



IES LM-79-19

MEASUREMENT AND TEST REPORT

For

GREEN CREATIVE LTD

Room 3603, Level 36, Tower 1, Enterprise Square Five, 38 Wang Chiu Road, Kowloon Bay, KL, Hong Kong

Test Model:

PXCYL6/SM/LEM9027/KDIM010UNV/SP/WH/WH

| | |
|-----------------------|--|
| Report Type: | Electrical and Photometric tests including: Input Current, Power, Power Factor, Luminous Flux, Luminous Efficacy, CRI, CCT, Chromaticity Coordinate, Spectral Power Distribution, In situ Temperature Measurement Test |
| Reviewed By: | Hexy He <i>Hexy He</i> |
| Report Number: | KS2210917-48732E-10-6 |
| Test Date: | 2021-10-13 to 2021-10-14 |
| Report Date: | 2021-11-18 |
| Approved by: | Bill Xiong / EE Engineer |
| Prepared By: | Bay Area Compliance Laboratories Corp. (Dongguan). No.12, Pulong East 1 st Road, Tangxia Town, Dongguan, Guangdong, China. Tel: +86-0769-86858888 Fax: +86-0769-86858588 |

1. Product Description

General Information:

One test sample was in good condition and received on 2021-09-17, and used for testing.

Model Tested: PXCYL6/SM/LEM9027/KDIM010UNV/SP/WH/WH
 Manufacturer: GREEN CREATIVE LTD
 Brand Name: GREEN CREATIVE
 Product Designation: LED Surface Downlight
 Burning Time Before Test: 0hour(For New Products)

#Rated Values:

Rated Voltage/Frequency: 120-277V 50/60Hz
 Rated Power: 31.5W
 Nominal CCT: 2700K
 Nominal Lumen Output: 1960lm

2. Standards Used

- ANSI/IES LM-79-19: Approved method :Optical and Electrical Measurements of Solid-State Lighting Products
- ANSI C82.77-10-2014: Harmonic Emission Limits – Related Power Quality Requirements for Lighting
- IES TM-30-18: IES Method for Evaluating Light Source Color Rendition (This method is not in IAS accreditation scope)
- ANSI/UL 1993-2012: Standard for Safety of Self-Ballasted Lamps and Lamp Adapters
- ANSI/UL 8750-2015: Standard for Light Emitting Diode (LED) Equipment for Use in Lighting Products
- ANSI/UL 153-2014: Standard for Safety of Portable Electric Luminaires
- ANSI/UL 1598-2008: Standard for Safety of Luminaires

3. Description of Test Equipment

| Device | Manufacture | Model No | Serial No | Calibration date | Calibration due date |
|---|-------------|-----------|------------------|------------------|----------------------|
| 1.5m temperature integrating sphere | SENSING | SPR-600 | S09008 | 2020-10-21 | 2021-10-20 |
| High-precision rapid spectral analysis system | EVERFINE | HAAS-2000 | M112048CA1361125 | 2020-10-21 | 2021-10-20 |
| Digital power meter | YOKOGAWA | WT310 | 13398 | 2021-06-30 | 2022-06-29 |
| Programmable Precision DC Power Supply | EVERFINE | WY5015 | 11060010 | 2021-06-30 | 2022-06-29 |
| thermometer | SENSING | NA | NA | 2021-03-13 | 2022-03-12 |
| Standard Light Source | EVERFINE | D204 | N/A | 2020-10-20 | 2021-10-19 |
| Precision frequency power supply | ALL Power | APW-105N | 970613 | 2021-01-04 | 2022-01-03 |
| Multimeter | FLUKE | 17B | 1573 1328 | 2020-10-30 | 2021-10-29 |
| Hybrid Recorder | YOKOGAWA | DR240 | 10# | 2021-02-24 | 2022-02-23 |
| AC POWER SUPPLY | HengPu | HPA 1103 | 0003394 | 2021-01-04 | 2022-01-03 |

Statement of Traceability: Bay Area Compliance Laboratories Corp. (Dongguan) 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 ANSI/IES LM-79-19. The product was operated at rated voltage or at voltage required by manufacturer. The ambient temperature of the sample was maintained at $25^{\circ}\text{C} \pm 1.2^{\circ}\text{C}$ during measurement. And relative humidity is maintained between 10% and 65%. The air flow around the SSL product is less than 0.2m/s.

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 $U=2.1\%$ ($K=2$), at the 95% confidence level. The uncertainty of the correlated color temperature measurements is $U=22\text{K}$ ($K=2$), at the 95% confidence level. The uncertainty of the CRI is $U=2.1(K=2)$, at the 95% confidence level.

The uncertainty of power meter AC current $U=0.39\%$ of rdg, AC Voltage $U=0.25\%$ of rdg, Power $U=0.42\%$ ($K=2$), at the 95% confidence level.

