

IES LM-79-08

MEASUREMENT AND TEST REPORT

For

GREEN CREATIVE LTD

756 North Zhongshan Rd., Unit B301 Zhabei District, Shanghai, China

Test Model: 17T8U6/830/BYP

| | |
|-----------------------|--|
| Report Type: | Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution |
| Test Engineer: | George Yang <i>George Yang</i> |
| Report Number: | PKS180428080-10 |
| Test Date: | 2018-04-28 to 2018-05-02 |
| Report Date: | 2018-05-07 |
| Reviewed By: | Ray Gao/EE Engineer <i>Ry Gao</i> |
| Prepared By: | Bay Area Compliance Laboratories Corp. (Kunshan). No.248 Chenghu Road, Kunshan, Jiangsu province, China. Tel: +86-0512-86175000 Fax: +86-0512-88934268 |
| Test Facility: | Test facility was located at No.248 Chenghu Road, Kunshan, Jiangsu province, China. |
| Accreditation: | The IAS Accreditation Number TL-749. |

1. Product Description

General Information:

one sample was received on 2018-04-28 and used for testing.

Model Tested: 17T8U6/830/BYP
 Manufacturer: GREEN CREATIVE LTD
 Brand Name: GREEN CREATIVE
 Product Designation: LED Tube
 Lamp Shape: U tube
 Lamp base: G13
 Aging Time Before Test: 0hour(For New Products)

Rated Values:

Rated Voltage/Frequency: 120-277VAC 60Hz
 Rated Power: 17W
 Nominal CCT: 3000K
 Nominal Lumen Output: 2100lm

2. Standards Used

- IES LM-79-08: Approved Method: Electrical & Photometric Measurement of Solid-state Lighting Products
- ANSI C82.77-10-2014: Harmonic Emission Limits – Related Power Quality Requirements for Lighting
- IES TM-30-15: IES Method for Evaluating Light Source Color Rendition

3. Description of Test Equipment

| Device | Manufacture | Model No | Serial No | Calibration date | Calibration due date |
|--------------------------|-------------|----------|-------------|------------------|----------------------|
| Integrating Sphere | INVENTFINE | Dia 1.5m | JWWCV090112 | 2018-01-24 | 2019-01-24 |
| Power Meter | INVENTFINE | WT500 | GSJWQ20009 | 2018-03-23 | 2019-03-22 |
| Spectral photometer | INVENTFINE | CMS-3S | GSGSE100017 | 2018-01-24 | 2019-01-24 |
| AC Power Supply | INVENTFINE | CHP500 | JWJSD010071 | 2018-03-23 | 2019-03-22 |
| Standard Light Source | INVENTFINE | N/A | JWWCR020106 | 2018-01-24 | 2019-01-24 |
| Thermal Meter | KEJIAN | TA298 | N/A | 2017-11-14 | 2018-11-14 |
| DC Power Supply | INVENTFINE | WL3005 | JWWCP020069 | 2018-03-23 | 2019-03-22 |
| AC Power Supply | INVENTFINE | CHP-5KVA | 900511765 | 2018-03-23 | 2019-03-22 |
| DC Power Supply | INVENTFINE | WL3010 | JWDMP030001 | 2018-03-23 | 2019-03-22 |
| Power Meter | INVENTFINE | WT500 | GSDSQ200007 | 2018-03-23 | 2019-03-22 |
| Goniophotometer | INVENTFINE | GPM-1900 | YWGCF120001 | 2018-01-24 | 2019-01-24 |
| Wireless Weather Station | ZHONGXING | KG218 | N/A | 2017-11-14 | 2018-11-14 |
| Standard Light Source | INVENTFINE | N/A | JWBYR040007 | 2018-01-24 | 2019-01-24 |

Statement of Traceability: Bay Area Compliance Laboratories Corp.(Kunshan) attested that all calibration has been performed using suitable standards traceable to National Primary Standards and International System of Units (SI).

4. Test Method

Product was tested with no seasoning. All stabilization and measurements were made in compliance with IES LM-79-08. The product was operated at rated voltage or at voltage required by manufacturer. The ambient temperature of the sample was maintained at $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$ during measurement. And relative humidity is less than 65%.

Integrating Sphere System

The system includes AC power source, digital power meter, DC power supply, Spectroradiometer, and integrating sphere. The integrating sphere system is calibrated by standard spectrum light source before measurement.

4π geometry was used during measurement. The product was operated in its intended orientation in application and was recorded in this report.

The uncertainty of the light output (luminous flux) measurements is $U=2.6\%$ ($K=2$), at the 95% confidence level. The uncertainty of the correlated color temperature measurements is $U=24\text{K}$ ($K=2$), at the 95% confidence level. The uncertainty of the CRI is $U=2.5(K=2)$, at the 95% confidence level.

The uncertainty of power meter AC current $U=0.16\%$ of rdg, AC Voltage $U=0.18\%$ of rdg, Power $U=0.14\%$ ($K=2$), at the 95% confidence level.

Goniophotometer System

The goniophotometer system is calibrated by standard light source before measurement.

Type C goniophotometer was used for measuring total luminous flux, luminous intensity distribution, and color spatial uniformity. The product was operated in its intended orientation in application and was recorded in this report. The vertical angle (γ) test intervals were set no more than 1 degree while data for 5 degree intervals is reported. The horizontal angle (C plane) test intervals were set no more than 22.5 degree.

The uncertainty of the luminous flux is $U=2.6\%$ ($K=2$), at the 95% confidence level.

Fidelity Index and Gamut Index Calculation

The R_i , R_g was calculated according to IES TM-30-15 by using calculation tools. The calculation was based on the measured SPD from 380nm to 780nm with 1nm intervals. All the colors in this report is for reference only.

5. Test Result

[Integrating Sphere System]

Total operating time for integrating sphere test: **1.0 hour**

Test orientation: **Downward**

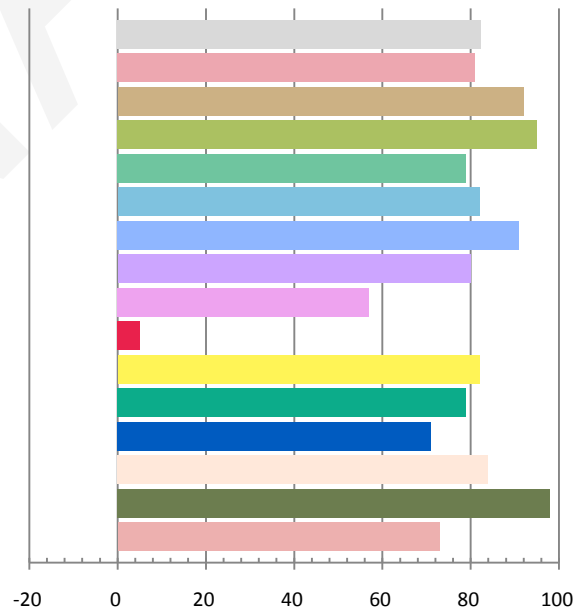
Photometric and Electrical Measurement Result

| Voltage (V) | Frequency (Hz) | Current (A) | Power (W) | Power Factor | Luminous Flux(lm) | Efficacy (lm/W) |
|-------------|----------------|-------------|-----------|--------------|-------------------|-----------------|
| 120.0 | 60 | 0.147 | 17.08 | 0.9682 | 2111.6 | 123.63 |

| Radiant Flux (W) | CCT (K) | Duv | x | y | u' | v' |
|------------------|---------|---------|--------|--------|--------|--------|
| 6.335 | 2974 | 0.00129 | 0.4407 | 0.4086 | 0.2510 | 0.5237 |

