be "s" for Surge-Protective Device type provided or blank for no Surge-Protective Device provided; "d" can be "AM" or "FM" to represent mounting bracket types; "e" can be "B" for junction box or blank for no junction box; "f" can be any two digits to represent CCT.

Representative (Tested) Model:
AST-SP01B-1200WSCS4H1-acde40
AST-SP01B-1200WSCS4H1-acde57

Model Different: All construction and rating are the same, except CCT

Test & Report By:

Sherry Yang

Engineer: Sherry Yang

Date: Nov. 08, 2019

Review By:

Jason Luo

Manager: Jason Luo



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1.1 Product Information:



| | | |
|---|---|-----|
| Organization Name | ASmart LIGHT CO., LTD | |
| Brand Name | ASmart | |
| Model Number | AST-SP01B-1200WSCS4H1-abcdef | |
| SKU (if available) | N/A | |
| Type of Luminaire (for integral lamps, list base type and lamp type) | Architectural Flood and Spot Luminaires | |
| Rated Voltage / Frequency | 277-480Vac, 50/60 Hz | |
| Nominal Power | 1200W | |
| Rated Initial Lamp Lumen | -- | |
| Declared CCT | 4000K,4500K,5000K,5700K | |
| LED Manufacturer | Seoul Semiconductor Co., LTD | |
| LED Model | STW7C2SB-NT | |
| Sample Number | BLC1910037E-D1(4000K),D2(5700K) | |
| Luminaire Aperture (for downlights) | -- | in. |
| Luminaire Length | -- | mm |
| Luminaires Width | -- | mm |
| Number of Units (modular products) | N/A | s |

Photo





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| AM | FM |
|---|--|
|  |  |

**1.2 Test Specifications:**

| | |
|----------------------------|--|
| Date of Receipt | Nov. 05, 2019 |
| Date of Test | Nov. 06, 2019 |
| Test item | <ol style="list-style-type: none"> 1. Total Luminous Flux 2. Luminous Distribution Intensity 3. Luminous Efficacy 4. Correlated Color Temperature 5. Color Rendering Index 6. Chromaticity Coordinate 7. Electrical Parameters |
| Reference Standard | <ol style="list-style-type: none"> 1. IES LM-79-2008 Electrical and Photometric Measurements of Solid-State Lighting Products 2. ANSI C78.377-2008 Specifications for the Chromaticity of Solid State Lighting Products 3. CIE 13.3-1995 Method of Measuring and Specifying Colour Rendering Properties of Light Sources 4. CIE 15-2004 Technical Report Colorimetry 5. IESNA LM-16-93 Practical Guide to Colorimetry of Light Source 6. IESNA TM-16-05 Technical Memorandum on Light Emitting Diode (LED) Sources and Systems |
| Reference Work Instruction | BL-QP-033 |

1.3 Test Methods**1) Photometric and Light Distribution Measurement – Goniophotometer Method:**

Photometric parameters were measured using the goniophotometer and software. The ambient temperature shall be maintained at $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$, measured at a point not more than 1 m from the sample and at the same height as the sample. The sample was operated at 120 or rated Volts AC, 60Hz. It was stabilized before measurement was made. Luminous flux, luminaire efficacy, zonal lumen were calculated from the software taken at 1° vertical intervals and 22.5° horizontal intervals.

2) Chromaticity Measurement – Sphere-Spectroradiometer Method:

Chromaticity parameters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$. The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere. The sample was operated at 120 or rated Volts AC, 60Hz. It was stabilized before measurement was made. Chromaticity coordinates, correlated color temperature and color rendering index were calculated from the spectral power distribution taken at 5 nm intervals over the range of 380 to 780 nm.

3) Electrical Measurements:

Electrical parameters were measured using power meters incorporated in goniophotometer or sphere-spectroradiometer system. The ambient temperature surrounding the sample was maintained at $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$. The sample was operated at 120 or rated Volts AC, 60Hz. It was stabilized before measurement was made. Voltage, frequency, current, power, power factor and total harmonic distortion were measured by and read from the power meter.

**2.1 Electrical, Photometric and Chromaticity Measurements***(Refer to Work Instruction BL-QP-033)*

| | | | |
|-------------------------|------------------------------|---------------------------------|----------|
| Test date | 2019-11-06 | Test Ambient: | 25.2 ° C |
| Test Orientation | As intended | Stabilization Time (min) | 90 |
| Model Number | AST-SP01B-1200WSCS4H1-acde40 | | |

Electrical Measurement:

| Sample No. | Voltage (Vac) | Frequency (Hz) | Current (A) | Power (W) | Power Factor | THD % |
|--------------------------|---------------|----------------|-------------|-----------|-----------------------|---------------------|
| BLC191003 | 277.0 | 60 | 4.1276 | 1134.21 | 0.992 | 5.27 |
| 7E-D1 | 480.0 | 60 | 2.5192 | 1123.36 | 0.929 | 13.53 |
| DLC Pass Criteria | | | | | >= 0.9(-3%) | <= 20(+5) |

Chromaticity Measurement - Sphere-Spectroradiometer Method:

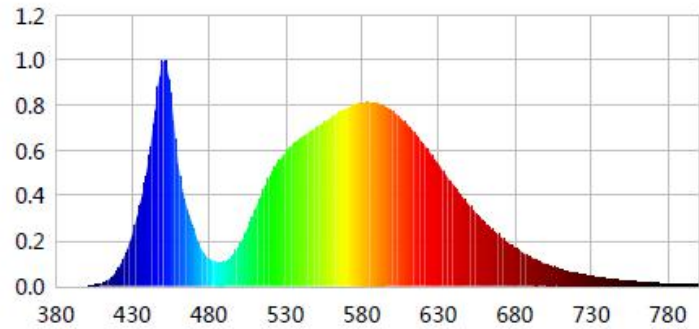
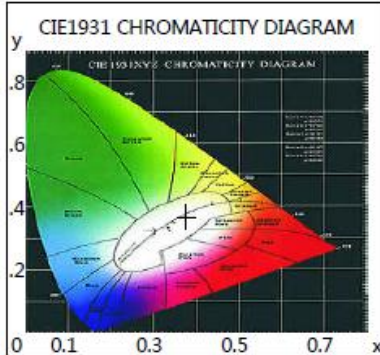
| Parameter | Result | Special Color Rendering Indices | | | |
|-----------------------------|----------------------------|---------------------------------|----|-----|----|
| Test Voltage (V) | 277.0 | R1 | 71 | R9 | 0 |
| Frequency (Hz) | 60 | R2 | 80 | R10 | 50 |
| CCT (K) | 4050 | R3 | 84 | R11 | 66 |
| Duv | -0.00218 | R4 | 72 | R12 | 41 |
| Chromaticity (x, y) | x=0.3768 y=0.3699 | R5 | 70 | R13 | 72 |
| Chromaticity (u', v') | u(u')=0.2255 v'(v')=0.4980 | R6 | 70 | R14 | 91 |
| Color Rendering Index (CRI) | 73.2 | R7 | 82 | R15 | 67 |
| R9 | 0 | R8 | 56 | -- | -- |

Photometric Measurement – Goniophotometer Method:

| Parameter | Result | | DLC V4.4 Pass Criteria |
|------------------------------------|----------|----------|------------------------|
| Test Voltage (V) | 277.0 | 480.0 | -- |
| Frequency (Hz) | 60 | 60 | |
| Total Luminous (lm) | 143869.9 | 143428.9 | >=30000(-10%) |
| Luminous Efficacy (lm/W) | 126.85 | 127.68 | Premium: >= 120(-3%) |
| Most worst Luminous/Highest | 126.46 | | |
| Zonal lumens in the 0-90° zone (%) | 99.4 | -- | >=85(-3) |
| Beam Angle (°) | 38.6 | -- | -- |
| Center Beam Candle Power (cd) | 224467 | -- | -- |



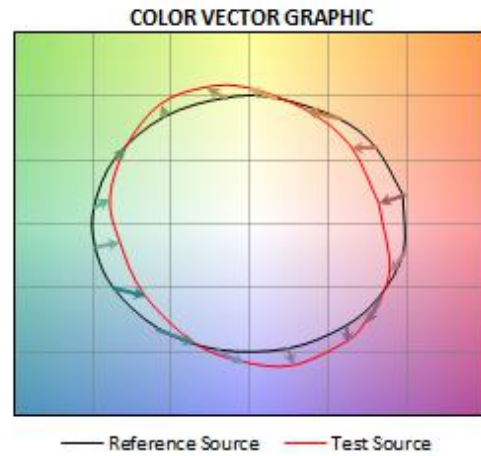
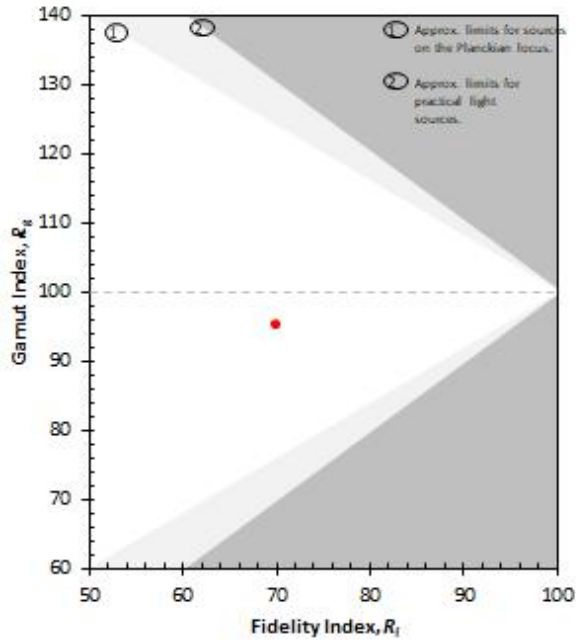
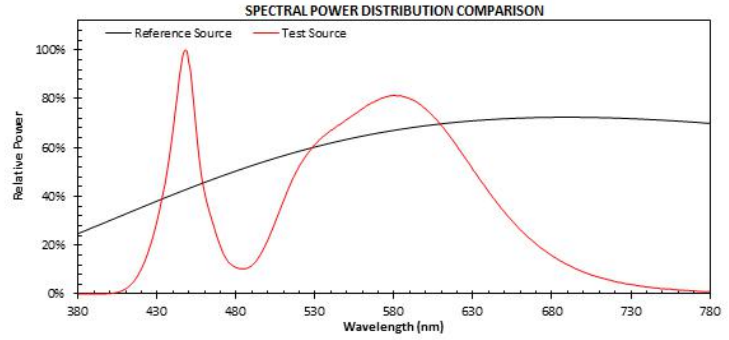
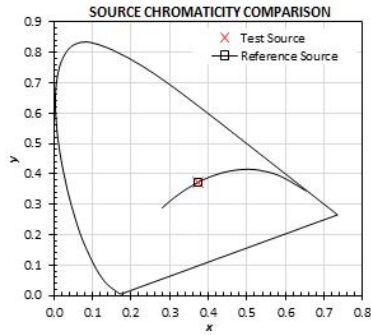
Spectral Power Distribution & Chromaticity Diagram