Fidelity Index and Gamut Index Calculation

The R_i , R_g was calculated according to IES TM-30-18 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.

In situ Temperature Measurement Test

The sample was operated until constant temperatures were obtained. A temperature was considered constant if the sample was operating for at least three hours and upon three successive readings - taken at 15 minute intervals - were within one degree and were not rising. Thermocouples were attached at locations described in the results by means of a cement made of water glass and Fuller's earth, solder, or epoxy.

The LED which has the highest temperature was measured at the location of LED case which is specified by LED source manufacturer and detailed by LM-80 report.

The drive current of LED package/module/ array was calculated as the total output current of the driver measured by multimeter, divided by the number of branches in parallel of LEDs.

5. Test Result

[Integrating Sphere System]

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

Test orientation: **Downward**

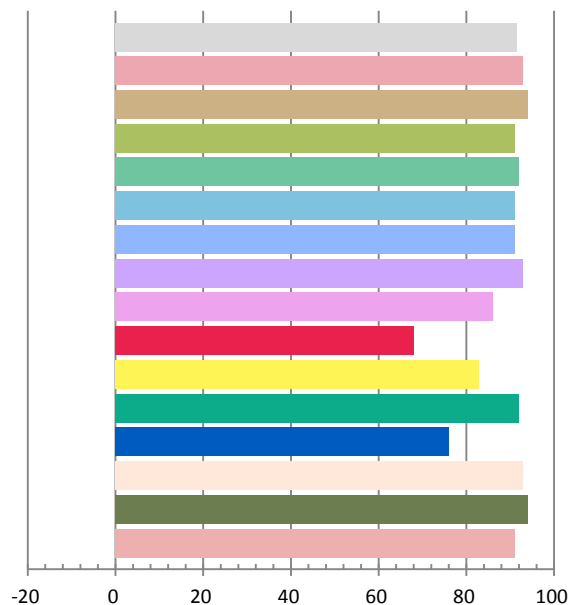
Photometric and Electrical Measurement Result

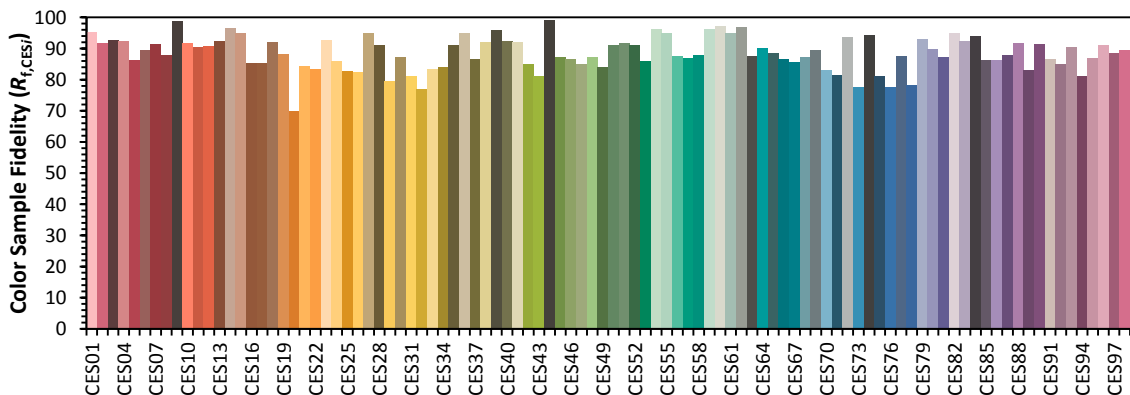
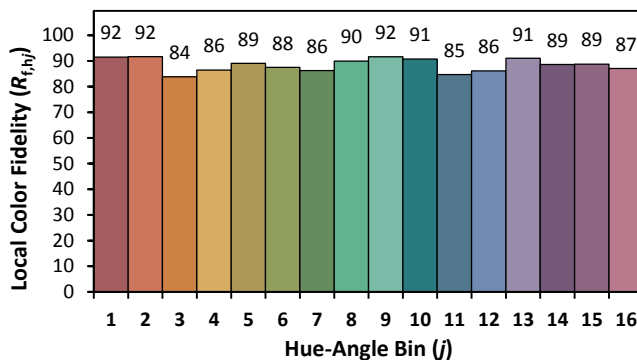
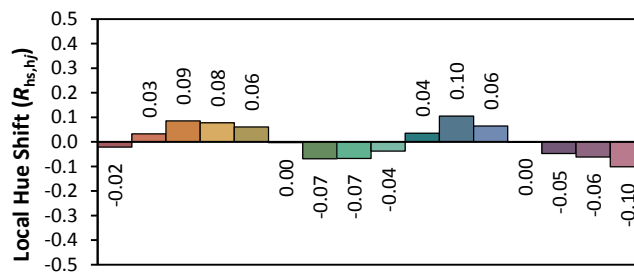
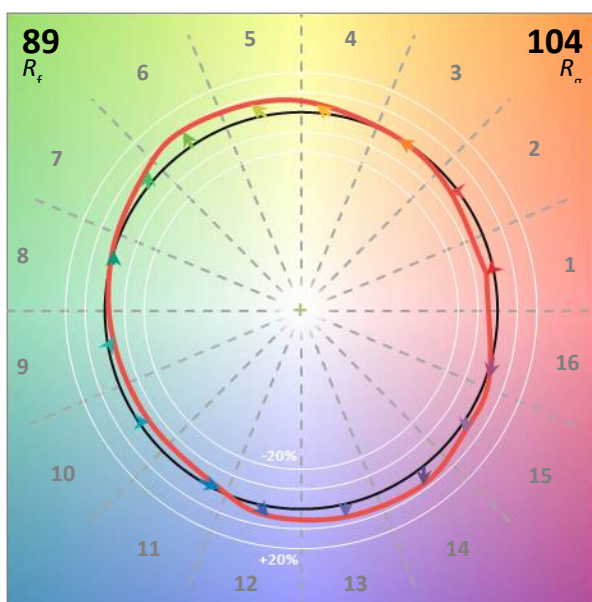
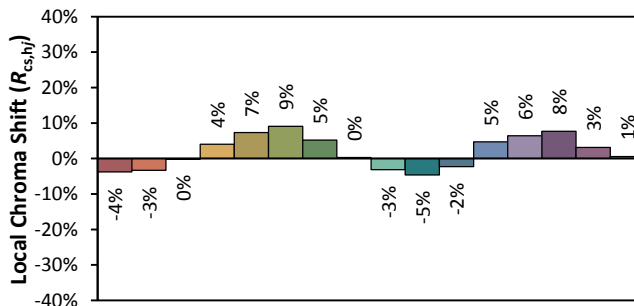
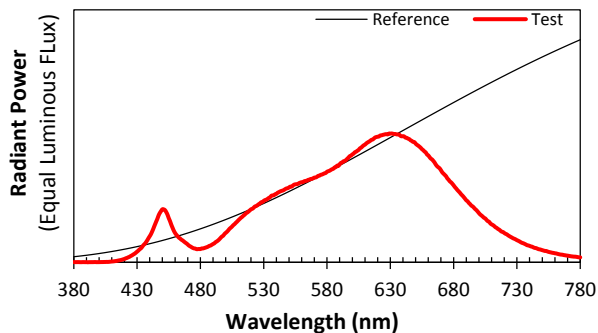
| Voltage (V) | Frequency (Hz) | Current (A) | Power (W) | Power Factor | Luminous Flux(lm) | Efficacy (lm/W) |
|-------------|----------------|-------------|-----------|--------------|-------------------|-----------------|
| 120.1 | 60 | 0.2535 | 30.22 | 0.9929 | 2026.7 | 67.07 |