Color Rendering Index

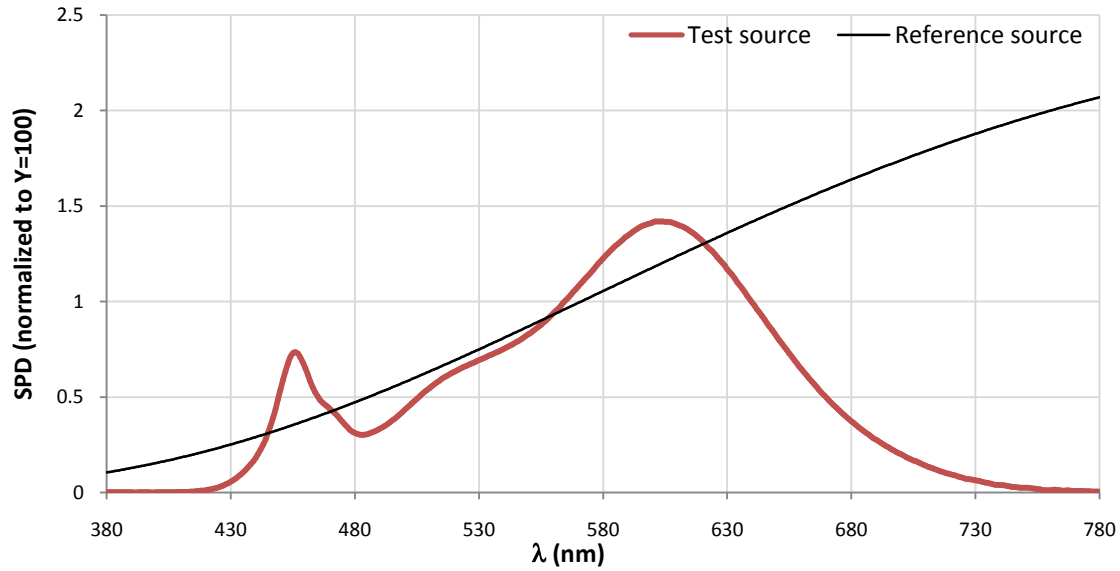
| | | | |
|--------------------------|------------------|------------------|------------------|
| Ra 82.3 | | | |
| R1 81 | R2 92 | R3 95 | R4 79 |
| R5 82 | R6 91 | R7 80 | R8 57 |
| R9 5 | R10 82 | R11 79 | R12 71 |
| R13 84 | R14 98 | R15 73 | |



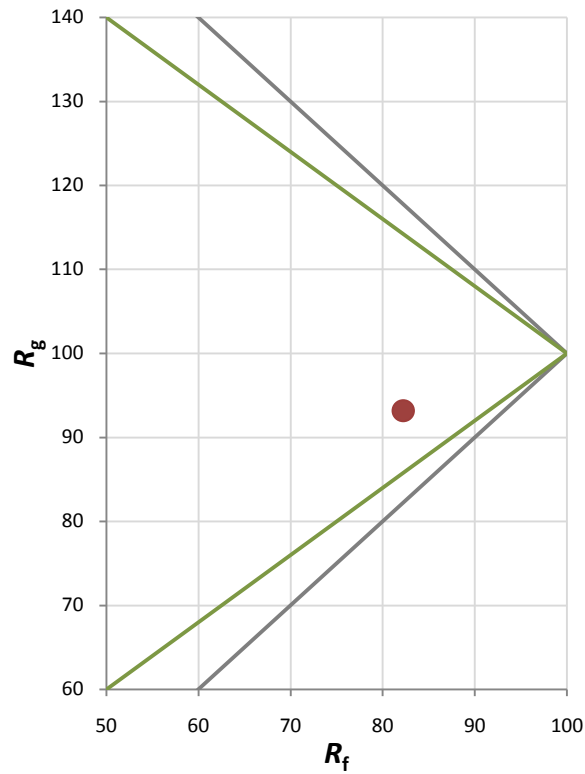
Fidelity Index and Gamut Index

| | |
|----------------------|----|
| Fidelity Index R_f | 82 |
| Gamut Index R_g | 93 |

