

## Photometric Test Report

### Relevant Standards

- ☒ IES LM-79-2008
- ☒ ANSI C82.77-2017

Prepared For

**RAB Lighting Inc.**

Prepared By

**Dongguan New Testing Centre Co., Ltd.**

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Date: 2023-06-13

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Issue Date: 2023-06-13

Revised Date: N/A

## 1.0 Test Summary

DLC Technical Requirements V5.1

| Outdoor Non-Cutoff and Semi-Cutoff Wall-Mounted Area Luminaires                      |                                |                      |          |            |
|--|--------------------------------|----------------------|----------|------------|
| Requirement Category   | Test Method                    | Requirements         |          | Test Value |
| Luminaire Output (lm)<br>(Goniophotometer – Section 4.2) (0°-180° zones)             | IES LM-79-2008                 | N/A                  |          | 21852      |
| Minimum Luminaire Efficacy (lm/W)<br>(Goniophotometer – Section 4.2) (0°-180° zones) | IES LM-79-2008                 | N/A                  |          | 158.5      |
| Luminaire Output (lm)<br>(Goniophotometer – Section 4.2) (0°-90° zones)              | IES LM-79-2008                 | 300                  |          | 21062      |
| Minimum Luminaire Efficacy (lm/W)<br>(Goniophotometer – Section 4.2) (0°-90° zones)  | IES LM-79-2008                 | Standard             | Premium  | 152.7      |
|  |                                | 105                  | 120      |            |
| Power (Input Wattage) (W)<br>(Goniophotometer – Section 4.2)                         | IES LM-79-2008                 | Worst Case           |          | 137.9      |
| Total Harmonic Distortion (A%)<br>(THD & PF – Section 4.3)                           | ANSI C82.77:2014               | 20.00%               | 120V     | 3.53       |
|  |                                |                      | 277V     | 8.91       |
| Power Factor<br>(THD & PF – Section 4.3)   | ANSI C82.77:2014               | 0.9                  | 120V     | 0.997      |
|  |                                |                      | 277V     | 0.932      |
| Allowable CCTs* (K)<br>(Integrating Sphere – Section 4.1)                            | IES LM-79-2008                 | 7 steps              | 3985±275 | 3922       |
|  |                                | 4 steps              | 3985±154 |            |
| Minimum CRI<br>(Integrating Sphere – Section 4.1)                                    | IES LM-79-2008<br>CIE13.3-1995 | ≥70                  |          | 75.2       |
| Minimum R9<br>(Integrating Sphere – Section 4.1)                                     | IES LM-79-2008<br>CIE13.3-1995 | N/A                  |          | -23        |
| Minimum Rf<br>(Integrating Sphere – Section 4.1)                                     | ANSI/IES TM-30-18              | ≥70                  |          | 77         |
| Minimum Rg<br>(Integrating Sphere – Section 4.1)                                     | ANSI/IES TM-30-18              | ≥89                  |          | 93         |
| IES Rcs,h1<br>(Integrating Sphere – Section 4.1)                                     | ANSI/IES TM-30-18              | -18%≤IES Rcs,h1≤+23% |          | -17%       |
| Zonal Lumen Requirement (80°-90°)<br>(Goniophotometer – Section 4.2)                 | IES LM-79-2008                 | ≤10%                 |          | 7.6%       |
| Input Voltage (V)  |                                |                      |          |            |
| (Goniophotometer – Section 4.2)  | IES LM-79-2008                 | Worst Cast           |          | 120.0      |
| (Goniophotometer – Section 4.2)  |                                | Non-Worst Case       |          | 277.0      |
| Input Current (A)  |                                |                      |          |            |
| (Goniophotometer – Section 4.2)  | IES LM-79-2008                 | Worst Case           |          | 1.153      |
| (Goniophotometer – Section 4.2)  |                                | Non-Worst Case       |          | 0.520      |
| Power (Input Wattage – W)  |                                |                      |          |            |
| (Goniophotometer – Section 4.2)  | IES LM-79-2008                 | Worst Case           |          | 137.9      |
| (Goniophotometer – Section 4.2)  |                                | Non-Worst Case       |          | 134.4      |

## 2.0 Test List

| Test Item | Test                    | Test Date  | Model Number        | Sample No.   |
|-----------|-------------------------|------------|---------------------|--------------|
| 1         | Integrating Sphere Test | 2023-06-12 | W34L @ 150W / 4000K | 230612001-S1 |
| 2         | Goniophotometer Test    | 2023-06-12 | W34L @ 150W / 4000K | 230612001-S1 |
| 3         | THD and PF Test         | 2023-06-12 | W34L @ 150W / 4000K | 230612001-S1 |

### Remark (If any)

1. The results contained in this report pertain only to the tested samples.
2. This report shall not be reproduced, no limited part or full, without approval of Dongguan New Testing Centre Co., Ltd.
3. This report does not imply product certification, approval, or endorsement by NVLAP, or any agency of the Federal Government.