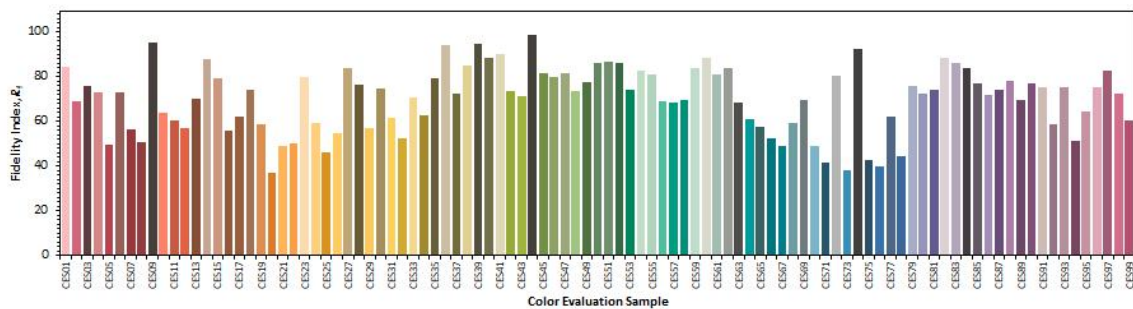
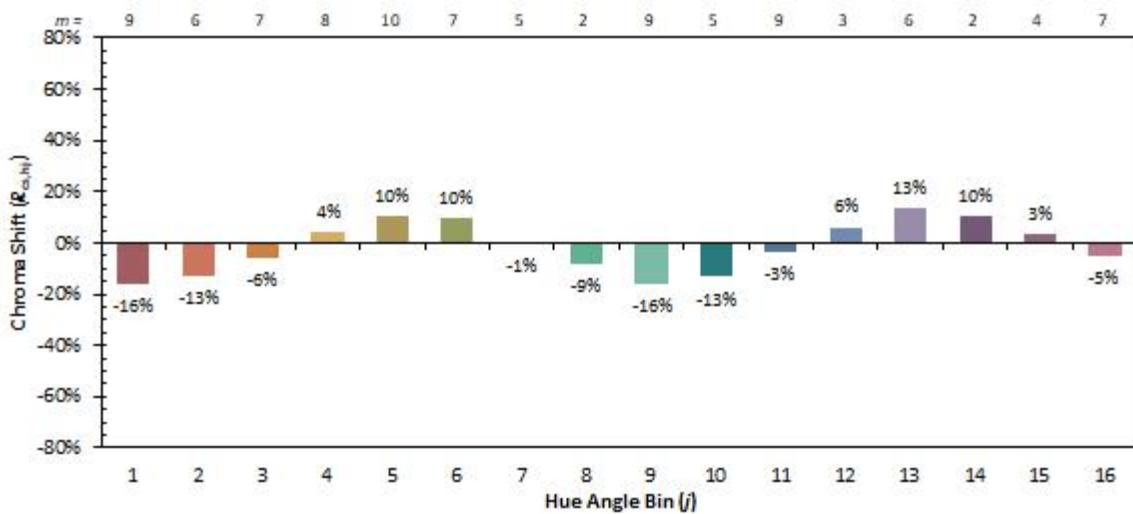
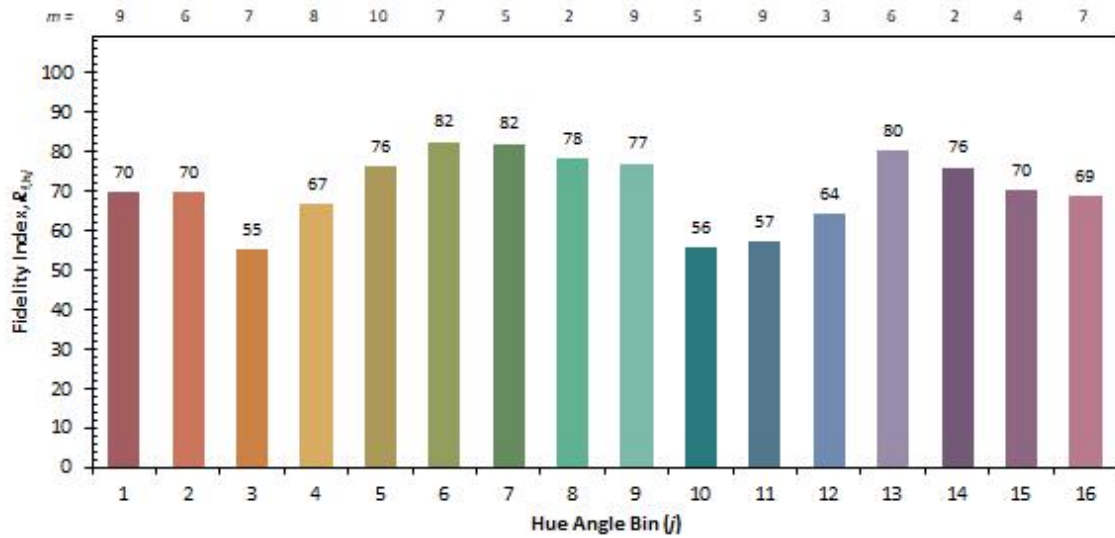


| WL(nm) | PL | PE(mW/nm) | WL(nm) | PL | PE(mW/nm) | WL(nm) | PL | PE(mW/nm) |
|--------|--------|-----------|--------|--------|-----------|--------|--------|-----------|
| 380 | 0.0005 | 1.1182 | 525 | 0.5448 | 1218.2081 | 670 | 0.2217 | 495.6527 |
| 385 | 0.0006 | 1.2844 | 530 | 0.5896 | 1318.4884 | 675 | 0.1945 | 434.8169 |
| 390 | 0.0004 | 0.8006 | 535 | 0.6270 | 1402.0792 | 680 | 0.1704 | 381.0076 |
| 395 | 0.0003 | 0.7796 | 540 | 0.6554 | 1465.5671 | 685 | 0.1499 | 335.2003 |
| 400 | 0.0011 | 2.3602 | 545 | 0.6787 | 1517.5868 | 690 | 0.1307 | 292.3549 |
| 405 | 0.0038 | 8.4434 | 550 | 0.7001 | 1565.4256 | 695 | 0.1139 | 254.7615 |
| 410 | 0.0115 | 25.6628 | 555 | 0.7240 | 1619.0593 | 700 | 0.0983 | 219.8593 |
| 415 | 0.0310 | 69.3513 | 560 | 0.7446 | 1665.0573 | 705 | 0.0854 | 190.8837 |
| 420 | 0.0682 | 152.4324 | 565 | 0.7687 | 1719.0059 | 710 | 0.0745 | 166.6473 |
| 425 | 0.1319 | 294.9197 | 570 | 0.7857 | 1757.0201 | 715 | 0.0650 | 145.2859 |
| 430 | 0.2271 | 507.8507 | 575 | 0.8023 | 1793.9415 | 720 | 0.0575 | 128.5612 |
| 435 | 0.3593 | 803.4606 | 580 | 0.8118 | 1815.2163 | 725 | 0.0484 | 108.2947 |
| 440 | 0.5323 | 1190.3486 | 585 | 0.8105 | 1812.3766 | 730 | 0.0418 | 93.5562 |
| 445 | 0.7761 | 1735.5744 | 590 | 0.8077 | 1806.0706 | 735 | 0.0372 | 83.1385 |
| 450 | 0.9930 | 2220.4742 | 595 | 0.7953 | 1778.4714 | 740 | 0.0320 | 71.5271 |
| 455 | 0.8575 | 1917.5112 | 600 | 0.7764 | 1736.0373 | 745 | 0.0278 | 62.2425 |
| 460 | 0.5359 | 1198.3621 | 605 | 0.7469 | 1670.0566 | 750 | 0.0248 | 55.3750 |
| 465 | 0.3620 | 809.4621 | 610 | 0.7150 | 1598.8811 | 755 | 0.0209 | 46.8180 |
| 470 | 0.2533 | 566.3859 | 615 | 0.6764 | 1512.4533 | 760 | 0.0175 | 39.1038 |
| 475 | 0.1647 | 368.3580 | 620 | 0.6326 | 1414.6309 | 765 | 0.0155 | 34.6995 |
| 480 | 0.1206 | 269.6938 | 625 | 0.5869 | 1312.4243 | 770 | 0.0143 | 31.9498 |
| 485 | 0.1045 | 233.6139 | 630 | 0.5404 | 1208.3672 | 775 | 0.0115 | 25.7757 |
| 490 | 0.1059 | 236.8272 | 635 | 0.4925 | 1101.2526 | 780 | 0.0103 | 22.9643 |
| 495 | 0.1298 | 290.2699 | 640 | 0.4475 | 1000.7054 | 785 | 0.0083 | 18.4655 |
| 500 | 0.1803 | 403.2699 | 645 | 0.4007 | 896.0065 | 790 | 0.0075 | 16.7639 |
| 505 | 0.2510 | 561.2262 | 650 | 0.3594 | 803.6623 | 795 | 0.0073 | 16.2349 |
| 510 | 0.3321 | 742.7080 | 655 | 0.3203 | 716.1378 | 800 | 0.0061 | 13.5768 |
| 515 | 0.4142 | 926.2280 | 660 | 0.2845 | 636.2882 | | | |
| 520 | 0.4859 | 1086.6330 | 665 | 0.2508 | 560.7339 | | | |



TM30







Zonal Lumen Tabulation

Zonal Lumen Summary

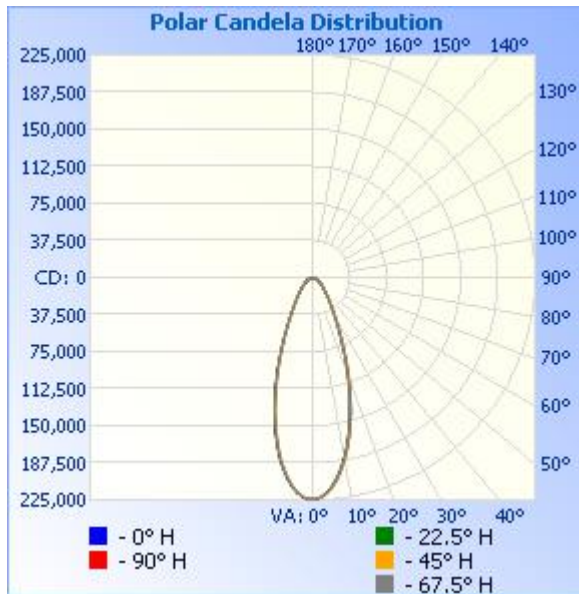
| Zone | Lumens | % Lamp | % Luminaire |
|--------|-----------|--------|-------------|
| 0-30 | 91,803.4 | 63.8% | 63.8% |
| 0-40 | 111,252.0 | 77.3% | 77.4% |
| 0-60 | 132,290.3 | 92% | 92% |
| 60-90 | 10,656.3 | 7.4% | 7.4% |
| 70-100 | 4,946.3 | 3.4% | 3.4% |
| 90-120 | 366.7 | 0.3% | 0.3% |
| 0-90 | 142,946.6 | 99.4% | 99.4% |
| 90-180 | 872.1 | 0.6% | 0.6% |
| 0-180 | 143,818.7 | 100% | 100% |