| Radiant Flux (W) | CCT (K) | Duv | x | y | u' | v' |
|------------------|---------|----------|--------|--------|--------|--------|
| 7.4191 | 2669 | -0.00108 | 0.4605 | 0.4078 | 0.2642 | 0.5264 |

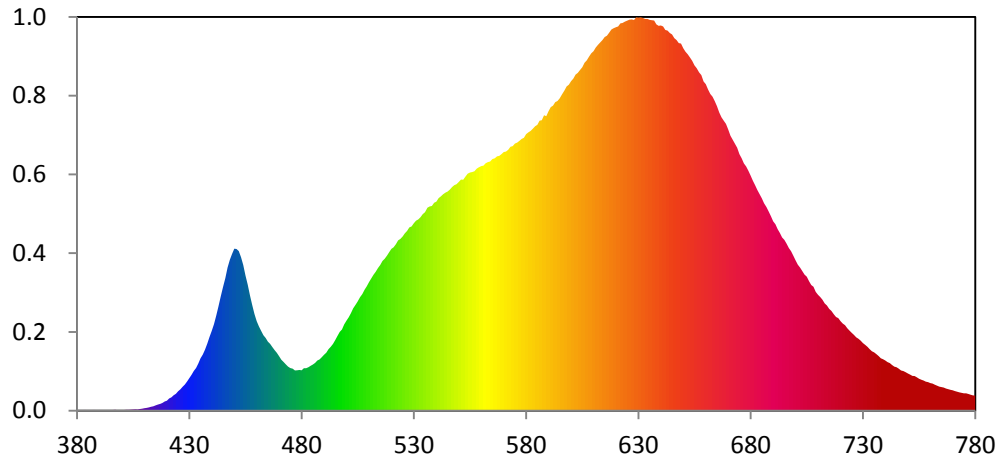
Color Rendering Index

| | | | |
|------------|------------|------------|------------|
| Ra | | | |
| 91.5 | | | |
| R1 | R2 | R3 | R4 |
| 93 | 94 | 91 | 92 |
| R5 | R6 | R7 | R8 |
| 91 | 91 | 93 | 86 |
| R9 | R10 | R11 | R12 |
| 68 | 83 | 92 | 76 |
| R13 | R14 | R15 | |
| 93 | 94 | 91 | |