## 3.0 Product Description

Luminaire Description: Model No. W34L @ 150W / 4000K, color tunable from 3000K, 4000K and 5000K.

Electrical Specification: 120-277Vac, 50/60Hz

### Photos of Luminaire Characteristics



## 4.0 LM-79 Measurement and Test Results

### 4.1 Integrating Sphere Test

|                            |                     |                                  |              |
|----------------------------|---------------------|----------------------------------|--------------|
| <b>Model No.</b>           | W34L @ 150W / 4000K | <b>Sample ID</b>                 | 230612001-S1 |
| <b>Operate time (Min.)</b> | 10                  | <b>Stabilization time (Min.)</b> | 60           |
| <b>Temperature (°C)</b>    | 25.4                | <b>Humidity (%RH)</b>            | 41.0         |

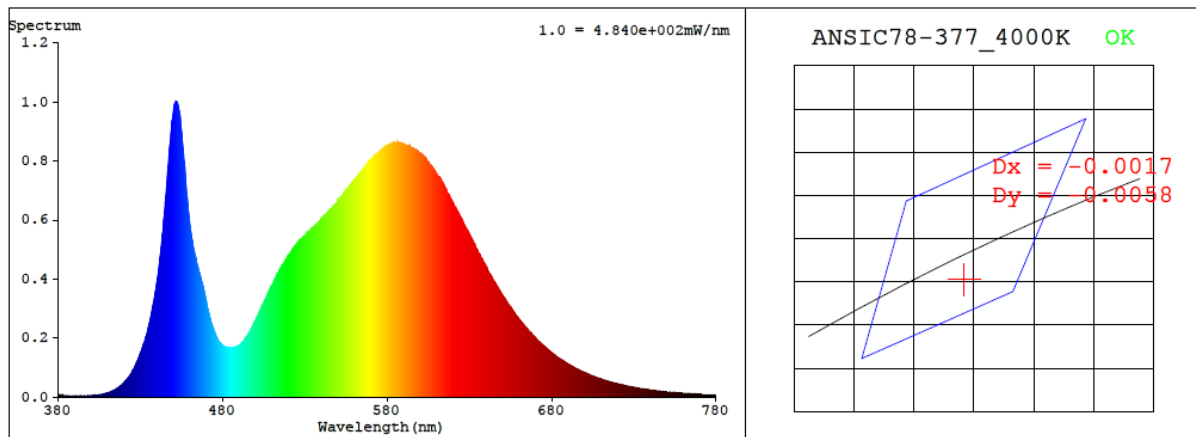
|   |
|---|
| <b>Test Method</b>  |
| <p>The Samples were tested according to the IES LM-79-2008.</p> <p>Photometric parameters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at 25±1°C.</p> <p>The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere.</p> <p>The voltage of an AC power supply (RMS voltage) or DC power supply (instantaneous voltage) applied to the device under test shall be regulated to within ±0.2 percent under load.</p> <p>The sample was measured using 4<math>\pi</math> geometry and operated at rated voltage and was stabilized before measurement. Chromaticity coordinates, correlated color temperature and color rendering index were calculated from the spectral radiant flux measurements taken at 1 nm intervals over the range of 380 to 780nm.</p> |

#### Test Result

| Voltage (Vac) | Frequency (Hz) | Current (A) | Power (W) | Power Factor |
|---------------|----------------|-------------|-----------|--------------|
| 120.0         | 60             | 1.153       | 137.9     | 0.997        |
| 277.0         | 60             | 0.520       | 134.4     | 0.932        |

| CCT (K) | CRI  | R9  | Duv     | Rf | Rg | IES Rcs,h1 |
|---------|------|-----|---------|----|----|------------|
| 3922    | 75.2 | -23 | -0.0022 | 77 | 93 | -17%       |