Lumens Per Zone

| Zone | Lumens | % Total | Zone | Lumens | % Total |
|-------|----------|---------|---------|--------|---------|
| 0-10 | 19,532.0 | 13.6% | 90-100 | 169.0 | 0.1% |
| 10-20 | 40,344.1 | 28.1% | 100-110 | 99.4 | 0.1% |
| 20-30 | 31,927.4 | 22.2% | 110-120 | 98.2 | 0.1% |
| 30-40 | 19,448.6 | 13.5% | 120-130 | 89.6 | 0.1% |
| 40-50 | 12,509.1 | 8.7% | 130-140 | 94.2 | 0.1% |
| 50-60 | 8,529.3 | 5.9% | 140-150 | 105.5 | 0.1% |
| 60-70 | 5,879.1 | 4.1% | 150-160 | 106.9 | 0.1% |
| 70-80 | 3,586.7 | 2.5% | 160-170 | 79.6 | 0.1% |
| 80-90 | 1,190.5 | 0.8% | 170-180 | 29.5 | 0% |

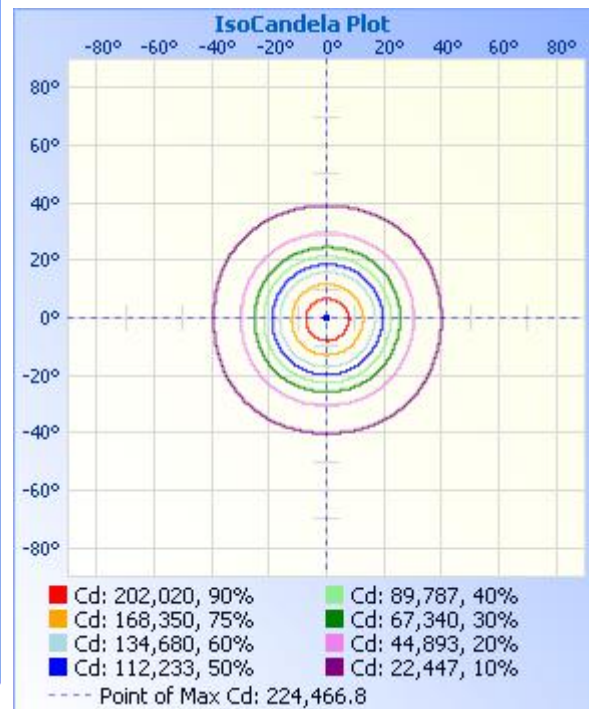
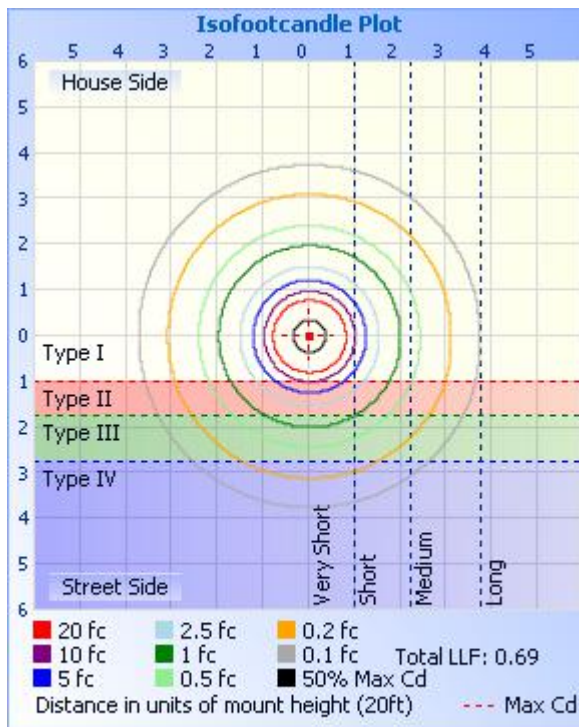


Photometric Data



| Height | Center Beam fc | Beam Width |
|---------|----------------|-----------------|
| 17.0ft | 777 fc | 11.8 ft 11.9 ft |
| 34.0ft | 194 fc | 23.5 ft 23.8 ft |
| 51.0ft | 86.3 fc | 35.3 ft 35.8 ft |
| 68.0ft | 48.5 fc | 47.1 ft 47.7 ft |
| 85.0ft | 31.1 fc | 58.9 ft 59.6 ft |
| 102.0ft | 21.6 fc | 70.6 ft 71.5 ft |

■ Vert. Spread: 38.2°
■ Horiz. Spread: 38.6°





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Candela Table - Type C

| | 0 | 22.5 | 45 | 67.5 | 90 | 112.5 | 135 | 157.5 | 180 | 202.5 | 225 | 247.5 | 270 | 292.5 | 315 | 337.5 | 360 |
|----|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0 | 224467 | 224467 | 224467 | 224467 | 224467 | 224467 | 224467 | 224467 | 224467 | 224467 | 224467 | 224467 | 224467 | 224467 | 224467 | 224467 | 224467 |
| 1 | 223830 | 223917 | 223985 | 224073 | 224005 | 224161 | 224142 | 224255 | 224205 | 224167 | 223991 | 223897 | 224086 | 223911 | 223843 | 223768 | 223830 |
| 2 | 222387 | 222472 | 222684 | 222940 | 222776 | 223049 | 223025 | 223274 | 223112 | 223016 | 222721 | 222565 | 222920 | 222599 | 222451 | 222232 | 222387 |
| 3 | 220095 | 220015 | 220644 | 221020 | 220792 | 221156 | 221122 | 221452 | 221150 | 221034 | 220707 | 220444 | 220998 | 220443 | 220229 | 219854 | 220095 |
| 4 | 217054 | 216951 | 217823 | 218254 | 217698 | 218469 | 218419 | 218455 | 218434 | 218220 | 217792 | 217510 | 218309 | 217538 | 217258 | 216770 | 217054 |
| 5 | 213269 | 213156 | 214213 | 214770 | 214104 | 214677 | 214999 | 214997 | 214918 | 214688 | 214157 | 213794 | 214909 | 213958 | 213601 | 212974 | 213269 |
| 6 | 208316 | 208691 | 209471 | 210084 | 209918 | 210578 | 210436 | 210814 | 210315 | 210479 | 209909 | 209458 | 210804 | 209679 | 208701 | 208461 | 208316 |
| 7 | 203201 | 203595 | 204529 | 205223 | 205121 | 205824 | 205706 | 206057 | 205524 | 205190 | 204541 | 204003 | 205620 | 204337 | 203721 | 202867 | 203201 |
| 8 | 197430 | 197855 | 198880 | 199605 | 199107 | 200413 | 200288 | 200083 | 200047 | 199706 | 198942 | 198385 | 200130 | 198645 | 198004 | 197030 | 197430 |
| 9 | 191054 | 191571 | 192711 | 193467 | 193118 | 194509 | 194384 | 194090 | 194052 | 193591 | 192792 | 192147 | 194072 | 192535 | 191819 | 190682 | 191054 |
| 10 | 184415 | 184212 | 186124 | 187011 | 186617 | 187456 | 187918 | 187598 | 187500 | 186975 | 186186 | 185497 | 187696 | 186006 | 185172 | 184039 | 184415 |
| 11 | 177264 | 177046 | 178372 | 180073 | 179548 | 180427 | 180903 | 180531 | 180387 | 179835 | 178948 | 178183 | 180734 | 178977 | 178094 | 176885 | 177264 |
| 12 | 169207 | 169705 | 171084 | 172140 | 172343 | 173217 | 172976 | 173208 | 172336 | 172457 | 171478 | 169950 | 173591 | 171724 | 170080 | 169588 | 169207 |
| 13 | 161488 | 162096 | 163364 | 164526 | 164794 | 165651 | 165406 | 165692 | 164717 | 163990 | 162957 | 162186 | 165287 | 163371 | 162354 | 161160 | 161488 |
| 14 | 153363 | 153911 | 155262 | 156430 | 156197 | 157835 | 157642 | 157102 | 156879 | 156043 | 154925 | 154166 | 157227 | 155249 | 154321 | 153063 | 153363 |
| 15 | 145194 | 145601 | 147011 | 148216 | 148848 | 149657 | 149484 | 149761 | 148660 | 147752 | 146598 | 145795 | 149054 | 147008 | 146176 | 144867 | 145194 |
| 16 | 136918 | 136566 | 138715 | 139864 | 140688 | 140667 | 141364 | 140803 | 140453 | 139555 | 138302 | 137493 | 140781 | 138849 | 137819 | 136627 | 136918 |
| 17 | 128443 | 128087 | 130182 | 131374 | 131430 | 132263 | 132065 | 132325 | 131185 | 130957 | 129769 | 128922 | 132266 | 130339 | 129375 | 128180 | 128443 |
| 18 | 120231 | 119784 | 121048 | 122290 | 123089 | 123917 | 123708 | 123941 | 122835 | 122572 | 120529 | 119700 | 123993 | 122030 | 121080 | 119965 | 120231 |
| 19 | 111206 | 111693 | 112809 | 114032 | 114810 | 115613 | 115432 | 115639 | 114485 | 113406 | 112190 | 111367 | 114835 | 113002 | 111931 | 111172 | 111206 |
| 20 | 103087 | 103595 | 104632 | 105937 | 106706 | 106723 | 107318 | 106712 | 106435 | 105352 | 104151 | 103365 | 106581 | 104730 | 103780 | 102773 | 103087 |
| 21 | 95255 | 95611 | 96762 | 97966 | 98689 | 98607 | 99180 | 98546 | 98340 | 97318 | 96137 | 95351 | 98589 | 96677 | 95785 | 94932 | 95255 |
| 22 | 87761 | 87432 | 89205 | 90409 | 90261 | 90948 | 91478 | 90918 | 90659 | 89689 | 88573 | 87819 | 90897 | 89111 | 88320 | 87484 | 87761 |
| 23 | 80603 | 80516 | 81329 | 82463 | 82843 | 83469 | 83271 | 83439 | 82552 | 82317 | 81272 | 80549 | 83523 | 82007 | 81036 | 80324 | 80603 |
| 24 | 73378 | 73763 | 74703 | 75825 | 76149 | 76797 | 76630 | 76703 | 75907 | 75627 | 73971 | 73304 | 76112 | 75103 | 73753 | 73757 | 73378 |
| 25 | 67220 | 67517 | 68460 | 69463 | 69767 | 70286 | 70146 | 70292 | 69580 | 68774 | 67859 | 67242 | 69555 | 68675 | 67512 | 67527 | 67220 |
| 26 | 61605 | 61840 | 62754 | 63657 | 63397 | 63914 | 64354 | 63931 | 63847 | 63096 | 62323 | 61724 | 63647 | 62833 | 61807 | 61334 | 61605 |
| 27 | 56452 | 56687 | 57574 | 58383 | 58101 | 58591 | 58437 | 58537 | 58001 | 57875 | 57155 | 56656 | 58331 | 57497 | 56671 | 56184 | 56452 |
| 28 | 51893 | 52079 | 52494 | 53265 | 53328 | 53730 | 53625 | 53712 | 53248 | 53142 | 52519 | 52064 | 53578 | 52381 | 52002 | 51645 | 51893 |
| 29 | 47328 | 47702 | 48315 | 49036 | 48892 | 49294 | 49212 | 49317 | 48908 | 48853 | 47890 | 47466 | 49235 | 48282 | 47471 | 47556 | 47328 |