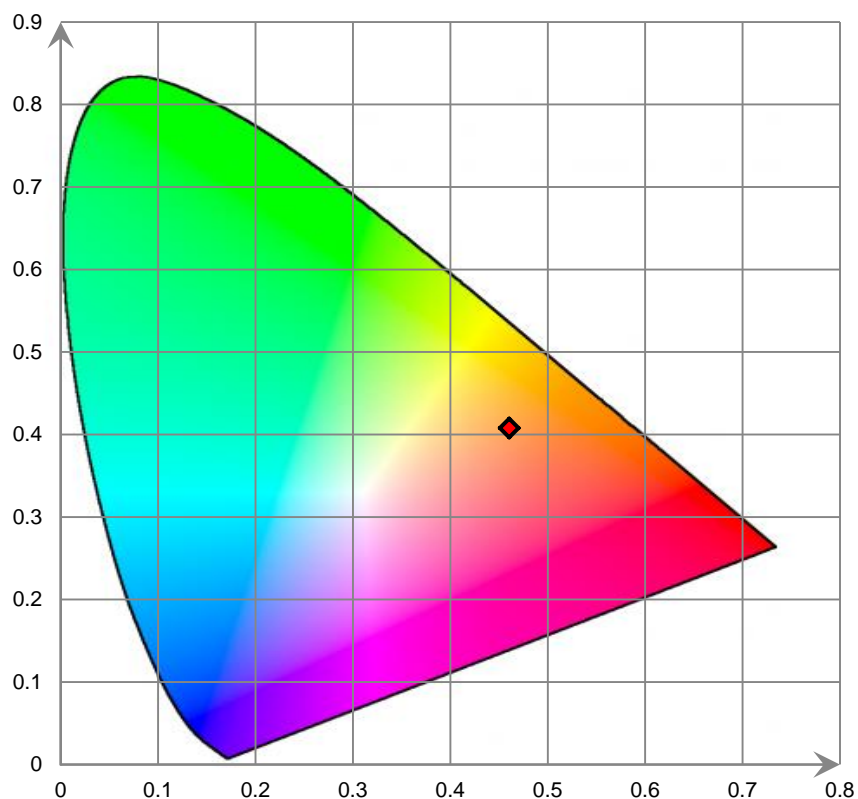
Relative Spectral Power Distribution



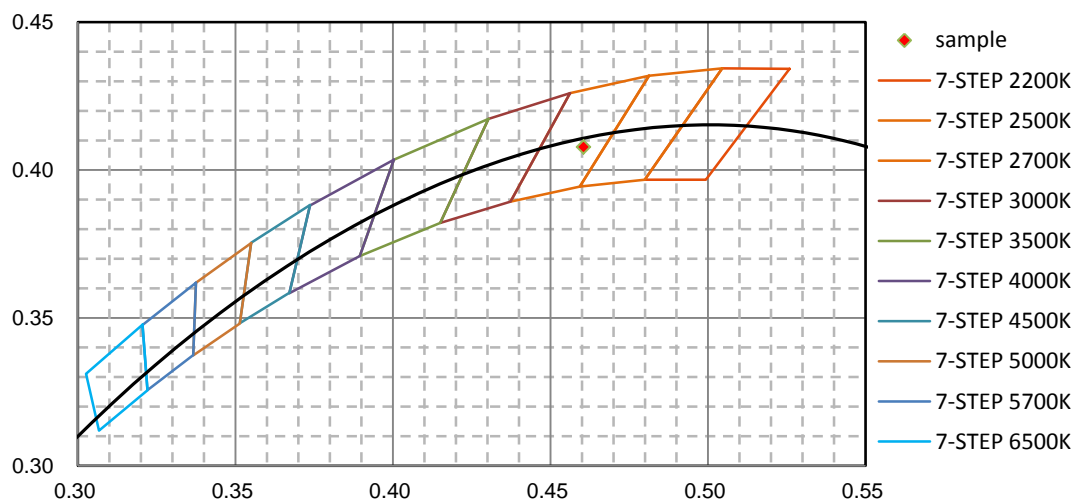
| nm | mW | nm | mW | nm | mW | nm | mW | nm | mW |
|-----|-----------|-----|-----------|-----|-----------|-----|-----------|-----|-----------|
| 380 | 9.534E-02 | 421 | 1.418E+00 | 462 | 9.223E+00 | 503 | 1.182E+01 | 544 | 2.517E+01 |
| 381 | 7.897E-02 | 422 | 1.556E+00 | 463 | 8.716E+00 | 504 | 1.221E+01 | 545 | 2.531E+01 |
| 382 | 7.612E-02 | 423 | 1.782E+00 | 464 | 8.399E+00 | 505 | 1.262E+01 | 546 | 2.553E+01 |
| 383 | 8.187E-02 | 424 | 1.954E+00 | 465 | 7.984E+00 | 506 | 1.312E+01 | 547 | 2.582E+01 |
| 384 | 8.377E-02 | 425 | 2.242E+00 | 466 | 7.714E+00 | 507 | 1.347E+01 | 548 | 2.605E+01 |
| 385 | 5.771E-02 | 426 | 2.464E+00 | 467 | 7.342E+00 | 508 | 1.395E+01 | 549 | 2.616E+01 |
| 386 | 5.729E-02 | 427 | 2.773E+00 | 468 | 6.991E+00 | 509 | 1.436E+01 | 550 | 2.641E+01 |
| 387 | 8.129E-02 | 428 | 3.026E+00 | 469 | 6.675E+00 | 510 | 1.484E+01 | 551 | 2.670E+01 |
| 388 | 8.484E-02 | 429 | 3.382E+00 | 470 | 6.298E+00 | 511 | 1.527E+01 | 552 | 2.667E+01 |
| 389 | 6.189E-02 | 430 | 3.766E+00 | 471 | 5.891E+00 | 512 | 1.570E+01 | 553 | 2.704E+01 |
| 390 | 8.154E-02 | 431 | 4.148E+00 | 472 | 5.632E+00 | 513 | 1.604E+01 | 554 | 2.738E+01 |
| 391 | 2.725E-02 | 432 | 4.597E+00 | 473 | 5.358E+00 | 514 | 1.647E+01 | 555 | 2.750E+01 |
| 392 | 6.650E-02 | 433 | 4.931E+00 | 474 | 5.101E+00 | 515 | 1.682E+01 | 556 | 2.757E+01 |
| 393 | 6.412E-02 | 434 | 5.446E+00 | 475 | 4.919E+00 | 516 | 1.729E+01 | 557 | 2.766E+01 |
| 394 | 7.916E-02 | 435 | 6.057E+00 | 476 | 4.854E+00 | 517 | 1.755E+01 | 558 | 2.794E+01 |
| 395 | 7.129E-02 | 436 | 6.484E+00 | 477 | 4.648E+00 | 518 | 1.791E+01 | 559 | 2.812E+01 |
| 396 | 9.421E-02 | 437 | 7.058E+00 | 478 | 4.668E+00 | 519 | 1.830E+01 | 560 | 2.825E+01 |
| 397 | 1.038E-01 | 438 | 7.735E+00 | 479 | 4.710E+00 | 520 | 1.870E+01 | 561 | 2.831E+01 |
| 398 | 6.724E-02 | 439 | 8.510E+00 | 480 | 4.671E+00 | 521 | 1.888E+01 | 562 | 2.858E+01 |