## 4.1 Integrating Sphere Test



### Colorimetric Parameters

Chromaticity Coordinate:  $x = 0.3822$   $y = 0.3732$  /  $u' = 0.2277$   $v' = 0.5003$  ( $duv = -2.21e-03$ )

CCT= 3922K Prcp WL:  $L_d = 580.6nm$  Purity=26.7%

Peak WL:  $L_p = 452nm$  FWHM:  $\approx 20.0nm$  Ratio: R=17.5% G=79.5% B=3.0%

Render Index:  $R_a = 75.2$  AvgR = 66.2 TM30:  $R_f = 77$   $R_g = 94$

EEL: 0.08557 A++ Highest

R1 =72 R2 =84 R3 =92 R4 =72 R5 =72 R6 =76 R7 =81

R8 =53 R9 =-23 R10=61 R11=67 R12=49 R13=75 R14=95 R15=66

## 4.1 Integrating Sphere Test

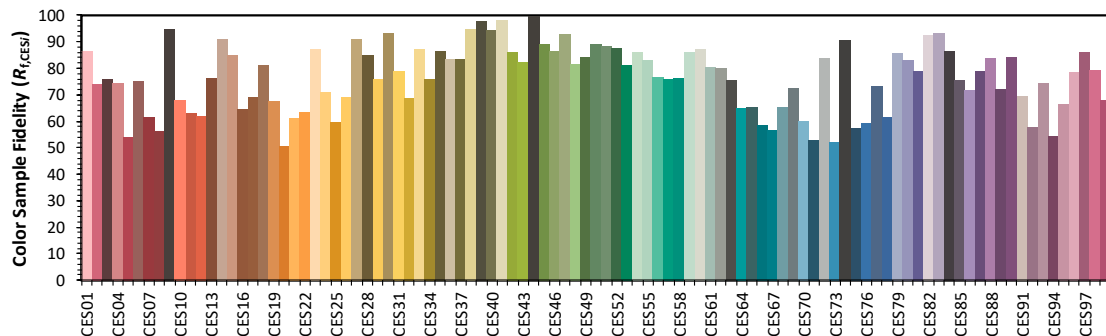
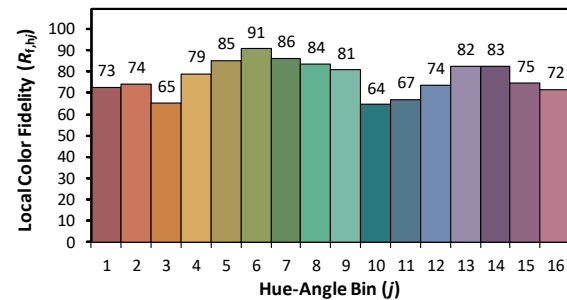
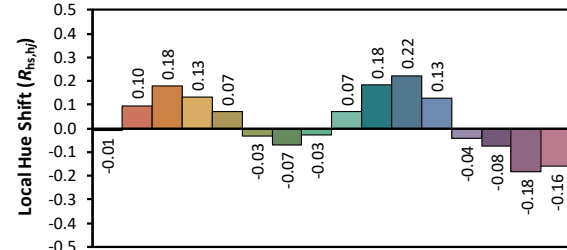
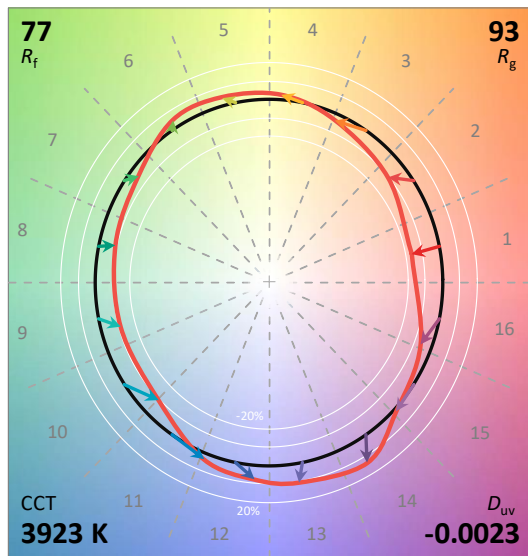
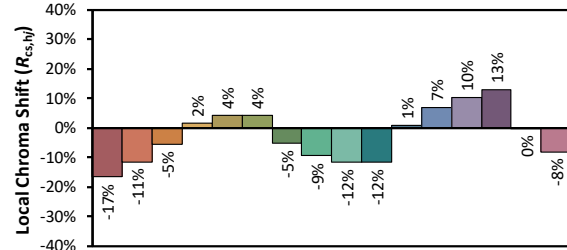
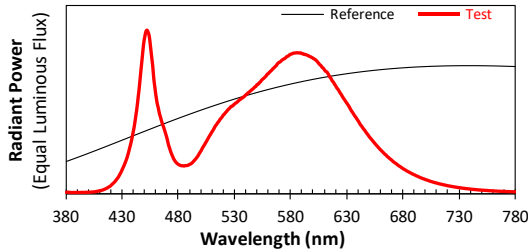
### ANSI/IES TM-30-18 Color Rendition Report