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|----|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 30 | 43662 | 44188 | 44618 | 45201 | 45062 | 45383 | 45293 | 45409 | 45036 | 44644 | 44168 | 43825 | 44987 | 44259 | 43739 | 43767 | 43662 |
| 31 | 40352 | 40737 | 41284 | 41829 | 41612 | 41903 | 41841 | 41907 | 41626 | 41287 | 40877 | 40572 | 41556 | 41079 | 40431 | 40146 | 40352 |
| 32 | 37366 | 37623 | 38231 | 38789 | 38280 | 38542 | 38465 | 38542 | 38547 | 38298 | 37949 | 37644 | 38436 | 37930 | 37423 | 37181 | 37366 |
| 33 | 34643 | 35072 | 35459 | 35967 | 35485 | 35712 | 35663 | 35708 | 35474 | 35553 | 35253 | 34985 | 35641 | 35050 | 34726 | 34516 | 34643 |
| 34 | 32220 | 32583 | 32969 | 33439 | 33027 | 33238 | 33197 | 33242 | 33038 | 33089 | 32832 | 32395 | 33146 | 32569 | 32305 | 32100 | 32220 |
| 35 | 29884 | 30307 | 30555 | 31031 | 30744 | 30964 | 30900 | 30982 | 30771 | 30620 | 30392 | 30199 | 30757 | 30301 | 29933 | 29977 | 29884 |
| 36 | 27867 | 28281 | 28590 | 29016 | 28717 | 28902 | 28835 | 28704 | 28710 | 28625 | 28421 | 28234 | 28660 | 28296 | 27923 | 27830 | 27867 |
| 37 | 26150 | 26424 | 26644 | 27046 | 26639 | 26803 | 26968 | 26843 | 26874 | 26749 | 26594 | 26407 | 26895 | 26428 | 26032 | 26144 | 26150 |
| 38 | 24395 | 24617 | 25043 | 25413 | 24980 | 25109 | 25096 | 25102 | 24969 | 25061 | 24887 | 24624 | 25092 | 24766 | 24353 | 24371 | 24395 |
| 39 | 22746 | 23123 | 23366 | 23724 | 23364 | 23504 | 23517 | 23504 | 23414 | 23492 | 23204 | 23048 | 23432 | 23073 | 22762 | 22767 | 22746 |
| 40 | 21291 | 21622 | 21815 | 22160 | 21910 | 22029 | 22032 | 22068 | 21953 | 21872 | 21721 | 21621 | 21891 | 21704 | 21476 | 21387 | 21291 |
| 41 | 19998 | 20309 | 20464 | 20783 | 20550 | 20642 | 20646 | 20669 | 20585 | 20503 | 20413 | 20320 | 20538 | 20274 | 20016 | 19976 | 19998 |
| 42 | 18824 | 19015 | 19300 | 19601 | 19184 | 19393 | 19392 | 19277 | 19367 | 19290 | 19194 | 19106 | 19365 | 19099 | 18874 | 18803 | 18824 |
| 43 | 17631 | 17914 | 18080 | 18381 | 18042 | 18125 | 18125 | 18160 | 18074 | 18164 | 18036 | 17993 | 18111 | 18000 | 17694 | 17760 | 17631 |
| 44 | 16613 | 16876 | 17041 | 17317 | 17025 | 17094 | 17101 | 17111 | 17044 | 16995 | 16935 | 16873 | 17044 | 16956 | 16683 | 16605 | 16613 |
| 45 | 15695 | 15851 | 15997 | 16310 | 16033 | 16094 | 16090 | 16125 | 16044 | 16038 | 15953 | 15910 | 16052 | 15907 | 15659 | 15682 | 15695 |
| 46 | 14695 | 14944 | 15052 | 15303 | 15048 | 15101 | 15185 | 15132 | 15164 | 15138 | 15083 | 15052 | 15166 | 14982 | 14767 | 14814 | 14695 |
| 47 | 13965 | 14131 | 14289 | 14546 | 14237 | 14238 | 14336 | 14271 | 14346 | 14287 | 14239 | 14220 | 14336 | 14164 | 13937 | 13996 | 13965 |
| 48 | 13209 | 13456 | 13507 | 13764 | 13469 | 13470 | 13512 | 13522 | 13496 | 13550 | 13494 | 13463 | 13582 | 13433 | 13244 | 13203 | 13209 |
| 49 | 12497 | 12712 | 12787 | 12982 | 12752 | 12795 | 12801 | 12822 | 12784 | 12793 | 12725 | 12713 | 12883 | 12745 | 12545 | 12573 | 12497 |
| 50 | 11898 | 12112 | 12149 | 12369 | 12059 | 12164 | 12133 | 12098 | 12166 | 12168 | 12118 | 12081 | 12184 | 12064 | 11933 | 11886 | 11898 |
| 51 | 11279 | 11461 | 11492 | 11718 | 11473 | 11496 | 11571 | 11499 | 11567 | 11599 | 11542 | 11505 | 11566 | 11452 | 11303 | 11349 | 11279 |
| 52 | 10661 | 10911 | 10917 | 11174 | 10886 | 10902 | 10953 | 10968 | 10961 | 10999 | 10967 | 10948 | 11005 | 10877 | 10735 | 10794 | 10661 |
| 53 | 10249 | 10386 | 10379 | 10661 | 10394 | 10402 | 10398 | 10419 | 10461 | 10498 | 10423 | 10404 | 10512 | 10377 | 10254 | 10244 | 10249 |
| 54 | 9755 | 9879 | 9916 | 10166 | 9888 | 9909 | 9924 | 9938 | 9911 | 10004 | 9903 | 9941 | 9976 | 9909 | 9786 | 9788 | 9755 |
| 55 | 9318 | 9485 | 9484 | 9641 | 9383 | 9403 | 9474 | 9464 | 9481 | 9523 | 9459 | 9459 | 9464 | 9403 | 9262 | 9302 | 9318 |
| 56 | 8875 | 8985 | 9002 | 9222 | 8965 | 8972 | 8994 | 9008 | 9025 | 9079 | 9027 | 9053 | 9083 | 8978 | 8894 | 8896 | 8875 |
| 57 | 8450 | 8598 | 8608 | 8790 | 8559 | 8566 | 8582 | 8615 | 8619 | 8679 | 8602 | 8615 | 8641 | 8534 | 8463 | 8440 | 8450 |
| 58 | 8082 | 8160 | 8220 | 8390 | 8191 | 8203 | 8182 | 8197 | 8231 | 8279 | 8214 | 8246 | 8248 | 8166 | 8057 | 8072 | 8082 |
| 59 | 7701 | 7828 | 7826 | 8027 | 7823 | 7785 | 7839 | 7859 | 7850 | 7897 | 7858 | 7858 | 7823 | 7803 | 7714 | 7710 | 7701 |
| 60 | 7388 | 7466 | 7501 | 7651 | 7405 | 7416 | 7496 | 7535 | 7476 | 7497 | 7495 | 7501 | 7524 | 7410 | 7383 | 7360 | 7388 |
| 61 | 7001 | 7153 | 7144 | 7326 | 7087 | 7129 | 7115 | 7142 | 7182 | 7172 | 7138 | 7182 | 7137 | 7122 | 7040 | 7017 | 7001 |