| 399 | 7.513E-02 | 440 | 9.218E+00 | 481 | 4.901E+00 | 522 | 1.923E+01 | 563 | 2.870E+01 |
| 400 | 7.943E-02 | 441 | 9.984E+00 | 482 | 4.902E+00 | 523 | 1.967E+01 | 564 | 2.879E+01 |
| 401 | 9.204E-02 | 442 | 1.096E+01 | 483 | 5.030E+00 | 524 | 1.984E+01 | 565 | 2.905E+01 |
| 402 | 1.079E-01 | 443 | 1.204E+01 | 484 | 5.185E+00 | 525 | 2.012E+01 | 566 | 2.916E+01 |
| 403 | 1.074E-01 | 444 | 1.317E+01 | 485 | 5.340E+00 | 526 | 2.048E+01 | 567 | 2.937E+01 |
| 404 | 1.293E-01 | 445 | 1.425E+01 | 486 | 5.519E+00 | 527 | 2.076E+01 | 568 | 2.943E+01 |
| 405 | 1.346E-01 | 446 | 1.532E+01 | 487 | 5.793E+00 | 528 | 2.117E+01 | 569 | 2.963E+01 |
| 406 | 1.620E-01 | 447 | 1.653E+01 | 488 | 5.927E+00 | 529 | 2.127E+01 | 570 | 2.987E+01 |
| 407 | 1.500E-01 | 448 | 1.742E+01 | 489 | 6.195E+00 | 530 | 2.165E+01 | 571 | 2.993E+01 |
| 408 | 1.909E-01 | 449 | 1.811E+01 | 490 | 6.467E+00 | 531 | 2.194E+01 | 572 | 3.013E+01 |
| 409 | 2.406E-01 | 450 | 1.872E+01 | 491 | 6.707E+00 | 532 | 2.209E+01 | 573 | 3.048E+01 |
| 410 | 2.968E-01 | 451 | 1.867E+01 | 492 | 7.116E+00 | 533 | 2.236E+01 | 574 | 3.056E+01 |
| 411 | 3.284E-01 | 452 | 1.843E+01 | 493 | 7.393E+00 | 534 | 2.270E+01 | 575 | 3.085E+01 |
| 412 | 3.838E-01 | 453 | 1.774E+01 | 494 | 7.725E+00 | 535 | 2.293E+01 | 576 | 3.096E+01 |
| 413 | 4.541E-01 | 454 | 1.683E+01 | 495 | 8.154E+00 | 536 | 2.344E+01 | 577 | 3.116E+01 |
| 414 | 5.193E-01 | 455 | 1.561E+01 | 496 | 8.640E+00 | 537 | 2.359E+01 | 578 | 3.138E+01 |
| 415 | 6.238E-01 | 456 | 1.455E+01 | 497 | 9.097E+00 | 538 | 2.364E+01 | 579 | 3.152E+01 |
| 416 | 7.161E-01 | 457 | 1.331E+01 | 498 | 9.386E+00 | 539 | 2.401E+01 | 580 | 3.194E+01 |
| 417 | 7.972E-01 | 458 | 1.221E+01 | 499 | 9.976E+00 | 540 | 2.415E+01 | 581 | 3.213E+01 |
| 418 | 9.091E-01 | 459 | 1.118E+01 | 500 | 1.039E+01 | 541 | 2.454E+01 | 582 | 3.230E+01 |
| 419 | 1.067E+00 | 460 | 1.035E+01 | 501 | 1.078E+01 | 542 | 2.475E+01 | 583 | 3.257E+01 |
| 420 | 1.167E+00 | 461 | 9.742E+00 | 502 | 1.127E+01 | 543 | 2.500E+01 | 584 | 3.284E+01 |