Source: 1 CIE F1

Manufacturer: RAB Lighting Inc.

Date: 2023/6/13

Model: W34L @ 150W / 4000K



**Notes:** This is a recommended method for displaying ANSI/IES TM-30-18 information.

$x$  0.3822  
 $y$  0.3730  
 $u'$  0.2278  
 $v'$  0.5002

CIE 13.3-1995  
(CRI)

$R_a$  75  
 $R_g$  -23

Colors are for visual orientation purposes only. Created with the ANSI/IES TM-30-18 Calculator Version 2.00.

## 4.1 Integrating Sphere Test

| Spectral Distribution over Visible Wavelength |                   |            |                   |            |                   |            |                   |            |                   |            |                   |
|---|-------------------|------------|-------------------|------------|-------------------|------------|-------------------|------------|-------------------|------------|-------------------|
| WL<br>(nm)                                    | Radiant<br>(W/nm) | WL<br>(nm) | Radiant<br>(W/nm) | WL<br>(nm) | Radiant<br>(W/nm) | WL<br>(nm) | Radiant<br>(W/nm) | WL<br>(nm) | Radiant<br>(W/nm) | WL<br>(nm) | Radiant<br>(W/nm) |
| 380   | 4.50E-06          | 447        | 7.84E-04          | 514        | 4.21E-04          | 581        | 8.54E-04          | 648        | 3.64E-04          | 715        | 5.26E-05          |
| 381   | 4.90E-06          | 448        | 8.53E-04          | 515        | 4.32E-04          | 582        | 8.57E-04          | 649        | 3.56E-04          | 716        | 5.07E-05          |
| 382   | 5.40E-06          | 449        | 9.19E-04          | 516        | 4.40E-04          | 583        | 8.58E-04          | 650        | 3.45E-04          | 717        | 4.92E-05          |
| 383   | 3.30E-06          | 450        | 9.60E-04          | 517        | 4.52E-04          | 584        | 8.60E-04          | 651        | 3.37E-04          | 718        | 4.78E-05          |
| 384   | 3.60E-06          | 451        | 9.92E-04          | 518        | 4.59E-04          | 585        | 8.60E-04          | 652        | 3.29E-04          | 719        | 4.61E-05          |
| 385   | 2.10E-06          | 452        | 9.99E-04          | 519        | 4.68E-04          | 586        | 8.61E-04          | 653        | 3.21E-04          | 720        | 4.48E-05          |
| 386   | 3.10E-06          | 453        | 9.84E-04          | 520        | 4.79E-04          | 587        | 8.59E-04          | 654        | 3.12E-04          | 721        | 4.33E-05          |
| 387   | 3.40E-06          | 454        | 9.60E-04          | 521        | 4.85E-04          | 588        | 8.59E-04          | 655        | 3.04E-04          | 722        | 4.21E-05          |
| 388   | 2.60E-06          | 455        | 9.03E-04          | 522        | 4.94E-04          | 589        | 8.60E-04          | 656        | 2.96E-04          | 723        | 4.10E-05          |
| 389   | 3.30E-06          | 456        | 8.40E-04          | 523        | 5.01E-04          | 590        | 8.55E-04          | 657        | 2.88E-04          | 724        | 3.97E-05          |
| 390   | 3.60E-06          | 457        | 7.82E-04          | 524        | 5.10E-04          | 591        | 8.55E-04          | 658        | 2.80E-04          | 725        | 3.84E-05          |
| 391   | 3.60E-06          | 458        | 7.02E-04          | 525        | 5.17E-04          | 592        | 8.50E-04          | 659        | 2.73E-04          | 726        | 3.71E-05          |
| 392   | 3.00E-06          | 459        | 6.46E-04          | 526        | 5.24E-04          | 593        | 8.50E-04          | 660        | 2.65E-04          | 727        | 3.63E-05          |
| 393   | 3.00E-06          | 460        | 5.93E-04          | 527        | 5.32E-04          | 594        | 8.48E-04          | 661        | 2.59E-04          | 728        | 3.50E-05          |
| 394   | 4.40E-06          | 461        | 5.51E-04          | 528        | 5.33E-04          | 595        | 8.45E-04          | 662        | 2.52E-04          | 729        | 3.38E-05          |
| 395   | 3.10E-06          | 462        | 5.22E-04          | 529        | 5.40E-04          | 596        | 8.41E-04          | 663        | 2.44E-04          | 730        | 3.31E-05          |
| 396   | 3.80E-06          | 463        | 4.88E-04          | 530        | 5.47E-04          | 597        | 8.37E-04          | 664        | 2.38E-04          | 731        | 3.20E-05          |
| 397   | 3.90E-06          | 464        | 4.65E-04          | 531        | 5.52E-04          | 598        | 8.35E-04          | 665        | 2.32E-04          | 732        | 3.10E-05          |
| 398   | 4.90E-06          | 465        | 4.40E-04          | 532        | 5.56E-04          | 599        | 8.31E-04          | 666        | 2.24E-04          | 733        | 3.00E-05          |