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| | | | | | | | | | | | | | | | | | |
|----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 62 | 6739 | 6797 | 6800 | 6976 | 6744 | 6766 | 6790 | 6786 | 6826 | 6859 | 6825 | 6826 | 6844 | 6766 | 6716 | 6711 | 6739 |
| 63 | 6383 | 6490 | 6550 | 6675 | 6413 | 6454 | 6522 | 6511 | 6533 | 6509 | 6513 | 6544 | 6482 | 6454 | 6397 | 6368 | 6383 |
| 64 | 6114 | 6171 | 6193 | 6356 | 6158 | 6166 | 6235 | 6236 | 6220 | 6246 | 6225 | 6250 | 6170 | 6129 | 6098 | 6099 | 6114 |
| 65 | 5802 | 5940 | 5943 | 6062 | 5833 | 5885 | 5917 | 5912 | 5946 | 5965 | 5924 | 5962 | 5864 | 5842 | 5861 | 5824 | 5802 |
| 66 | 5558 | 5621 | 5662 | 5825 | 5552 | 5560 | 5655 | 5650 | 5683 | 5659 | 5624 | 5662 | 5596 | 5567 | 5524 | 5568 | 5558 |
| 67 | 5290 | 5390 | 5380 | 5530 | 5240 | 5336 | 5349 | 5344 | 5359 | 5396 | 5343 | 5387 | 5309 | 5286 | 5293 | 5300 | 5290 |
| 68 | 5028 | 5115 | 5124 | 5255 | 5010 | 5061 | 5112 | 5094 | 5103 | 5140 | 5124 | 5124 | 5041 | 5029 | 5049 | 5019 | 5028 |
| 69 | 4765 | 4833 | 4861 | 4974 | 4748 | 4773 | 4849 | 4857 | 4859 | 4858 | 4855 | 4892 | 4791 | 4773 | 4800 | 4813 | 4765 |
| 70 | 4522 | 4577 | 4579 | 4736 | 4486 | 4523 | 4581 | 4588 | 4634 | 4627 | 4611 | 4623 | 4542 | 4511 | 4487 | 4507 | 4522 |
| 71 | 4278 | 4339 | 4385 | 4530 | 4261 | 4292 | 4344 | 4357 | 4372 | 4346 | 4342 | 4361 | 4305 | 4286 | 4263 | 4276 | 4278 |
| 72 | 4010 | 4108 | 4098 | 4235 | 3993 | 4067 | 4094 | 4101 | 4091 | 4114 | 4116 | 4079 | 4024 | 4061 | 4038 | 4039 | 4010 |
| 73 | 3841 | 3808 | 3872 | 3998 | 3718 | 3830 | 3913 | 3870 | 3878 | 3883 | 3872 | 3904 | 3793 | 3811 | 3832 | 3827 | 3841 |
| 74 | 3554 | 3633 | 3641 | 3747 | 3506 | 3561 | 3614 | 3633 | 3635 | 3652 | 3641 | 3622 | 3550 | 3555 | 3582 | 3565 | 3554 |
| 75 | 3341 | 3426 | 3453 | 3510 | 3306 | 3374 | 3408 | 3458 | 3429 | 3426 | 3403 | 3428 | 3350 | 3330 | 3364 | 3365 | 3341 |
| 76 | 3123 | 3195 | 3209 | 3310 | 3082 | 3136 | 3214 | 3227 | 3141 | 3208 | 3197 | 3178 | 3119 | 3124 | 3177 | 3121 | 3123 |
| 77 | 2910 | 2989 | 2990 | 3078 | 2839 | 2899 | 3015 | 3003 | 2948 | 2989 | 2959 | 2984 | 2888 | 2905 | 2971 | 2884 | 2910 |
| 78 | 2667 | 2745 | 2784 | 2865 | 2564 | 2630 | 2759 | 2716 | 2754 | 2732 | 2746 | 2740 | 2683 | 2643 | 2678 | 2691 | 2667 |
| 79 | 2398 | 2507 | 2521 | 2609 | 2383 | 2412 | 2484 | 2516 | 2461 | 2539 | 2496 | 2465 | 2439 | 2449 | 2472 | 2416 | 2398 |
| 80 | 2223 | 2263 | 2246 | 2377 | 2121 | 2199 | 2278 | 2341 | 2255 | 2301 | 2221 | 2284 | 2190 | 2168 | 2184 | 2210 | 2223 |
| 81 | 1949 | 2032 | 2077 | 2127 | 1872 | 1974 | 2041 | 2091 | 2017 | 2070 | 2002 | 2046 | 1940 | 1981 | 1960 | 2016 | 1949 |
| 82 | 1686 | 1770 | 1795 | 1927 | 1610 | 1749 | 1785 | 1798 | 1780 | 1801 | 1783 | 1846 | 1672 | 1718 | 1735 | 1754 | 1686 |
| 83 | 1461 | 1538 | 1520 | 1645 | 1422 | 1506 | 1579 | 1567 | 1561 | 1576 | 1495 | 1589 | 1454 | 1487 | 1498 | 1504 | 1461 |
| 84 | 1237 | 1294 | 1308 | 1426 | 1154 | 1237 | 1304 | 1323 | 1280 | 1307 | 1257 | 1270 | 1223 | 1212 | 1279 | 1267 | 1237 |
| 85 | 962 | 1057 | 1039 | 1157 | 917 | 993 | 1092 | 1142 | 1080 | 1082 | 1051 | 1082 | 1017 | 993 | 1017 | 1061 | 962 |
| 86 | 806 | 838 | 826 | 932 | 680 | 818 | 849 | 843 | 837 | 888 | 788 | 857 | 749 | 756 | 786 | 818 | 806 |
| 87 | 581 | 556 | 588 | 719 | 455 | 537 | 674 | 649 | 618 | 619 | 594 | 626 | 455 | 506 | 562 | 587 | 581 |
| 88 | 418 | 450 | 388 | 519 | 299 | 431 | 456 | 437 | 443 | 463 | 394 | 444 | 368 | 344 | 406 | 387 | 418 |
| 89 | 237 | 294 | 300 | 344 | 225 | 231 | 350 | 318 | 294 | 331 | 269 | 338 | 206 | 137 | 281 | 300 | 237 |
| 90 | 219 | 231 | 163 | 288 | 137 | 131 | 225 | 225 | 237 | 150 | 219 | 225 | 156 | 194 | 200 | 262 | 219 |
| 91 | 212 | 238 | 194 | 288 | 106 | 156 | 231 | 200 | 231 | 219 | 194 | 250 | 143 | 206 | 250 | 243 | 212 |
| 92 | 187 | 194 | 163 | 256 | 119 | 156 | 225 | 206 | 212 | 244 | 194 | 225 | 112 | 175 | 206 | 218 | 187 |
| 93 | 244 | 244 | 206 | 244 | 75 | 106 | 181 | 200 | 106 | 206 | 188 | 231 | 100 | 162 | 206 | 212 | 244 |



Report No.: BLC1910037E-D

| | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 94 | 169 | 206 | 175 | 188 | 94 | 81 | 175 | 137 | 169 | 175 | 169 | 206 | 106 | 144 | 137 | 212 | 169 |
| 95 | 181 | 169 | 113 | 231 | 69 | 75 | 156 | 150 | 169 | 194 | 138 | 238 | 100 | 112 | 193 | 200 | 181 |
| 96 | 156 | 163 | 131 | 219 | 81 | 87 | 144 | 150 | 144 | 144 | 113 | 194 | 69 | 125 | 175 | 181 | 156 |
| 97 | 125 | 156 | 144 | 200 | 62 | 106 | 144 | 87 | 150 | 169 | 119 | 213 | 0 | 81 | 162 | 175 | 125 |
| 98 | 106 | 144 | 119 | 200 | 0 | 75 | 106 | 150 | 144 | 163 | 138 | 194 | 0 | 119 | 169 | 106 | 106 |
| 99 | 106 | 150 | 81 | 150 | 0 | 69 | 112 | 144 | 112 | 138 | 75 | 194 | 0 | 0 | 150 | 131 | 106 |
| 100 | 112 | 150 | 100 | 213 | 0 | 0 | 131 | 94 | 119 | 156 | 94 | 156 | 0 | 0 | 137 | 181 | 112 |
| 101 | 94 | 113 | 75 | 181 | 0 | 0 | 112 | 106 | 81 | 106 | 100 | 138 | 69 | 81 | 131 | 156 | 94 |
| 102 | 137 | 144 | 106 | 181 | 0 | 0 | 100 | 112 | 81 | 125 | 81 | 150 | 0 | 62 | 125 | 119 | 137 |
| 103 | 87 | 125 | 94 | 181 | 0 | 0 | 125 | 125 | 81 | 113 | 94 | 156 | 0 | 69 | 100 | 162 | 87 |
| 104 | 119 | 131 | 131 | 194 | 0 | 0 | 75 | 94 | 112 | 119 | 0 | 156 | 0 | 69 | 94 | 112 | 119 |
| 105 | 106 | 144 | 113 | 188 | 0 | 0 | 112 | 119 | 100 | 106 | 94 | 188 | 0 | 0 | 112 | 162 | 106 |
| 106 | 131 | 144 | 106 | 181 | 0 | 0 | 131 | 119 | 100 | 144 | 119 | 131 | 0 | 0 | 125 | 125 | 131 |
| 107 | 81 | 150 | 81 | 125 | 0 | 0 | 0 | 100 | 112 | 88 | 100 | 194 | 0 | 0 | 125 | 131 | 81 |
| 108 | 112 | 113 | 119 | 156 | 0 | 0 | 100 | 100 | 87 | 94 | 106 | 169 | 62 | 75 | 119 | 131 | 112 |
| 109 | 100 | 119 | 106 | 138 | 0 | 75 | 106 | 87 | 125 | 94 | 100 | 181 | 0 | 94 | 75 | 125 | 100 |
| 110 | 106 | 138 | 131 | 175 | 0 | 0 | 106 | 106 | 106 | 144 | 94 | 169 | 0 | 0 | 125 | 131 | 106 |
| 111 | 119 | 81 | 100 | 181 | 0 | 0 | 87 | 125 | 112 | 125 | 100 | 188 | 0 | 106 | 131 | 144 | 119 |
| 112 | 119 | 169 | 113 | 188 | 0 | 62 | 125 | 125 | 106 | 156 | 94 | 163 | 0 | 81 | 131 | 100 | 119 |
| 113 | 100 | 125 | 94 | 163 | 0 | 0 | 100 | 119 | 94 | 106 | 138 | 125 | 75 | 87 | 125 | 131 | 100 |
| 114 | 131 | 138 | 113 | 181 | 0 | 0 | 100 | 81 | 112 | 100 | 81 | 144 | 0 | 62 | 94 | 119 | 131 |
| 115 | 100 | 169 | 106 | 94 | 0 | 0 | 100 | 106 | 125 | 125 | 144 | 169 | 0 | 81 | 112 | 119 | 100 |
| 116 | 100 | 144 | 81 | 150 | 0 | 0 | 112 | 131 | 112 | 131 | 100 | 156 | 0 | 69 | 94 | 119 | 100 |
| 117 | 125 | 169 | 88 | 106 | 0 | 0 | 131 | 125 | 69 | 119 | 75 | 181 | 0 | 62 | 112 | 156 | 125 |
| 118 | 112 | 144 | 94 | 188 | 0 | 62 | 112 | 125 | 112 | 113 | 81 | 169 | 0 | 69 | 125 | 150 | 112 |
| 119 | 119 | 169 | 88 | 181 | 0 | 0 | 125 | 144 | 75 | 119 | 119 | 163 | 0 | 75 | 144 | 125 | 119 |
| 120 | 112 | 169 | 125 | 144 | 0 | 62 | 119 | 112 | 106 | 163 | 113 | 144 | 0 | 0 | 150 | 137 | 112 |
| 121 | 125 | 150 | 81 | 163 | 0 | 0 | 87 | 119 | 125 | 106 | 88 | 163 | 0 | 81 | 100 | 156 | 125 |
| 122 | 106 | 156 | 106 | 188 | 0 | 0 | 100 | 112 | 119 | 113 | 131 | 188 | 0 | 0 | 131 | 144 | 106 |
| 123 | 131 | 144 | 131 | 188 | 0 | 0 | 106 | 94 | 94 | 100 | 131 | 169 | 0 | 0 | 125 | 144 | 131 |
| 124 | 119 | 138 | 113 | 163 | 0 | 0 | 112 | 106 | 100 | 106 | 94 | 181 | 0 | 0 | 112 | 137 | 119 |
| 125 | 119 | 113 | 106 | 194 | 0 | 0 | 137 | 112 | 112 | 138 | 81 | 188 | 0 | 87 | 131 | 131 | 119 |