| nm | mW | nm | mW | nm | mW | nm | mW | nm | mW |
|-----|-----------|-----|-----------|-----|-----------|-----|-----------|-----|-----------|
| 585 | 3.300E+01 | 626 | 4.516E+01 | 667 | 3.388E+01 | 708 | 1.431E+01 | 749 | 4.448E+00 |
| 586 | 3.349E+01 | 627 | 4.519E+01 | 668 | 3.349E+01 | 709 | 1.373E+01 | 750 | 4.293E+00 |
| 587 | 3.355E+01 | 628 | 4.510E+01 | 669 | 3.312E+01 | 710 | 1.339E+01 | 751 | 4.169E+00 |
| 588 | 3.411E+01 | 629 | 4.542E+01 | 670 | 3.247E+01 | 711 | 1.314E+01 | 752 | 4.023E+00 |
| 589 | 3.401E+01 | 630 | 4.538E+01 | 671 | 3.175E+01 | 712 | 1.282E+01 | 753 | 4.002E+00 |
| 590 | 3.457E+01 | 631 | 4.543E+01 | 672 | 3.128E+01 | 713 | 1.239E+01 | 754 | 3.855E+00 |
| 591 | 3.506E+01 | 632 | 4.535E+01 | 673 | 3.083E+01 | 714 | 1.215E+01 | 755 | 3.689E+00 |
| 592 | 3.523E+01 | 633 | 4.525E+01 | 674 | 3.037E+01 | 715 | 1.177E+01 | 756 | 3.584E+00 |
| 593 | 3.563E+01 | 634 | 4.525E+01 | 675 | 2.963E+01 | 716 | 1.153E+01 | 757 | 3.483E+00 |
| 594 | 3.575E+01 | 635 | 4.512E+01 | 676 | 2.915E+01 | 717 | 1.114E+01 | 758 | 3.365E+00 |
| 595 | 3.608E+01 | 636 | 4.509E+01 | 677 | 2.856E+01 | 718 | 1.081E+01 | 759 | 3.312E+00 |
| 596 | 3.652E+01 | 637 | 4.505E+01 | 678 | 2.820E+01 | 719 | 1.069E+01 | 760 | 3.193E+00 |
| 597 | 3.696E+01 | 638 | 4.461E+01 | 679 | 2.771E+01 | 720 | 1.035E+01 | 761 | 3.140E+00 |
| 598 | 3.745E+01 | 639 | 4.444E+01 | 680 | 2.715E+01 | 721 | 1.007E+01 | 762 | 3.003E+00 |
| 599 | 3.764E+01 | 640 | 4.448E+01 | 681 | 2.655E+01 | 722 | 9.873E+00 | 763 | 2.897E+00 |
| 600 | 3.805E+01 | 641 | 4.437E+01 | 682 | 2.604E+01 | 723 | 9.536E+00 | 764 | 2.781E+00 |
| 601 | 3.834E+01 | 642 | 4.396E+01 | 683 | 2.549E+01 | 724 | 9.252E+00 | 765 | 2.729E+00 |
| 602 | 3.881E+01 | 643 | 4.389E+01 | 684 | 2.501E+01 | 725 | 8.989E+00 | 766 | 2.678E+00 |
| 603 | 3.902E+01 | 644 | 4.361E+01 | 685 | 2.453E+01 | 726 | 8.745E+00 | 767 | 2.569E+00 |
| 604 | 3.936E+01 | 645 | 4.344E+01 | 686 | 2.396E+01 | 727 | 8.482E+00 | 768 | 2.497E+00 |
| 605 | 3.966E+01 | 646 | 4.303E+01 | 687 | 2.352E+01 | 728 | 8.302E+00 | 769 | 2.416E+00 |
| 606 | 4.019E+01 | 647 | 4.281E+01 | 688 | 2.300E+01 | 729 | 8.082E+00 | 770 | 2.359E+00 |
| 607 | 4.046E+01 | 648 | 4.245E+01 | 689 | 2.245E+01 | 730 | 7.817E+00 | 771 | 2.274E+00 |
| 608 | 4.088E+01 | 649 | 4.240E+01 | 690 | 2.187E+01 | 731 | 7.615E+00 | 772 | 2.196E+00 |
| 609 | 4.127E+01 | 650 | 4.186E+01 | 691 | 2.154E+01 | 732 | 7.384E+00 | 773 | 2.118E+00 |
| 610 | 4.151E+01 | 651 | 4.145E+01 | 692 | 2.096E+01 | 733 | 7.106E+00 | 774 | 2.070E+00 |
| 611 | 4.193E+01 | 652 | 4.115E+01 | 693 | 2.053E+01 | 734 | 6.876E+00 | 775 | 2.012E+00 |
| 612 | 4.225E+01 | 653 | 4.079E+01 | 694 | 2.001E+01 | 735 | 6.733E+00 | 776 | 2.000E+00 |
| 613 | 4.252E+01 | 654 | 4.040E+01 | 695 | 1.973E+01 | 736 | 6.530E+00 | 777 | 1.939E+00 |
| 614 | 4.280E+01 | 655 | 3.989E+01 | 696 | 1.929E+01 | 737 | 6.307E+00 | 778 | 1.851E+00 |
| 615 | 4.316E+01 | 656 | 3.955E+01 | 697 | 1.879E+01 | 738 | 6.060E+00 | 779 | 1.769E+00 |
| 616 | 4.330E+01 | 657 | 3.907E+01 | 698 | 1.841E+01 | 739 | 5.954E+00 | 780 | 1.755E+00 |
| 617 | 4.364E+01 | 658 | 3.875E+01 | 699 | 1.790E+01 | 740 | 5.802E+00 | | |
| 618 | 4.402E+01 | 659 | 3.802E+01 | 700 | 1.736E+01 | 741 | 5.618E+00 | | |
| 619 | 4.418E+01 | 660 | 3.770E+01 | 701 | 1.687E+01 | 742 | 5.508E+00 | | |
| 620 | 4.429E+01 | 661 | 3.710E+01 | 702 | 1.652E+01 | 743 | 5.283E+00 | | |
| 621 | 4.437E+01 | 662 | 3.658E+01 | 703 | 1.613E+01 | 744 | 5.098E+00 | | |
| 622 | 4.472E+01 | 663 | 3.626E+01 | 704 | 1.571E+01 | 745 | 5.028E+00 | | |
| 623 | 4.478E+01 | 664 | 3.575E+01 | 705 | 1.547E+01 | 746 | 4.853E+00 | | |
| 624 | 4.493E+01 | 665 | 3.516E+01 | 706 | 1.496E+01 | 747 | 4.656E+00 | | |
| 625 | 4.504E+01 | 666 | 3.443E+01 | 707 | 1.452E+01 | 748 | 4.573E+00 | | |