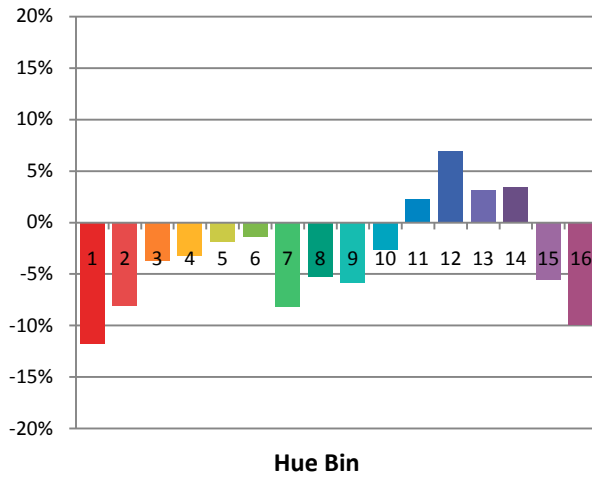
Spectral Power Distribution Comparison



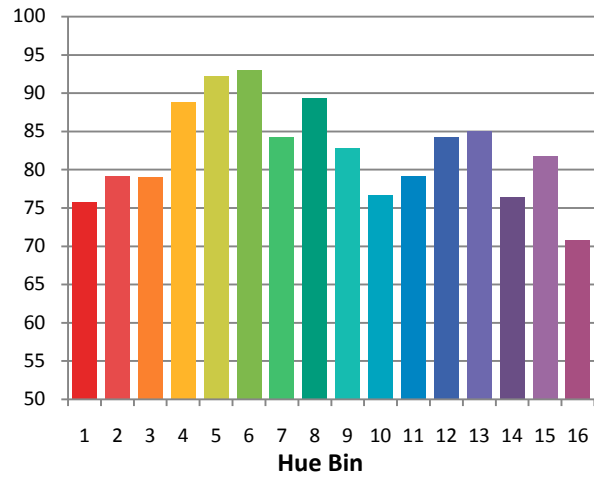
Plot of R_g versus R_f



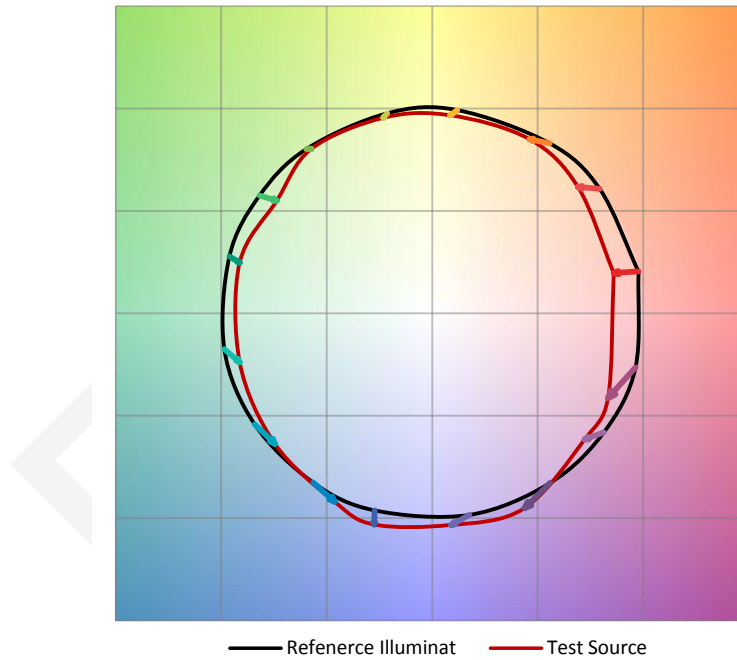
Chroma Shift by Hue



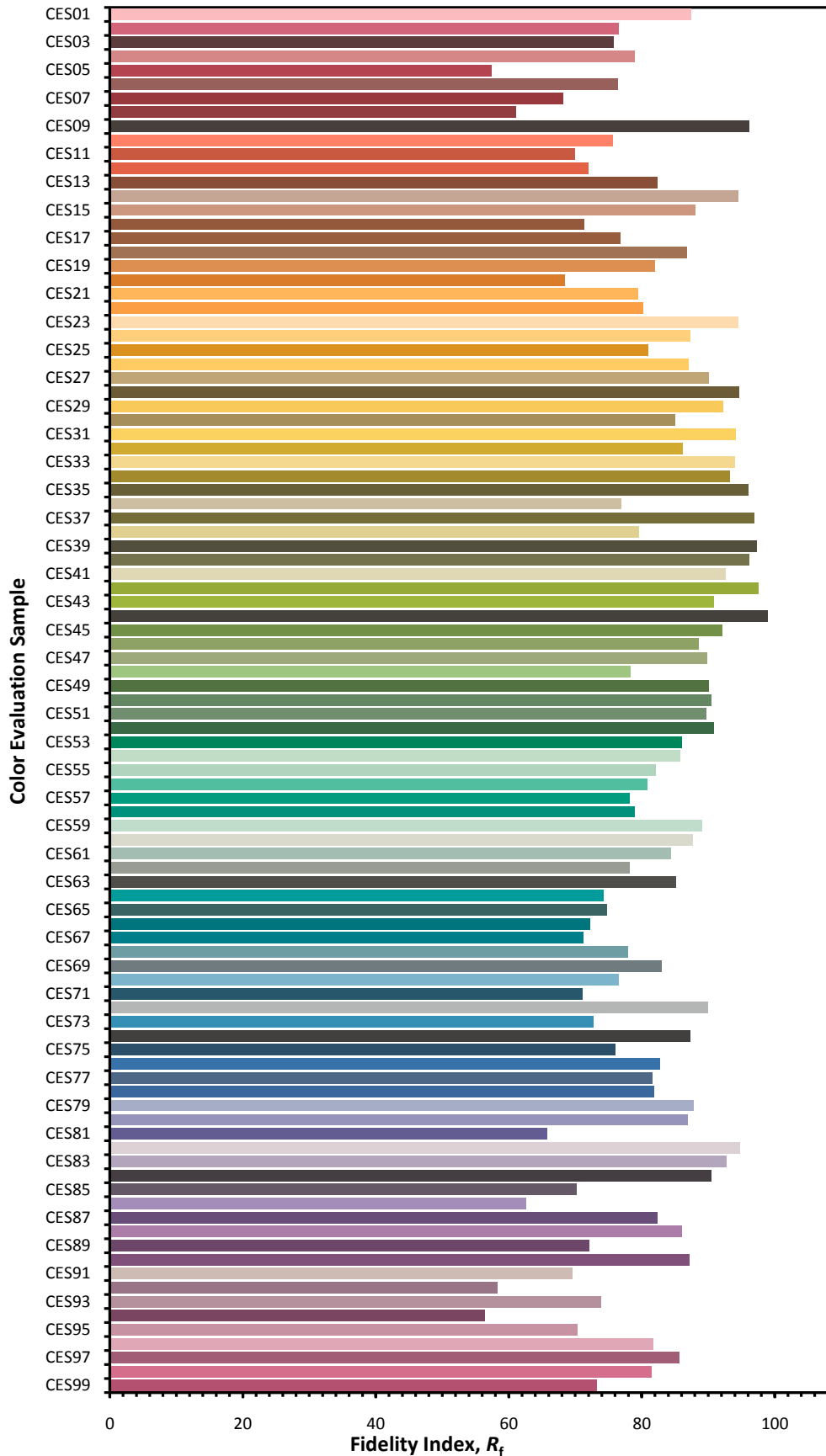
R_f by Hue



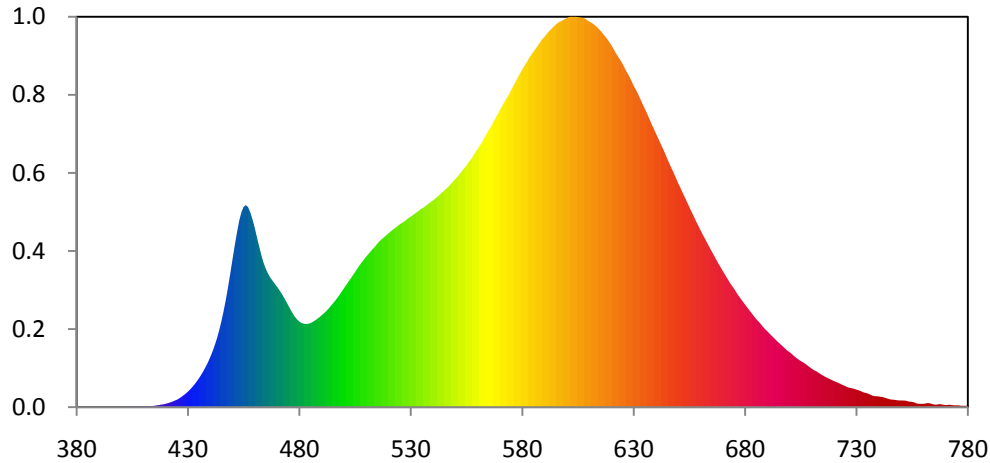
Color Vector Graphic



Color Fidelity by CES Sample



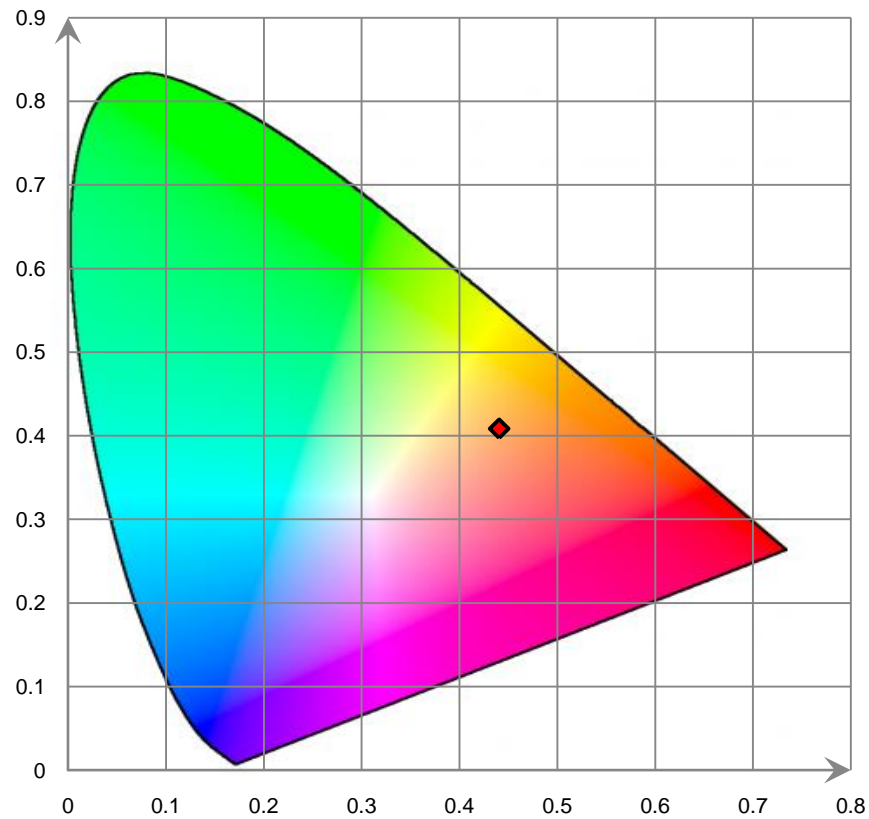
Relative Spectral Power Distribution



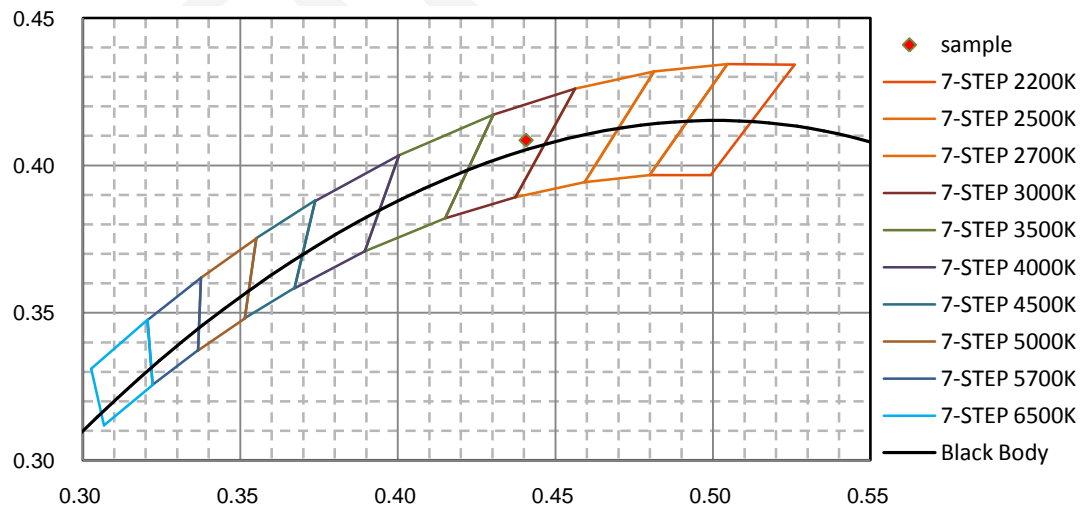
| nm | mW | nm | mW | nm | mW | nm | mW | nm | mW |
|-----|-----------|-----|-----------|-----|-----------|-----|-----------|-----|-----------|
| 380 | 5.500E-02 | 421 | 4.582E-01 | 462 | 1.804E+01 | 503 | 1.444E+01 | 544 | 2.409E+01 |
| 381 | 4.190E-02 | 422 | 5.277E-01 | 463 | 1.705E+01 | 504 | 1.481E+01 | 545 | 2.433E+01 |
| 382 | 4.050E-02 | 423 | 6.211E-01 | 464 | 1.619E+01 | 505 | 1.518E+01 | 546 | 2.456E+01 |
| 383 | 3.870E-02 | 424 | 7.281E-01 | 465 | 1.552E+01 | 506 | 1.555E+01 | 547 | 2.479E+01 |
| 384 | 3.830E-02 | 425 | 8.285E-01 | 466 | 1.499E+01 | 507 | 1.592E+01 | 548 | 2.507E+01 |
| 385 | 3.170E-02 | 426 | 9.733E-01 | 467 | 1.456E+01 | 508 | 1.627E+01 | 549 | 2.536E+01 |
| 386 | 2.870E-02 | 427 | 1.143E+00 | 468 | 1.420E+01 | 509 | 1.659E+01 | 550 | 2.562E+01 |
| 387 | 2.800E-02 | 428 | 1.333E+00 | 469 | 1.385E+01 | 510 | 1.690E+01 | 551 | 2.590E+01 |
| 388 | 2.700E-02 | 429 | 1.520E+00 | 470 | 1.353E+01 | 511 | 1.721E+01 | 552 | 2.621E+01 |
| 389 | 3.970E-02 | 430 | 1.752E+00 | 471 | 1.317E+01 | 512 | 1.750E+01 | 553 | 2.652E+01 |
| 390 | 3.910E-02 | 431 | 1.998E+00 | 472 | 1.279E+01 | 513 | 1.779E+01 | 554 | 2.683E+01 |
| 391 | 2.020E-02 | 432 | 2.272E+00 | 473 | 1.237E+01 | 514 | 1.805E+01 | 555 | 2.715E+01 |
| 392 | 1.540E-02 | 433 | 2.571E+00 | 474 | 1.193E+01 | 515 | 1.837E+01 | 556 | 2.751E+01 |
| 393 | 2.470E-02 | 434 | 2.903E+00 | 475 | 1.146E+01 | 516 | 1.865E+01 | 557 | 2.783E+01 |
| 394 | 2.400E-02 | 435 | 3.262E+00 | 476 | 1.098E+01 | 517 | 1.888E+01 | 558 | 2.822E+01 |
| 395 | 2.750E-02 | 436 | 3.660E+00 | 477 | 1.055E+01 | 518 | 1.908E+01 | 559 | 2.862E+01 |
| 396 | 2.440E-02 | 437 | 4.080E+00 | 478 | 1.016E+01 | 519 | 1.931E+01 | 560 | 2.901E+01 |