| 399   | 4.00E-06          | 466        | 4.18E-04          | 533        | 5.63E-04          | 600        | 8.26E-04          | 667        | 2.19E-04          | 734        | 2.92E-05          |
| 400   | 4.60E-06          | 467        | 3.99E-04          | 534        | 5.70E-04          | 601        | 8.22E-04          | 668        | 2.12E-04          | 735        | 2.82E-05          |
| 401   | 5.50E-06          | 468        | 3.77E-04          | 535        | 5.74E-04          | 602        | 8.18E-04          | 669        | 2.07E-04          | 736        | 2.72E-05          |
| 402   | 5.50E-06          | 469        | 3.54E-04          | 536        | 5.79E-04          | 603        | 8.11E-04          | 670        | 2.01E-04          | 737        | 2.64E-05          |
| 403   | 6.00E-06          | 470        | 3.29E-04          | 537        | 5.84E-04          | 604        | 8.04E-04          | 671        | 1.95E-04          | 738        | 2.58E-05          |
| 404   | 6.80E-06          | 471        | 2.98E-04          | 538        | 5.89E-04          | 605        | 7.95E-04          | 672        | 1.89E-04          | 739        | 2.51E-05          |
| 405   | 7.10E-06          | 472        | 2.77E-04          | 539        | 5.95E-04          | 606        | 7.87E-04          | 673        | 1.84E-04          | 740        | 2.41E-05          |
| 406   | 8.40E-06          | 473        | 2.55E-04          | 540        | 6.03E-04          | 607        | 7.81E-04          | 674        | 1.80E-04          | 741        | 2.32E-05          |
| 407   | 9.70E-06          | 474        | 2.37E-04          | 541        | 6.07E-04          | 608        | 7.71E-04          | 675        | 1.74E-04          | 742        | 2.26E-05          |
| 408   | 1.08E-05          | 475        | 2.21E-04          | 542        | 6.15E-04          | 609        | 7.66E-04          | 676        | 1.69E-04          | 743        | 2.16E-05          |
| 409   | 1.25E-05          | 476        | 2.06E-04          | 543        | 6.19E-04          | 610        | 7.56E-04          | 677        | 1.64E-04          | 744        | 2.13E-05          |
| 410   | 1.39E-05          | 477        | 1.96E-04          | 544        | 6.26E-04          | 611        | 7.47E-04          | 678        | 1.60E-04          | 745        | 2.08E-05          |
| 411   | 1.52E-05          | 478        | 1.87E-04          | 545        | 6.32E-04          | 612        | 7.44E-04          | 679        | 1.55E-04          | 746        | 2.00E-05          |
| 412   | 1.75E-05          | 479        | 1.80E-04          | 546        | 6.37E-04          | 613        | 7.35E-04          | 680        | 1.50E-04          | 747        | 1.93E-05          |
| 413   | 2.00E-05          | 480        | 1.75E-04          | 547        | 6.43E-04          | 614        | 7.22E-04          | 681        | 1.46E-04          | 748        | 1.85E-05          |
| 414   | 2.29E-05          | 481        | 1.72E-04          | 548        | 6.51E-04          | 615        | 7.10E-04          | 682        | 1.42E-04          | 749        | 1.85E-05          |
| 415   | 2.57E-05          | 482        | 1.69E-04          | 549        | 6.54E-04          | 616        | 7.02E-04          | 683        | 1.37E-04          | 750        | 1.77E-05          |
| 416   | 2.93E-05          | 483        | 1.67E-04          | 550        | 6.66E-04          | 617        | 6.87E-04          | 684        | 1.33E-04          | 751        | 1.73E-05          |
| 417   | 3.32E-05          | 484        | 1.67E-04          | 551        | 6.67E-04          | 618        | 6.81E-04          | 685        | 1.30E-04          | 752        | 1.68E-05          |
| 418   | 3.76E-05          | 485        | 1.66E-04          | 552        | 6.77E-04          | 619        | 6.68E-04          | 686        | 1.26E-04          | 753        | 1.61E-05          |
| 419   | 4.12E-05          | 486        | 1.68E-04          | 553        | 6.82E-04          | 620        | 6.58E-04          | 687        | 1.22E-04          | 754        | 1.58E-05          |
| 420   | 4.78E-05          | 487        | 1.68E-04          | 554        | 6.92E-04          | 621        | 6.46E-04          | 688        | 1.19E-04          | 755        | 1.55E-05          |
| 421   | 5.42E-05          | 488        | 1.69E-04          | 555        | 6.99E-04          | 622        | 6.37E-04          | 689        | 1.15E-04          | 756        | 1.46E-05          |
| 422   | 6.07E-05          | 489        | 1.72E-04          | 556        | 7.04E-04          | 623        | 6.27E-04          | 690        | 1.13E-04          | 757        | 1.41E-05          |