CIE 1931 x y Chromaticity Diagram

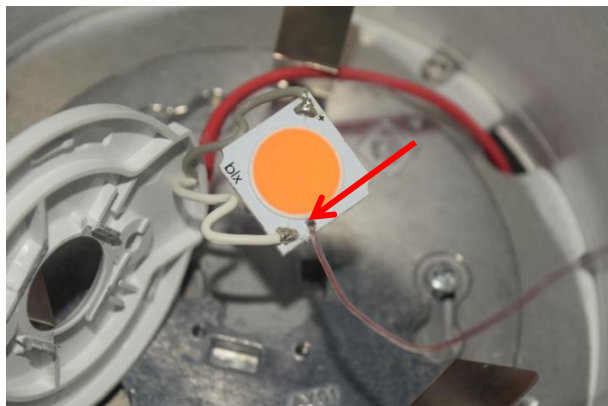


7-Step Chromaticity Quadrangles

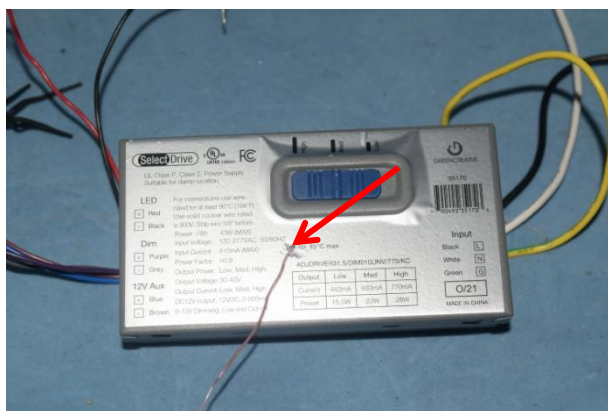


[In situ Temperature Measurement Test]