| 397 | 2.530E-02 | 438 | 4.544E+00 | 479 | 9.856E+00 | 520 | 1.953E+01 | 561 | 2.939E+01 |
| 398 | 1.540E-02 | 439 | 5.046E+00 | 480 | 9.622E+00 | 521 | 1.975E+01 | 562 | 2.978E+01 |
| 399 | 8.000E-03 | 440 | 5.612E+00 | 481 | 9.459E+00 | 522 | 1.994E+01 | 563 | 3.022E+01 |
| 400 | 2.380E-02 | 441 | 6.224E+00 | 482 | 9.378E+00 | 523 | 2.014E+01 | 564 | 3.070E+01 |
| 401 | 2.860E-02 | 442 | 6.932E+00 | 483 | 9.339E+00 | 524 | 2.034E+01 | 565 | 3.111E+01 |
| 402 | 2.980E-02 | 443 | 7.711E+00 | 484 | 9.373E+00 | 525 | 2.053E+01 | 566 | 3.152E+01 |
| 403 | 3.350E-02 | 444 | 8.608E+00 | 485 | 9.445E+00 | 526 | 2.070E+01 | 567 | 3.200E+01 |
| 404 | 3.720E-02 | 445 | 9.631E+00 | 486 | 9.580E+00 | 527 | 2.086E+01 | 568 | 3.246E+01 |
| 405 | 4.600E-02 | 446 | 1.078E+01 | 487 | 9.736E+00 | 528 | 2.105E+01 | 569 | 3.289E+01 |
| 406 | 4.770E-02 | 447 | 1.204E+01 | 488 | 9.915E+00 | 529 | 2.125E+01 | 570 | 3.336E+01 |
| 407 | 5.010E-02 | 448 | 1.347E+01 | 489 | 1.011E+01 | 530 | 2.142E+01 | 571 | 3.382E+01 |
| 408 | 5.370E-02 | 449 | 1.501E+01 | 490 | 1.032E+01 | 531 | 2.158E+01 | 572 | 3.427E+01 |
| 409 | 7.880E-02 | 450 | 1.659E+01 | 491 | 1.053E+01 | 532 | 2.176E+01 | 573 | 3.471E+01 |
| 410 | 9.540E-02 | 451 | 1.816E+01 | 492 | 1.077E+01 | 533 | 2.195E+01 | 574 | 3.511E+01 |
| 411 | 8.340E-02 | 452 | 1.962E+01 | 493 | 1.104E+01 | 534 | 2.214E+01 | 575 | 3.560E+01 |
| 412 | 8.050E-02 | 453 | 2.093E+01 | 494 | 1.134E+01 | 535 | 2.232E+01 | 576 | 3.606E+01 |
| 413 | 1.043E-01 | 454 | 2.191E+01 | 495 | 1.164E+01 | 536 | 2.249E+01 | 577 | 3.654E+01 |
| 414 | 1.278E-01 | 455 | 2.252E+01 | 496 | 1.193E+01 | 537 | 2.266E+01 | 578 | 3.702E+01 |
| 415 | 1.587E-01 | 456 | 2.271E+01 | 497 | 1.226E+01 | 538 | 2.286E+01 | 579 | 3.747E+01 |
| 416 | 2.046E-01 | 457 | 2.248E+01 | 498 | 1.261E+01 | 539 | 2.305E+01 | 580 | 3.792E+01 |
| 417 | 2.347E-01 | 458 | 2.189E+01 | 499 | 1.297E+01 | 540 | 2.323E+01 | 581 | 3.834E+01 |
| 418 | 2.891E-01 | 459 | 2.108E+01 | 500 | 1.334E+01 | 541 | 2.344E+01 | 582 | 3.874E+01 |
| 419 | 3.221E-01 | 460 | 2.015E+01 | 501 | 1.371E+01 | 542 | 2.365E+01 | 583 | 3.916E+01 |
| 420 | 3.813E-01 | 461 | 1.908E+01 | 502 | 1.409E+01 | 543 | 2.387E+01 | 584 | 3.956E+01 |