Laboratory: Belling Test Laboratory Co., LTD A2LA Certificate# 4810.01
Unit 401, No. 309 Xinxin Seven Road, Zengcheng District,
Guangzhou, People' s Republic of China. Website: <http://www.blst.com>

Report Format Number BL-FM-SA-012



Report No.: BLC1910037E-D

| | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 126 | 106 | 150 | 125 | 194 | 0 | 0 | 94 | 125 | 112 | 119 | 69 | 169 | 0 | 69 | 94 | 144 | 106 |
| 127 | 131 | 75 | 75 | 200 | 0 | 62 | 131 | 131 | 125 | 138 | 100 | 150 | 0 | 81 | 119 | 156 | 131 |
| 128 | 137 | 150 | 131 | 188 | 0 | 62 | 119 | 119 | 106 | 125 | 88 | 181 | 0 | 75 | 106 | 150 | 137 |
| 129 | 137 | 81 | 94 | 188 | 0 | 0 | 137 | 125 | 100 | 75 | 94 | 175 | 0 | 0 | 150 | 162 | 137 |
| 130 | 125 | 144 | 131 | 200 | 0 | 0 | 94 | 125 | 100 | 131 | 88 | 200 | 0 | 106 | 119 | 125 | 125 |
| 131 | 131 | 131 | 88 | 194 | 0 | 0 | 137 | 125 | 81 | 169 | 88 | 206 | 0 | 94 | 119 | 150 | 131 |
| 132 | 144 | 188 | 113 | 194 | 0 | 0 | 112 | 112 | 119 | 150 | 144 | 181 | 0 | 100 | 119 | 125 | 144 |
| 133 | 125 | 181 | 131 | 200 | 0 | 81 | 100 | 131 | 125 | 94 | 81 | 163 | 75 | 125 | 112 | 187 | 125 |
| 134 | 150 | 131 | 119 | 156 | 0 | 81 | 131 | 156 | 106 | 119 | 113 | 169 | 81 | 62 | 119 | 181 | 150 |
| 135 | 150 | 169 | 119 | 225 | 0 | 0 | 125 | 125 | 112 | 150 | 144 | 181 | 0 | 112 | 112 | 150 | 150 |
| 136 | 131 | 150 | 113 | 188 | 0 | 62 | 162 | 131 | 137 | 138 | 131 | 150 | 75 | 81 | 144 | 87 | 131 |
| 137 | 156 | 175 | 125 | 225 | 0 | 62 | 162 | 181 | 137 | 163 | 144 | 194 | 75 | 69 | 137 | 175 | 156 |
| 138 | 144 | 194 | 144 | 206 | 0 | 94 | 137 | 156 | 125 | 119 | 125 | 163 | 75 | 106 | 175 | 156 | 144 |
| 139 | 150 | 156 | 150 | 250 | 62 | 0 | 156 | 162 | 144 | 194 | 144 | 219 | 62 | 100 | 150 | 156 | 150 |
| 140 | 144 | 194 | 163 | 225 | 0 | 81 | 150 | 144 | 150 | 156 | 138 | 181 | 69 | 62 | 193 | 181 | 144 |
| 141 | 144 | 194 | 156 | 238 | 75 | 106 | 162 | 169 | 131 | 131 | 88 | 188 | 112 | 119 | 181 | 187 | 144 |
| 142 | 175 | 206 | 156 | 206 | 0 | 75 | 144 | 194 | 187 | 175 | 169 | 244 | 106 | 131 | 144 | 194 | 175 |
| 143 | 206 | 188 | 181 | 244 | 69 | 106 | 137 | 169 | 175 | 156 | 169 | 219 | 94 | 131 | 175 | 169 | 206 |
| 144 | 175 | 181 | 163 | 231 | 0 | 94 | 187 | 87 | 106 | 213 | 156 | 238 | 119 | 137 | 218 | 218 | 175 |
| 145 | 194 | 188 | 150 | 188 | 62 | 112 | 162 | 162 | 187 | 175 | 125 | 206 | 119 | 150 | 193 | 194 | 194 |
| 146 | 187 | 206 | 169 | 238 | 69 | 125 | 206 | 206 | 200 | 175 | 175 | 219 | 125 | 156 | 218 | 125 | 187 |
| 147 | 212 | 213 | 175 | 256 | 0 | 119 | 193 | 206 | 187 | 200 | 200 | 256 | 143 | 162 | 156 | 231 | 212 |
| 148 | 206 | 244 | 163 | 275 | 112 | 106 | 200 | 187 | 200 | 219 | 194 | 213 | 150 | 150 | 162 | 243 | 206 |
| 149 | 200 | 225 | 181 | 282 | 100 | 94 | 206 | 243 | 212 | 206 | 181 | 225 | 125 | 162 | 212 | 218 | 200 |
| 150 | 187 | 144 | 194 | 244 | 125 | 175 | 206 | 218 | 206 | 219 | 206 | 256 | 137 | 181 | 225 | 231 | 187 |
| 151 | 237 | 150 | 206 | 300 | 106 | 144 | 218 | 250 | 225 | 250 | 213 | 231 | 81 | 181 | 243 | 262 | 237 |
| 152 | 244 | 250 | 206 | 313 | 112 | 144 | 237 | 169 | 237 | 275 | 238 | 269 | 168 | 162 | 250 | 281 | 244 |
| 153 | 231 | 256 | 231 | 294 | 137 | 150 | 250 | 218 | 262 | 219 | 250 | 263 | 175 | 212 | 256 | 243 | 231 |
| 154 | 225 | 250 | 256 | 294 | 137 | 156 | 250 | 237 | 256 | 294 | 231 | 307 | 181 | 225 | 250 | 268 | 225 |
| 155 | 269 | 263 | 256 | 332 | 106 | 169 | 250 | 250 | 269 | 194 | 256 | 313 | 200 | 162 | 256 | 237 | 269 |
| 156 | 244 | 275 | 194 | 225 | 156 | 181 | 250 | 256 | 281 | 269 | 238 | 307 | 193 | 200 | 281 | 194 | 244 |
| 157 | 250 | 300 | 156 | 332 | 156 | 181 | 231 | 287 | 262 | 275 | 231 | 332 | 225 | 206 | 300 | 293 | 250 |

Laboratory: Belling Test Laboratory Co., LTD A2LA Certificate# 4810.01
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Report Format Number BL-FM-SA-012