| 423   | 6.74E-05          | 490        | 1.76E-04          | 557        | 7.11E-04          | 624        | 6.14E-04          | 691        | 1.09E-04          | 758        | 1.39E-05          |
| 424   | 7.54E-05          | 491        | 1.79E-04          | 558        | 7.17E-04          | 625        | 6.05E-04          | 692        | 1.05E-04          | 759        | 1.35E-05          |
| 425   | 8.49E-05          | 492        | 1.84E-04          | 559        | 7.29E-04          | 626        | 5.93E-04          | 693        | 1.03E-04          | 760        | 1.32E-05          |
| 426   | 9.36E-05          | 493        | 1.91E-04          | 560        | 7.32E-04          | 627        | 5.82E-04          | 694        | 9.94E-05          | 761        | 1.25E-05          |
| 427   | 1.05E-04          | 494        | 1.99E-04          | 561        | 7.41E-04          | 628        | 5.72E-04          | 695        | 9.59E-05          | 762        | 1.23E-05          |
| 428   | 1.18E-04          | 495        | 2.06E-04          | 562        | 7.47E-04          | 629        | 5.61E-04          | 696        | 9.35E-05          | 763        | 1.19E-05          |
| 429   | 1.30E-04          | 496        | 2.16E-04          | 563        | 7.54E-04          | 630        | 5.51E-04          | 697        | 9.04E-05          | 764        | 1.15E-05          |
| 430   | 1.47E-04          | 497        | 2.24E-04          | 564        | 7.61E-04          | 631        | 5.41E-04          | 698        | 8.78E-05          | 765        | 1.11E-05          |
| 431   | 1.61E-04          | 498        | 2.36E-04          | 565        | 7.68E-04          | 632        | 5.30E-04          | 699        | 8.56E-05          | 766        | 1.10E-05          |
| 432   | 1.78E-04          | 499        | 2.48E-04          | 566        | 7.75E-04          | 633        | 5.18E-04          | 700        | 8.27E-05          | 767        | 1.06E-05          |
| 433   | 1.95E-04          | 500        | 2.58E-04          | 567        | 7.81E-04          | 634        | 5.05E-04          | 701        | 8.04E-05          | 768        | 1.03E-05          |
| 434   | 2.14E-04          | 501        | 2.71E-04          | 568        | 7.91E-04          | 635        | 4.96E-04          | 702        | 7.81E-05          | 769        | 1.00E-05          |
| 435   | 2.37E-04          | 502        | 2.84E-04          | 569        | 7.99E-04          | 636        | 4.85E-04          | 703        | 7.55E-05          | 770        | 9.60E-06          |
| 436   | 2.63E-04          | 503        | 2.94E-04          | 570        | 8.03E-04          | 637        | 4.74E-04          | 704        | 7.29E-05          | 771        | 9.60E-06          |
| 437   | 2.90E-04          | 504        | 3.06E-04          | 571        | 8.07E-04          | 638        | 4.65E-04          | 705        | 7.10E-05          | 772        | 9.20E-06          |
| 438   | 3.18E-04          | 505        | 3.18E-04          | 572        | 8.14E-04          | 639        | 4.54E-04          | 706        | 6.87E-05          | 773        | 8.90E-06          |
| 439   | 3.52E-04          | 506        | 3.30E-04          | 573        | 8.19E-04          | 640        | 4.44E-04          | 707        | 6.67E-05          | 774        | 8.60E-06          |
| 440   | 3.87E-04          | 507        | 3.43E-04          | 574        | 8.23E-04          | 641        | 4.33E-04          | 708        | 6.45E-05          | 775        | 8.50E-06          |
| 441   | 4.27E-04          | 508        | 3.54E-04          | 575        | 8.27E-04          | 642        | 4.20E-04          | 709        | 6.30E-05          | 776        | 8.00E-06          |
| 442   | 4.74E-04          | 509        | 3.66E-04          | 576        | 8.34E-04          | 643        | 4.12E-04          | 710        | 6.12E-05          | 777        | 7.90E-06          |
| 443   | 5.23E-04          | 510        | 3.77E-04          | 577        | 8.39E-04          | 644        | 4.02E-04          | 711        | 5.89E-05          | 778        | 7.50E-06          |
| 444   | 5.84E-04          | 511        | 3.88E-04          | 578        | 8.41E-04          | 645        | 3.92E-04          | 712        | 5.70E-05          | 779        | 7.60E-06          |
| 445   | 6.43E-04          | 512        | 4.01E-04          | 579        | 8.48E-04          | 646        | 3.84E-04          | 713        | 5.56E-05          | 780        | 7.60E-06          |
| 446   | 7.15E-04          | 513        | 4.13E-04          | 580        | 8.52E-04          | 647        | 3.73E-04          | 714        | 5.40E-05          | N/A        | N/A               |