| nm | mW | nm | mW | nm | mW | nm | mW | nm | mW |
|-----|-----------|-----|-----------|-----|-----------|-----|-----------|-----|-----------|
| 585 | 3.991E+01 | 626 | 3.812E+01 | 667 | 1.663E+01 | 708 | 4.701E+00 | 749 | 7.581E-01 |
| 586 | 4.024E+01 | 627 | 3.764E+01 | 668 | 1.617E+01 | 709 | 4.510E+00 | 750 | 7.501E-01 |
| 587 | 4.060E+01 | 628 | 3.720E+01 | 669 | 1.576E+01 | 710 | 4.329E+00 | 751 | 7.484E-01 |
| 588 | 4.099E+01 | 629 | 3.670E+01 | 670 | 1.534E+01 | 711 | 4.149E+00 | 752 | 7.339E-01 |
| 589 | 4.134E+01 | 630 | 3.615E+01 | 671 | 1.492E+01 | 712 | 4.037E+00 | 753 | 6.758E-01 |
| 590 | 4.160E+01 | 631 | 3.568E+01 | 672 | 1.450E+01 | 713 | 3.878E+00 | 754 | 6.153E-01 |
| 591 | 4.192E+01 | 632 | 3.520E+01 | 673 | 1.408E+01 | 714 | 3.711E+00 | 755 | 5.915E-01 |
| 592 | 4.222E+01 | 633 | 3.465E+01 | 674 | 1.372E+01 | 715 | 3.562E+00 | 756 | 5.364E-01 |
| 593 | 4.246E+01 | 634 | 3.410E+01 | 675 | 1.336E+01 | 716 | 3.418E+00 | 757 | 4.206E-01 |
| 594 | 4.273E+01 | 635 | 3.357E+01 | 676 | 1.296E+01 | 717 | 3.296E+00 | 758 | 3.797E-01 |
| 595 | 4.296E+01 | 636 | 3.303E+01 | 677 | 1.258E+01 | 718 | 3.170E+00 | 759 | 3.788E-01 |
| 596 | 4.317E+01 | 637 | 3.246E+01 | 678 | 1.222E+01 | 719 | 3.052E+00 | 760 | 3.753E-01 |
| 597 | 4.332E+01 | 638 | 3.188E+01 | 679 | 1.189E+01 | 720 | 2.929E+00 | 761 | 4.046E-01 |
| 598 | 4.344E+01 | 639 | 3.133E+01 | 680 | 1.155E+01 | 721 | 2.824E+00 | 762 | 4.641E-01 |
| 599 | 4.357E+01 | 640 | 3.078E+01 | 681 | 1.122E+01 | 722 | 2.730E+00 | 763 | 4.357E-01 |
| 600 | 4.370E+01 | 641 | 3.024E+01 | 682 | 1.089E+01 | 723 | 2.594E+00 | 764 | 3.579E-01 |
| 601 | 4.384E+01 | 642 | 2.970E+01 | 683 | 1.056E+01 | 724 | 2.484E+00 | 765 | 2.927E-01 |
| 602 | 4.387E+01 | 643 | 2.915E+01 | 684 | 1.023E+01 | 725 | 2.375E+00 | 766 | 2.849E-01 |
| 603 | 4.386E+01 | 644 | 2.860E+01 | 685 | 9.923E+00 | 726 | 2.250E+00 | 767 | 3.379E-01 |
| 604 | 4.387E+01 | 645 | 2.800E+01 | 686 | 9.654E+00 | 727 | 2.171E+00 | 768 | 3.245E-01 |
| 605 | 4.384E+01 | 646 | 2.742E+01 | 687 | 9.360E+00 | 728 | 2.128E+00 | 769 | 2.774E-01 |
| 606 | 4.380E+01 | 647 | 2.687E+01 | 688 | 9.060E+00 | 729 | 2.073E+00 | 770 | 2.323E-01 |
| 607 | 4.374E+01 | 648 | 2.634E+01 | 689 | 8.774E+00 | 730 | 1.973E+00 | 771 | 2.596E-01 |
| 608 | 4.369E+01 | 649 | 2.577E+01 | 690 | 8.539E+00 | 731 | 1.897E+00 | 772 | 2.736E-01 |
| 609 | 4.352E+01 | 650 | 2.519E+01 | 691 | 8.272E+00 | 732 | 1.806E+00 | 773 | 2.307E-01 |
| 610 | 4.334E+01 | 651 | 2.467E+01 | 692 | 8.022E+00 | 733 | 1.683E+00 | 774 | 2.038E-01 |
| 611 | 4.321E+01 | 652 | 2.412E+01 | 693 | 7.785E+00 | 734 | 1.613E+00 | 775 | 2.062E-01 |
| 612 | 4.305E+01 | 653 | 2.358E+01 | 694 | 7.525E+00 | 735 | 1.550E+00 | 776 | 1.999E-01 |
| 613 | 4.285E+01 | 654 | 2.306E+01 | 695 | 7.287E+00 | 736 | 1.443E+00 | 777 | 1.640E-01 |
| 614 | 4.261E+01 | 655 | 2.251E+01 | 696 | 7.054E+00 | 737 | 1.322E+00 | 778 | 1.611E-01 |
| 615 | 4.234E+01 | 656 | 2.199E+01 | 697 | 6.832E+00 | 738 | 1.245E+00 | 779 | 1.598E-01 |
| 616 | 4.204E+01 | 657 | 2.146E+01 | 698 | 6.595E+00 | 739 | 1.230E+00 | 780 | 1.559E-01 |
| 617 | 4.174E+01 | 658 | 2.092E+01 | 699 | 6.358E+00 | 740 | 1.210E+00 | | |
| 618 | 4.142E+01 | 659 | 2.042E+01 | 700 | 6.189E+00 | 741 | 1.169E+00 | | |
| 619 | 4.107E+01 | 660 | 1.992E+01 | 701 | 5.986E+00 | 742 | 1.137E+00 | | |
| 620 | 4.070E+01 | 661 | 1.942E+01 | 702 | 5.754E+00 | 743 | 1.042E+00 | | |
| 621 | 4.026E+01 | 662 | 1.896E+01 | 703 | 5.550E+00 | 744 | 9.633E-01 | | |
| 622 | 3.979E+01 | 663 | 1.849E+01 | 704 | 5.368E+00 | 745 | 8.883E-01 | | |
| 623 | 3.941E+01 | 664 | 1.802E+01 | 705 | 5.192E+00 | 746 | 8.521E-01 | | |
| 624 | 3.903E+01 | 665 | 1.755E+01 | 706 | 5.057E+00 | 747 | 8.319E-01 | | |
| 625 | 3.860E+01 | 666 | 1.710E+01 | 707 | 4.889E+00 | 748 | 7.918E-01 | | |