Temperature measurement point of LED light source (TMP_{LED})

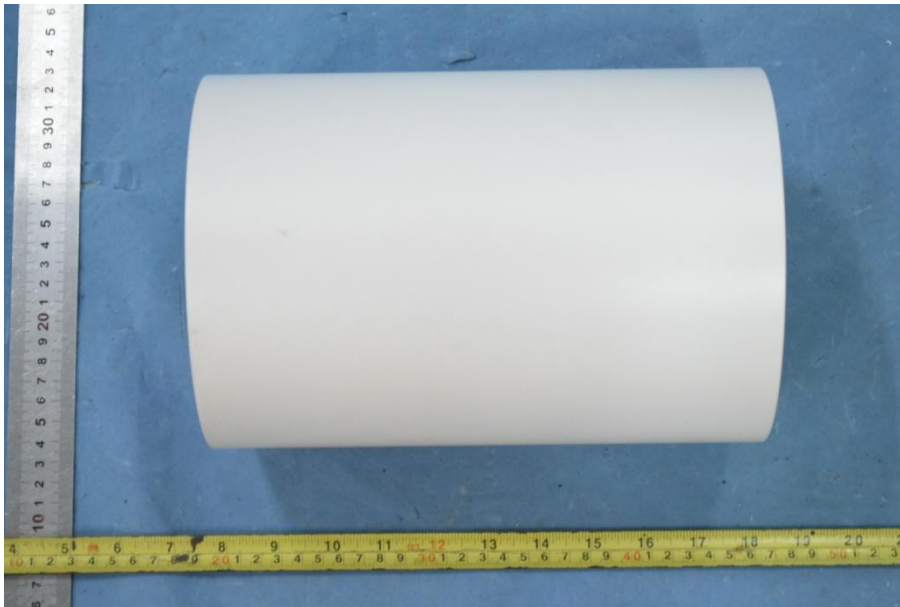
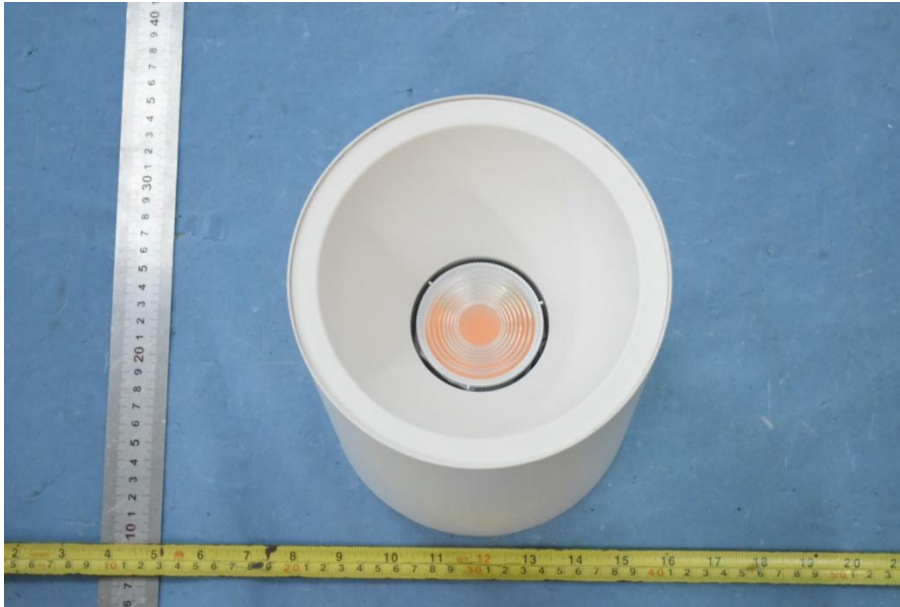


Temperature measurement point of driver (TMP_c)



| | |
|---|----------------------|
| Sample No. | KS2210917-48732E-S07 |
| Type of Thermocouples: | T |
| Test Duration | ≥3.5 hours |
| Maximum Recommended Driver Case Temperature | 90°C |
| Test Location | Test Result |
| TMP _{LED} | 67.9°C |
| TMP _c | 62.4°C |
| Driver Current of LED | Test Result |
| I _F (mA) | 777mA |

6. Product Photo



Directions

1. The information marked "superscript #" is provided by the applicant, the laboratory is not responsible for its authenticity and this information can affect the validity of the result in the test report.
2. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.
3. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.
4. The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval.
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