## 4.0 LM-79 Measurement and Test Results

### 4.2 Goniophotometer Test

|                            |                     |                                  |              |
|----------------------------|---------------------|----------------------------------|--------------|
| <b>Model No.</b>           | W34L @ 150W / 4000K | <b>Sample ID</b>                 | 230612001-S1 |
| <b>Operate time (Min.)</b> | 30                  | <b>Stabilization time (Min.)</b> | 60           |
| <b>Temperature (°C)</b>    | 25.0                | <b>Humidity (%RH)</b>            | 40.5         |

|   |
|---|
| <b>Test Method</b>  |
| <p>The Samples were tested according to the IES LM-79-2008.</p> <p>Photometric parameters were measured using a type C goniophotometer and software.</p> <p>The ambient temperature shall be maintained at <math>25 \pm 1^{\circ}\text{C}</math>, measured at a point not more than 1 m from the sample and at the same height as the sample.</p> <p>The voltage of an AC power supply (RMS voltage) or DC power supply (instantaneous voltage) applied to the device under test shall be regulated to within <math>\pm 0.2</math> percent under load.</p> <p>The samples were operated at rated voltage and was stabilized before measurement. Luminous flux, luminaire efficacy, zonal lumen were calculated from the software taken at <math>1.0^{\circ}</math> vertical intervals and <math>15^{\circ}</math> horizontal intervals.</p> |

#### Test Conditions

| Condition             | Voltage (Vac) | Frequency (Hz) | Current (A) | Power (W) | Power Factor |
|-----------------------|---------------|----------------|-------------|-----------|--------------|
| <b>WORST CASE</b>     | 120.0         | 60             | 1.153       | 137.9     | 0.997        |
| <b>NON-WORST CASE</b> | 277.0         | 60             | 0.520       | 134.4     | 0.932        |