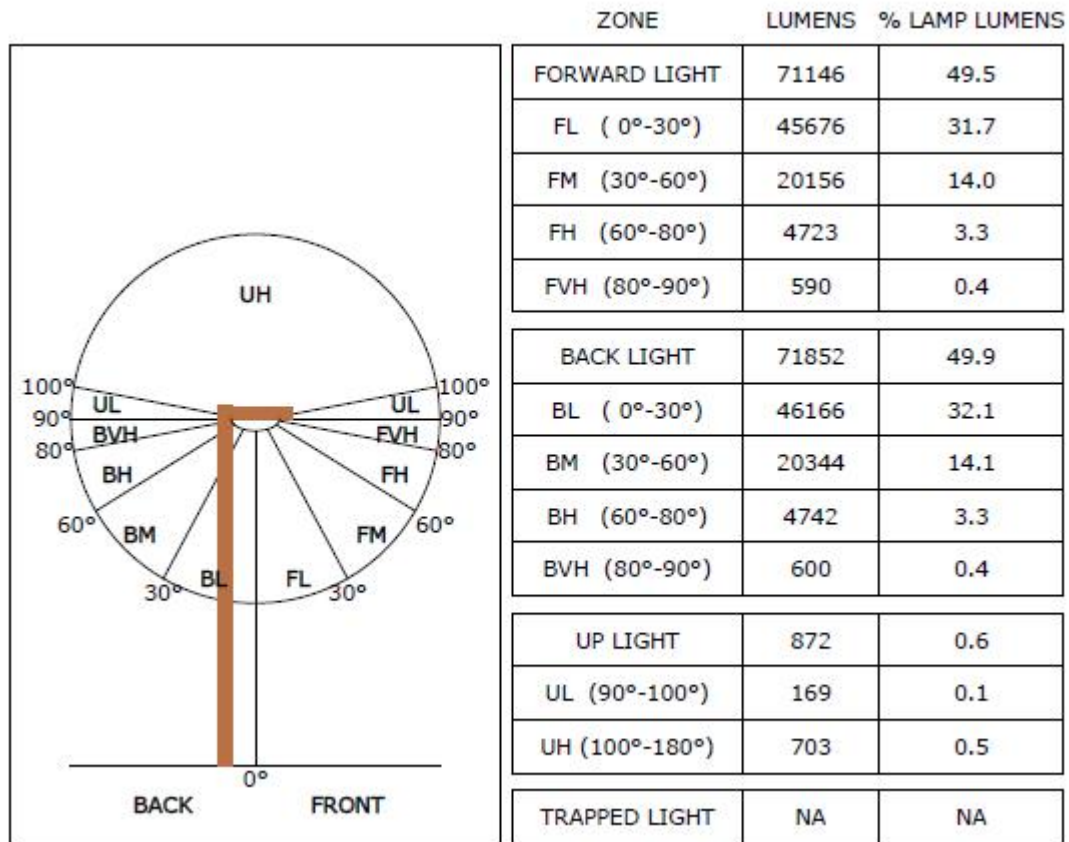
Report No.: BLC1910037E-D

Certificate#4810.01

| | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 158 | 237 | 281 | 275 | 332 | 156 | 137 | 218 | 218 | 256 | 275 | 238 | 288 | 200 | 200 | 206 | 281 | 237 |
| 159 | 287 | 275 | 275 | 325 | 162 | 106 | 250 | 262 | 181 | 188 | 206 | 338 | 200 | 225 | 275 | 312 | 287 |
| 160 | 294 | 269 | 294 | 275 | 212 | 206 | 275 | 256 | 300 | 281 | 256 | 350 | 212 | 219 | 250 | 225 | 294 |
| 161 | 312 | 194 | 282 | 256 | 143 | 212 | 293 | 306 | 300 | 300 | 275 | 344 | 212 | 244 | 293 | 300 | 312 |
| 162 | 131 | 294 | 288 | 300 | 175 | 206 | 231 | 268 | 237 | 294 | 288 | 288 | 218 | 250 | 237 | 293 | 131 |
| 163 | 275 | 313 | 156 | 388 | 181 | 187 | 293 | 312 | 319 | 294 | 275 | 325 | 231 | 262 | 306 | 306 | 275 |
| 164 | 281 | 331 | 275 | 375 | 193 | 244 | 293 | 231 | 312 | 263 | 294 | 313 | 218 | 237 | 306 | 343 | 281 |
| 165 | 294 | 319 | 263 | 338 | 212 | 181 | 312 | 318 | 294 | 313 | 282 | 382 | 243 | 212 | 300 | 343 | 294 |
| 166 | 294 | 306 | 288 | 369 | 231 | 244 | 312 | 325 | 294 | 313 | 269 | 375 | 268 | 200 | 350 | 268 | 294 |
| 167 | 306 | 325 | 269 | 319 | 206 | 244 | 287 | 256 | 300 | 319 | 313 | 363 | 262 | 219 | 331 | 318 | 306 |
| 168 | 275 | 306 | 282 | 394 | 168 | 262 | 343 | 343 | 331 | 294 | 319 | 388 | 243 | 287 | 312 | 350 | 275 |
| 169 | 294 | 344 | 332 | 400 | 175 | 219 | 293 | 318 | 356 | 269 | 319 | 344 | 181 | 275 | 331 | 350 | 294 |
| 170 | 312 | 350 | 344 | 407 | 206 | 269 | 325 | 250 | 325 | 338 | 319 | 382 | 256 | 281 | 337 | 300 | 312 |
| 171 | 337 | 369 | 288 | 357 | 243 | 244 | 337 | 350 | 344 | 275 | 325 | 357 | 218 | 300 | 325 | 331 | 337 |
| 172 | 231 | 344 | 275 | 419 | 218 | 194 | 337 | 350 | 350 | 338 | 294 | 369 | 262 | 256 | 331 | 343 | 231 |
| 173 | 300 | 331 | 288 | 394 | 243 | 262 | 331 | 343 | 362 | 319 | 256 | 388 | 262 | 262 | 300 | 368 | 300 |
| 174 | 175 | 306 | 307 | 369 | 187 | 237 | 312 | 356 | 219 | 350 | 325 | 388 | 287 | 231 | 343 | 368 | 175 |
| 175 | 237 | 306 | 313 | 369 | 250 | 269 | 306 | 343 | 325 | 356 | 344 | 382 | 274 | 262 | 381 | 375 | 237 |
| 176 | 344 | 263 | 325 | 369 | 181 | 275 | 337 | 381 | 225 | 394 | 300 | 375 | 293 | 294 | 331 | 331 | 344 |
| 177 | 300 | 381 | 307 | 256 | 231 | 262 | 262 | 362 | 300 | 331 | 338 | 338 | 237 | 300 | 318 | 350 | 300 |
| 178 | 337 | 331 | 288 | 388 | 231 | 256 | 318 | 325 | 337 | 331 | 294 | 357 | 231 | 269 | 262 | 318 | 337 |
| 179 | 337 | 363 | 332 | 375 | 218 | 212 | 306 | 350 | 325 | 338 | 332 | 363 | 237 | 300 | 306 | 337 | 337 |
| 180 | 294 | 231 | 294 | 369 | 181 | 269 | 293 | 325 | 269 | 306 | 313 | 357 | 243 | 200 | 300 | 337 | 294 |



Report No.: BLC1910037E-D



**2.2 Electrical, Photometric and Chromaticity Measurements***(Refer to Work Instruction BL-QP-033)*

| | | | |
|-------------------------|------------------------------|---------------------------------|----------|
| Test date | 2019-11-06 | Test Ambient: | 25.2 ° C |
| Test Orientation | As intended | Stabilization Time (min) | 90 |
| Model Number | AST-SP01B-1200WSCS4H1-acde57 | | |

Electrical Measurement:

| Sample No. | Voltage (Vac) | Frequency (Hz) | Current (A) | Power (W) | Power Factor | THD % |
|--------------------------|---------------|----------------|-------------|-----------|-----------------------|---------------------|
| BLC191003 | 277.0 | 60 | 4.1317 | 1134.17 | 0.991 | 5.34 |
| 7E-D2 | 480.0 | 60 | 2.5140 | 1123.45 | 0.931 | 13.62 |
| DLC Pass Criteria | | | | | >= 0.9(-3%) | <= 20(+5) |

Chromaticity Measurement - Sphere-Spectroradiometer Method:

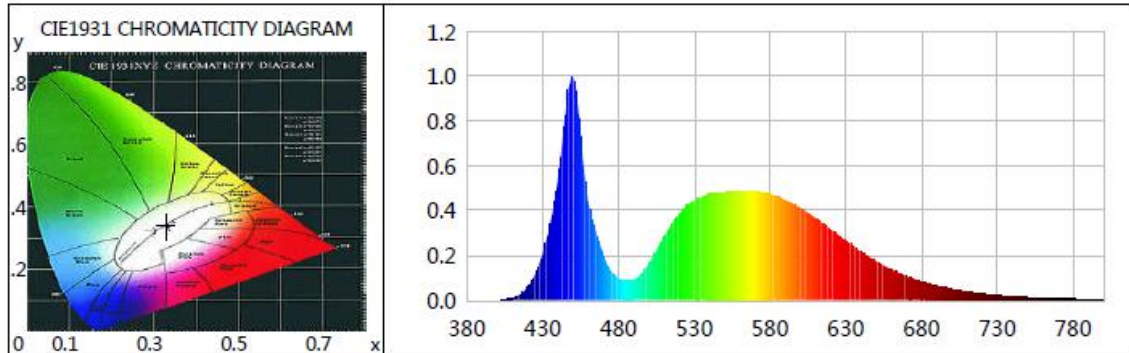
| Parameter | Result | Special Color Rendering Indices | | | |
|-----------------------------|----------------------------|---------------------------------|----|-----|----|
| Test Voltage (V) | 277.0 | R1 | 72 | R9 | 0 |
| Frequency (Hz) | 60 | R2 | 77 | R10 | 43 |
| CCT (K) | 5702 | R3 | 78 | R11 | 72 |
| Duv | 0.00006 | R4 | 75 | R12 | 42 |
| Chromaticity (x, y) | x=0.3280 y=0.3373 | R5 | 73 | R13 | 73 |
| Chromaticity (u', v') | u(u')=0.2053 v'(v')=0.4749 | R6 | 68 | R14 | 87 |
| Color Rendering Index (CRI) | 73.4 | R7 | 82 | R15 | 69 |
| R9 | 0 | R8 | 63 | -- | -- |

Photometric Measurement – Sphere-Spectroradiometer Method:

| Parameter | Result | | DLC V4.4 Pass Criteria |
|-----------------------------------|----------|----------|------------------------|
| Test Voltage (V) | 277.0 | 480.0 | -- |
| Frequency (Hz) | 60 | 60 | |
| Total Luminous (lm) | 148360.8 | 148048.2 | >=30000(-10%) |
| Luminous Efficacy (lm/W) | 130.81 | 131.78 | Premium: >= 120(-3%) |
| Most worst Luminous/Highest Watts | 130.53 | | |



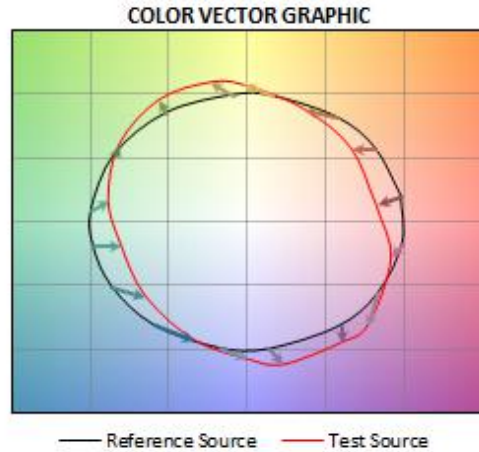
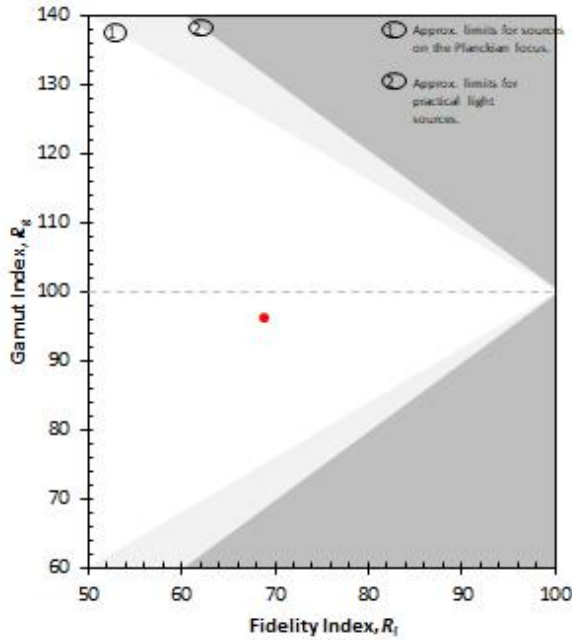
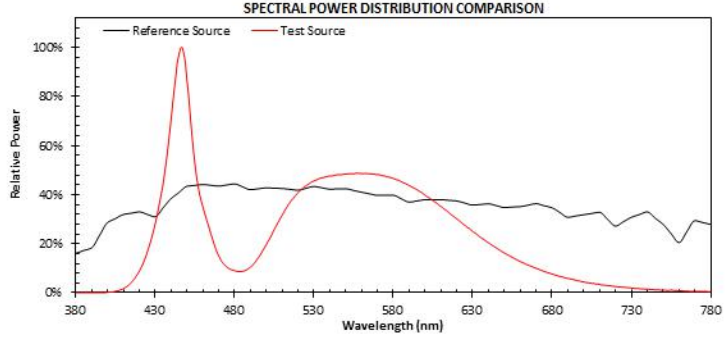
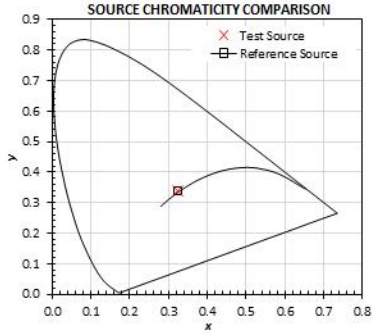
Spectral Power Distribution & Chromaticity Diagram