CIE 1931 x y Chromaticity Diagram



7-Step Chromaticity Quadrangles



[Goniophotometer System]

Total operating time for luminous intensity distribution: **1.0 hours**

Test orientation: **Downward**

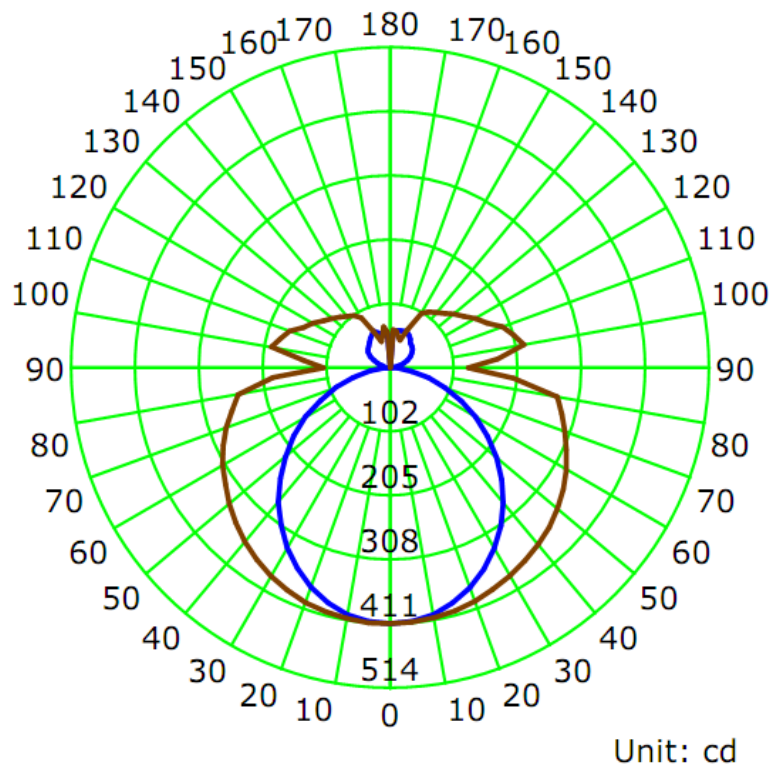
Electrical Measurement

| Input Voltage (V) | Frequency (Hz) | Input Current (A) | Power (W) | Power Factor |
|-------------------|----------------|-------------------|-----------|--------------|
| 120.0 | 60 | 0.1470 | 17.12 | 0.9710 |

Photometric Measurement

| Luminous Flux (lm) | Efficacy (lm/W) | I_{max} (cd) | S/MH (C0/180) | S/MH (C90/270) |
|--------------------|-----------------|----------------|---------------|----------------|
| 2126.4 | 124.25 | 411.3 | 1.21 | 1.41 |

Luminous Intensity Distribution



| | C0/180 | C45/225 | C90/270 | C135/315 | AVG. |
|-------------------------------|--------|---------|---------|----------|-------|
| Beam Angle (50% I_{max}): | 105.5 | 149.5 | 188.7 | 142.3 | 146.5 |
| Field Angle (10% I_{max}): | 352.8 | 351.8 | 353.2 | 352.9 | 352.7 |