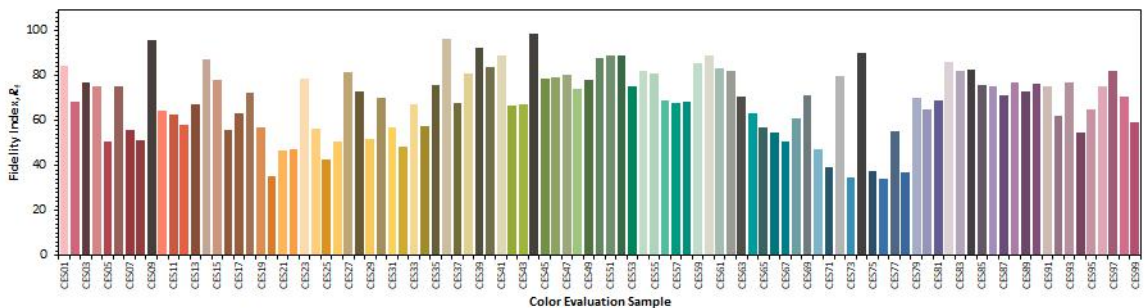
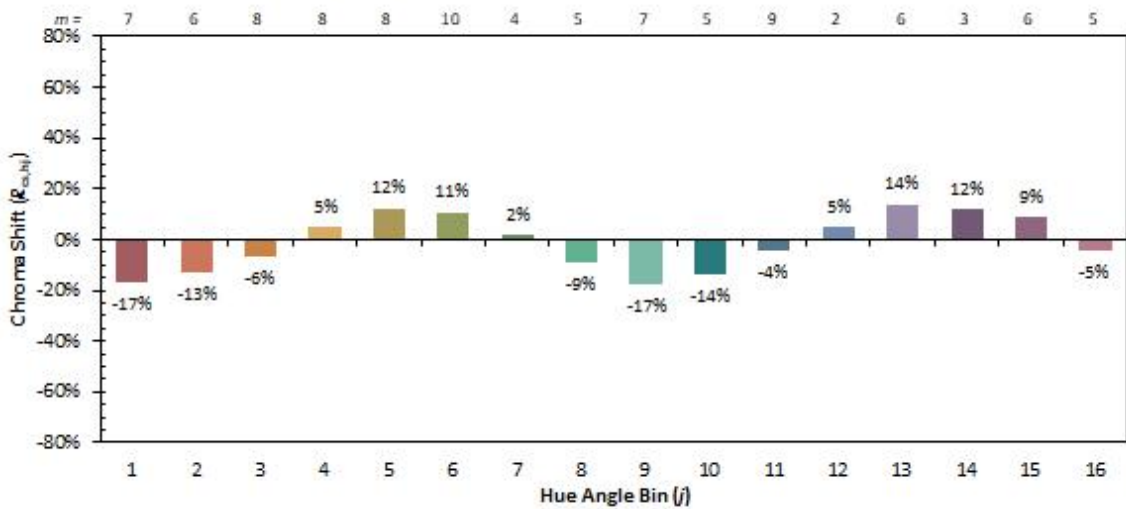
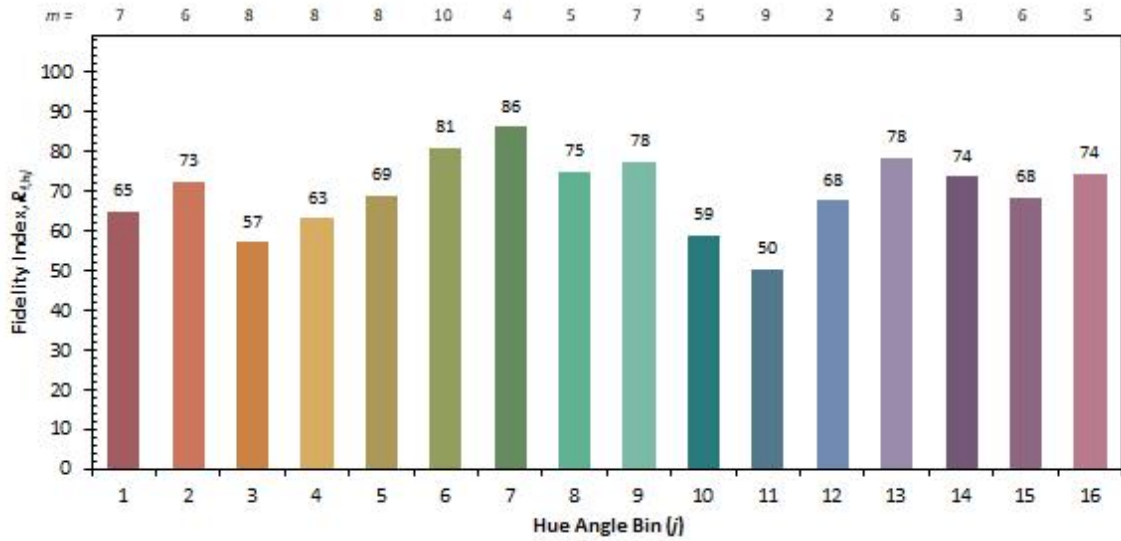


| WL(nm) | PL | PE(mW/nm) | WL(nm) | PL | PE(mW/nm) | WL(nm) | PL | PE(mW/nm) |
|--------|--------|-----------|--------|--------|-----------|--------|--------|-----------|
| 380 | 0.0008 | 2.9373 | 525 | 0.4214 | 1628.8900 | 670 | 0.1078 | 416.6415 |
| 385 | 0.0003 | 1.1030 | 530 | 0.4445 | 1718.0461 | 675 | 0.0952 | 367.8729 |
| 390 | 0.0009 | 3.4527 | 535 | 0.4617 | 1784.7527 | 680 | 0.0831 | 321.2018 |
| 395 | 0.0005 | 1.7458 | 540 | 0.4725 | 1826.3475 | 685 | 0.0725 | 280.0610 |
| 400 | 0.0007 | 2.6787 | 545 | 0.4774 | 1845.3032 | 690 | 0.0645 | 249.1744 |
| 405 | 0.0033 | 12.6349 | 550 | 0.4817 | 1861.9355 | 695 | 0.0566 | 218.6211 |
| 410 | 0.0095 | 36.6712 | 555 | 0.4853 | 1875.8034 | 700 | 0.0493 | 190.5524 |
| 415 | 0.0250 | 96.8226 | 560 | 0.4880 | 1886.4311 | 705 | 0.0420 | 162.3472 |
| 420 | 0.0573 | 221.3885 | 565 | 0.4870 | 1882.3947 | 710 | 0.0370 | 142.8826 |
| 425 | 0.1138 | 439.8772 | 570 | 0.4844 | 1872.5138 | 715 | 0.0321 | 124.1799 |
| 430 | 0.2063 | 797.6043 | 575 | 0.4807 | 1857.9835 | 720 | 0.0281 | 108.6487 |
| 435 | 0.3409 | 1317.8546 | 580 | 0.4730 | 1828.3806 | 725 | 0.0234 | 90.5877 |
| 440 | 0.5374 | 2077.4350 | 585 | 0.4609 | 1781.7558 | 730 | 0.0220 | 85.1043 |
| 445 | 0.8282 | 3201.5963 | 590 | 0.4474 | 1729.3615 | 735 | 0.0176 | 68.2246 |
| 450 | 1.0000 | 3865.5107 | 595 | 0.4310 | 1665.9688 | 740 | 0.0160 | 61.7652 |
| 455 | 0.7331 | 2833.8432 | 600 | 0.4124 | 1594.1514 | 745 | 0.0140 | 54.0084 |
| 460 | 0.4369 | 1688.7273 | 605 | 0.3894 | 1505.0894 | 750 | 0.0125 | 48.2378 |
| 465 | 0.3079 | 1190.3386 | 610 | 0.3674 | 1420.1313 | 755 | 0.0106 | 41.0136 |
| 470 | 0.2013 | 777.9520 | 615 | 0.3423 | 1323.1959 | 760 | 0.0100 | 38.8068 |
| 475 | 0.1274 | 492.4244 | 620 | 0.3167 | 1224.3668 | 765 | 0.0091 | 35.1734 |
| 480 | 0.0976 | 377.1213 | 625 | 0.2918 | 1127.8495 | 770 | 0.0055 | 21.2508 |
| 485 | 0.0873 | 337.5698 | 630 | 0.2658 | 1027.5893 | 775 | 0.0064 | 24.8252 |
| 490 | 0.0919 | 355.2926 | 635 | 0.2419 | 934.9712 | 780 | 0.0052 | 20.1503 |
| 495 | 0.1176 | 454.4343 | 640 | 0.2180 | 842.6528 | 785 | 0.0043 | 16.6610 |
| 500 | 0.1632 | 630.9150 | 645 | 0.1952 | 754.3843 | 790 | 0.0036 | 14.0367 |
| 505 | 0.2198 | 849.6297 | 650 | 0.1751 | 676.9279 | 795 | 0.0029 | 11.3246 |
| 510 | 0.2822 | 1090.6879 | 655 | 0.1557 | 602.0427 | 800 | 0.0031 | 11.9500 |
| 515 | 0.3394 | 1311.8420 | 660 | 0.1381 | 533.8177 | | | |
| 520 | 0.3843 | 1485.4643 | 665 | 0.1216 | 470.2381 | | | |



TM30







Calculated Efficacy Data for family models (4500K, 5000K):

| Model Number | Luminous Flux (lm) | Power (W) | Efficacy (lm/W) |
|------------------------------|--------------------|-----------|-----------------|
| AST-SP01B-1200WSCS4H1-acde40 | 143869.9 | 1134.21 | 126.85 |
| AST-SP01B-1200WSCS4H1-acde45 | 144992.6 | 1134.19 | 127.84 |
| AST-SP01B-1200WSCS4H1-acde50 | 146115.3 | 1134.19 | 128.83 |
| AST-SP01B-1200WSCS4H1-acde57 | 148360.8 | 1134.17 | 130.81 |

*1: This value is calculated and the calculation formula is as below:

$$144992.6 = (148360.8 - 143869.9) / 4 + 143869.9$$

$$146115.3 = (148360.8 - 143869.9) / 4 + 144992.6$$

*2: This value is calculated and the calculation formula is as below:

$$1134.19 = (1134.21 + 1134.17) / 2$$

*3: This value is calculated and the calculation formula is as below:

$$127.84 = 144992.6 / 490.41$$

$$128.83 = 146115.3 / 490.41$$



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3. Test Equipment

| Equipment Name | Model No. | Serial No. | Next Calibration Date |
|---|-----------|-------------|-----------------------|
| Goniophotometric System | GPM-3000 | DYHXF120001 | 2020-01-14 |
| AC Power Source | CHP-500C | N/A | 2020-01-13 |
| Total Luminous Flux Standard Lamp | 24V/150W | DYJYR040040 | 2020-01-21 |
| Digital Power Meter | WT500 | DYDWQ200006 | 2020-01-13 |
| Integral Sphere (2M) | 2M | DYJCE120067 | 2020-01-14 |
| Digital Power Meter | WT500 | DYDWQ200006 | 2020-01-13 |
| Optical Color and Electrical Measurement System | CMS-3000S | DYJCE120067 | 2020-01-14 |

Expand Uncertainty:
Photometric Measurement (Sphere): 2.08%, k=2
Chromaticity Measurement(Sphere):25.6K, k=2
Photometric Measurement(Goniophotometer):2.645%, k=2

***** END OF REPORT *****