Luminous Intensity (cd) Distribution Data

| C γ | 0° | 22.5° | 45° | 67.5° | 90° | 112.5° | 135° | 157.5° |
|--------|-----|-------|-----|-------|-----|--------|------|--------|
| 0.0° | 411 | 411 | 411 | 411 | 411 | 411 | 411 | 411 |
| 5.0° | 409 | 408 | 409 | 410 | 410 | 410 | 409 | 408 |
| 10.0° | 402 | 402 | 405 | 406 | 407 | 406 | 404 | 402 |
| 15.0° | 391 | 393 | 397 | 401 | 404 | 401 | 397 | 392 |
| 20.0° | 376 | 379 | 388 | 395 | 399 | 394 | 386 | 378 |
| 25.0° | 357 | 362 | 376 | 388 | 393 | 387 | 374 | 362 |
| 30.0° | 335 | 343 | 362 | 380 | 386 | 378 | 359 | 341 |
| 35.0° | 311 | 322 | 347 | 371 | 379 | 368 | 344 | 319 |
| 40.0° | 284 | 299 | 331 | 361 | 371 | 357 | 327 | 295 |
| 45.0° | 255 | 275 | 315 | 350 | 362 | 346 | 308 | 270 |
| 50.0° | 223 | 249 | 297 | 340 | 352 | 335 | 290 | 243 |
| 55.0° | 192 | 224 | 281 | 328 | 341 | 322 | 271 | 217 |
| 60.0° | 160 | 198 | 263 | 315 | 328 | 308 | 253 | 190 |
| 65.0° | 128 | 175 | 245 | 302 | 314 | 294 | 234 | 163 |
| 70.0° | 95 | 151 | 228 | 287 | 300 | 281 | 216 | 138 |
| 75.0° | 64 | 128 | 212 | 272 | 287 | 264 | 198 | 114 |
| 80.0° | 35 | 107 | 194 | 257 | 274 | 249 | 180 | 92 |
| 85.0° | 11 | 85 | 152 | 191 | 200 | 189 | 147 | 70 |
| 90.0° | 0 | 42 | 87 | 118 | 126 | 113 | 78 | 32 |
| 95.0° | 2 | 59 | 133 | 167 | 175 | 160 | 118 | 43 |
| 100.0° | 7 | 56 | 141 | 204 | 219 | 197 | 127 | 40 |
| 105.0° | 15 | 54 | 134 | 192 | 206 | 185 | 119 | 41 |
| 110.0° | 23 | 56 | 126 | 180 | 192 | 172 | 113 | 45 |
| 115.0° | 30 | 58 | 119 | 158 | 172 | 151 | 108 | 47 |
| 120.0° | 37 | 60 | 108 | 143 | 160 | 136 | 102 | 50 |
| 125.0° | 43 | 60 | 92 | 131 | 145 | 125 | 91 | 46 |
| 130.0° | 47 | 50 | 90 | 121 | 135 | 115 | 84 | 31 |
| 135.0° | 49 | 34 | 88 | 116 | 124 | 110 | 81 | 30 |
| 140.0° | 52 | 36 | 89 | 109 | 117 | 103 | 74 | 34 |
| 145.0° | 56 | 38 | 82 | 106 | 110 | 98 | 52 | 42 |
| 150.0° | 61 | 42 | 62 | 95 | 101 | 81 | 42 | 57 |
| 155.0° | 65 | 48 | 47 | 67 | 68 | 47 | 48 | 62 |
| 160.0° | 63 | 55 | 47 | 49 | 48 | 47 | 63 | 62 |
| 165.0° | 62 | 67 | 55 | 54 | 51 | 58 | 61 | 56 |
| 170.0° | 61 | 67 | 73 | 71 | 60 | 60 | 52 | 51 |
| 175.0° | 59 | 62 | 50 | 58 | 62 | 55 | 59 | 59 |
| 180.0° | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

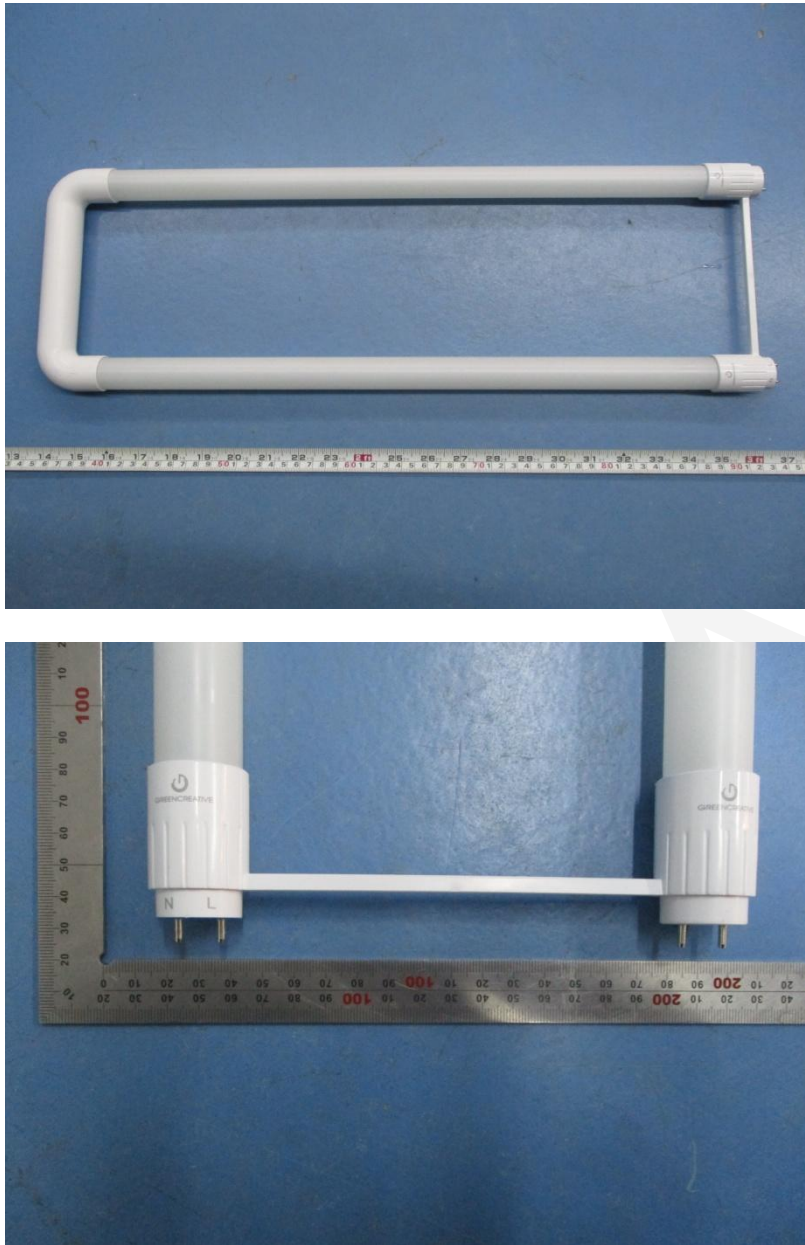
Luminous Intensity (cd) Distribution Data (cont.)

| C γ | 180° | 202.5° | 225° | 247.5° | 270° | 292.5° | 315° | 337.5° |
|--------|------|--------|------|--------|------|--------|------|--------|
| 0.0° | 411 | 411 | 411 | 411 | 411 | 411 | 411 | 411 |
| 5.0° | 409 | 408 | 410 | 411 | 411 | 411 | 409 | 408 |
| 10.0° | 402 | 403 | 406 | 408 | 409 | 408 | 405 | 402 |
| 15.0° | 390 | 393 | 399 | 405 | 406 | 404 | 397 | 392 |
| 20.0° | 375 | 379 | 390 | 398 | 401 | 397 | 388 | 377 |
| 25.0° | 355 | 362 | 378 | 390 | 394 | 388 | 374 | 360 |
| 30.0° | 334 | 343 | 363 | 381 | 386 | 379 | 358 | 340 |
| 35.0° | 308 | 321 | 348 | 370 | 375 | 366 | 342 | 317 |
| 40.0° | 281 | 297 | 330 | 357 | 365 | 354 | 323 | 292 |
| 45.0° | 252 | 272 | 311 | 344 | 352 | 339 | 303 | 266 |
| 50.0° | 222 | 246 | 292 | 329 | 339 | 324 | 283 | 239 |
| 55.0° | 190 | 220 | 272 | 314 | 325 | 308 | 263 | 211 |
| 60.0° | 158 | 193 | 253 | 299 | 312 | 293 | 242 | 183 |
| 65.0° | 125 | 169 | 234 | 284 | 297 | 277 | 223 | 157 |
| 70.0° | 94 | 144 | 214 | 268 | 282 | 262 | 203 | 132 |
| 75.0° | 62 | 121 | 197 | 252 | 265 | 246 | 186 | 108 |
| 80.0° | 33 | 100 | 179 | 236 | 249 | 229 | 168 | 87 |
| 85.0° | 9 | 77 | 147 | 185 | 190 | 178 | 138 | 66 |
| 90.0° | 0 | 35 | 75 | 102 | 108 | 97 | 69 | 29 |
| 95.0° | 0 | 51 | 107 | 135 | 141 | 135 | 108 | 40 |
| 100.0° | 7 | 48 | 126 | 182 | 195 | 178 | 116 | 38 |
| 105.0° | 14 | 46 | 118 | 172 | 184 | 168 | 109 | 38 |
| 110.0° | 22 | 49 | 111 | 162 | 173 | 155 | 103 | 43 |
| 115.0° | 29 | 51 | 105 | 140 | 155 | 137 | 98 | 45 |
| 120.0° | 38 | 52 | 97 | 128 | 145 | 123 | 93 | 48 |
| 125.0° | 45 | 52 | 87 | 118 | 132 | 115 | 84 | 44 |
| 130.0° | 48 | 41 | 82 | 112 | 124 | 109 | 79 | 30 |
| 135.0° | 51 | 29 | 81 | 106 | 116 | 104 | 78 | 29 |
| 140.0° | 54 | 31 | 77 | 101 | 109 | 100 | 75 | 31 |
| 145.0° | 58 | 38 | 67 | 95 | 103 | 94 | 63 | 41 |
| 150.0° | 62 | 46 | 41 | 81 | 93 | 81 | 40 | 49 |
| 155.0° | 65 | 59 | 41 | 48 | 66 | 46 | 40 | 61 |
| 160.0° | 61 | 63 | 47 | 44 | 45 | 44 | 49 | 62 |
| 165.0° | 56 | 58 | 60 | 50 | 51 | 53 | 64 | 62 |
| 170.0° | 54 | 52 | 61 | 61 | 68 | 72 | 68 | 61 |
| 175.0° | 55 | 50 | 51 | 61 | 59 | 57 | 57 | 55 |
| 180.0° | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Zonal Lumen Density Measurement

| Deg | Flux (lm) | % | Deg | Flux (lm) | % |
|---------|-----------|------|-------|-----------|--------|
| 0-5 | 9.8 | 0.46 | 0-5 | 9.8 | 0.46 |
| 5-10 | 29.1 | 1.37 | 0-10 | 38.9 | 1.83 |
| 10-15 | 47.6 | 2.24 | 0-15 | 86.5 | 4.07 |
| 15-20 | 64.7 | 3.04 | 0-20 | 151.2 | 7.11 |
| 20-25 | 80.0 | 3.76 | 0-25 | 231.2 | 10.87 |
| 25-30 | 93.0 | 4.38 | 0-30 | 324.2 | 15.25 |
| 30-35 | 103.8 | 4.88 | 0-35 | 428.0 | 20.13 |
| 35-40 | 111.9 | 5.26 | 0-40 | 539.9 | 25.39 |
| 40-45 | 117.4 | 5.52 | 0-45 | 657.3 | 30.91 |
| 45-50 | 120.3 | 5.66 | 0-50 | 777.5 | 36.57 |
| 50-55 | 120.7 | 5.68 | 0-55 | 898.2 | 42.24 |
| 55-60 | 118.8 | 5.59 | 0-60 | 1017.1 | 47.83 |
| 60-65 | 115.0 | 5.41 | 0-65 | 1132.0 | 53.24 |
| 65-70 | 109.4 | 5.14 | 0-70 | 1241.4 | 58.38 |
| 70-75 | 102.4 | 4.82 | 0-75 | 1343.9 | 63.20 |
| 75-80 | 94.4 | 4.44 | 0-80 | 1438.3 | 67.64 |
| 80-85 | 79.9 | 3.76 | 0-85 | 1518.2 | 71.40 |
| 85-90 | 53.8 | 2.53 | 0-90 | 1572.0 | 73.93 |
| 90-95 | 45.9 | 2.16 | 0-95 | 1617.9 | 76.09 |
| 95-100 | 58.6 | 2.76 | 0-100 | 1676.5 | 78.85 |
| 100-105 | 61.4 | 2.89 | 0-105 | 1738.0 | 81.74 |
| 105-110 | 57.5 | 2.70 | 0-110 | 1795.5 | 84.44 |
| 110-115 | 52.7 | 2.48 | 0-115 | 1848.2 | 86.92 |
| 115-120 | 47.4 | 2.23 | 0-120 | 1895.6 | 89.15 |
| 120-125 | 42.3 | 1.99 | 0-125 | 1937.9 | 91.14 |
| 125-130 | 36.8 | 1.73 | 0-130 | 1974.7 | 92.87 |
| 130-135 | 31.9 | 1.50 | 0-135 | 2006.6 | 94.37 |
| 135-140 | 28.0 | 1.32 | 0-140 | 2034.6 | 95.68 |
| 140-145 | 24.3 | 1.14 | 0-145 | 2058.9 | 96.83 |
| 145-150 | 20.0 | 0.94 | 0-150 | 2078.9 | 97.77 |
| 150-155 | 15.1 | 0.71 | 0-155 | 2094.0 | 98.48 |
| 155-160 | 11.3 | 0.53 | 0-160 | 2105.3 | 99.01 |
| 160-165 | 9.1 | 0.43 | 0-165 | 2114.4 | 99.44 |
| 165-170 | 7.1 | 0.33 | 0-170 | 2121.4 | 99.77 |
| 170-175 | 4.2 | 0.20 | 0-175 | 2125.7 | 99.97 |
| 175-180 | 0.7 | 0.03 | 0-180 | 2126.3 | 100.00 |

6. Product Photo



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