#### Test Result

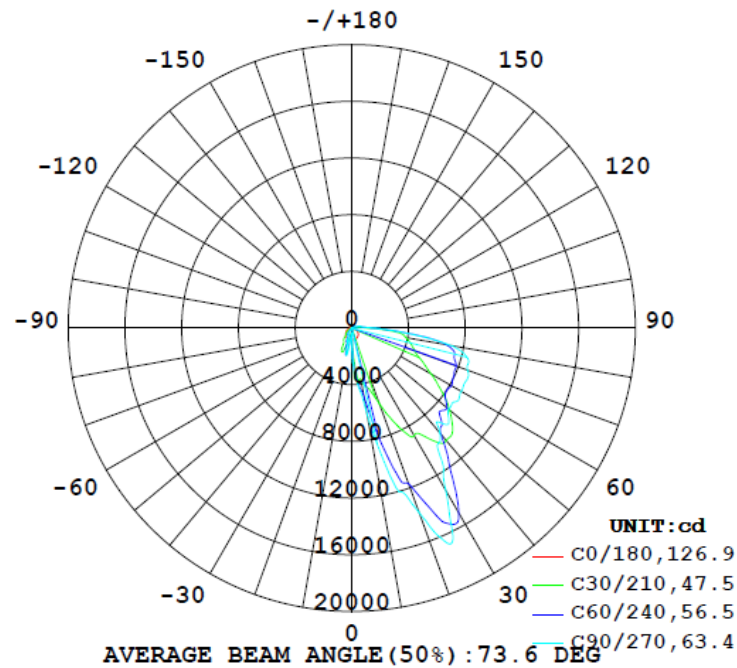
| Result Type          | Flux (lm) | Field Angle (10%) |         | Beam Angle (50%) |         | Luminous Efficacy (lm/W) | Zonal Lumen Requirement (80°-90°) | BUG      |
|----------------------|-----------|-------------------|---------|------------------|---------|--------------------------|-----------------------------------|----------|
|                      |           | C0-180            | C90-270 | C0-180           | C90-270 |                          |                                   |          |
| <b>0°-180° zones</b> | 21852     | 103.4             | 133.9   | 63.1             | 83.6    | 158.5                    | 7.3%                              | B1-U3-G5 |
| <b>0°-90° zones</b>  | 21062     | 103.4             | 133.9   | 63.1             | 83.6    | 152.7                    | 7.6%                              | B1-U3-G5 |



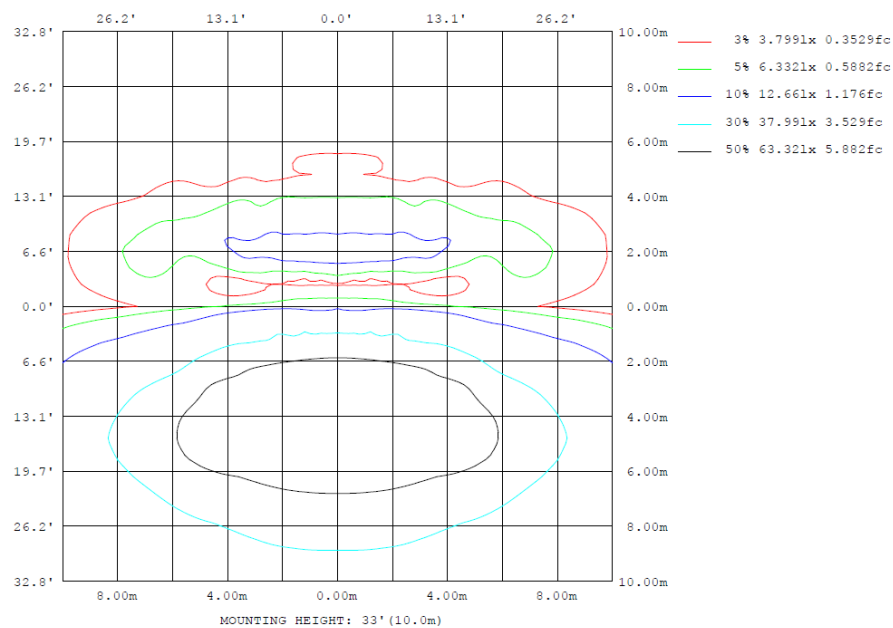
## 4.2 Goniophotometer Test

### Lighting Distribution Curve

#### LUMINOUS INTENSITY DISTRIBUTION DIAGRAM



### Isolux Plot



## 4.2 Goniophotometer Test

### Zonal Lumen Summary

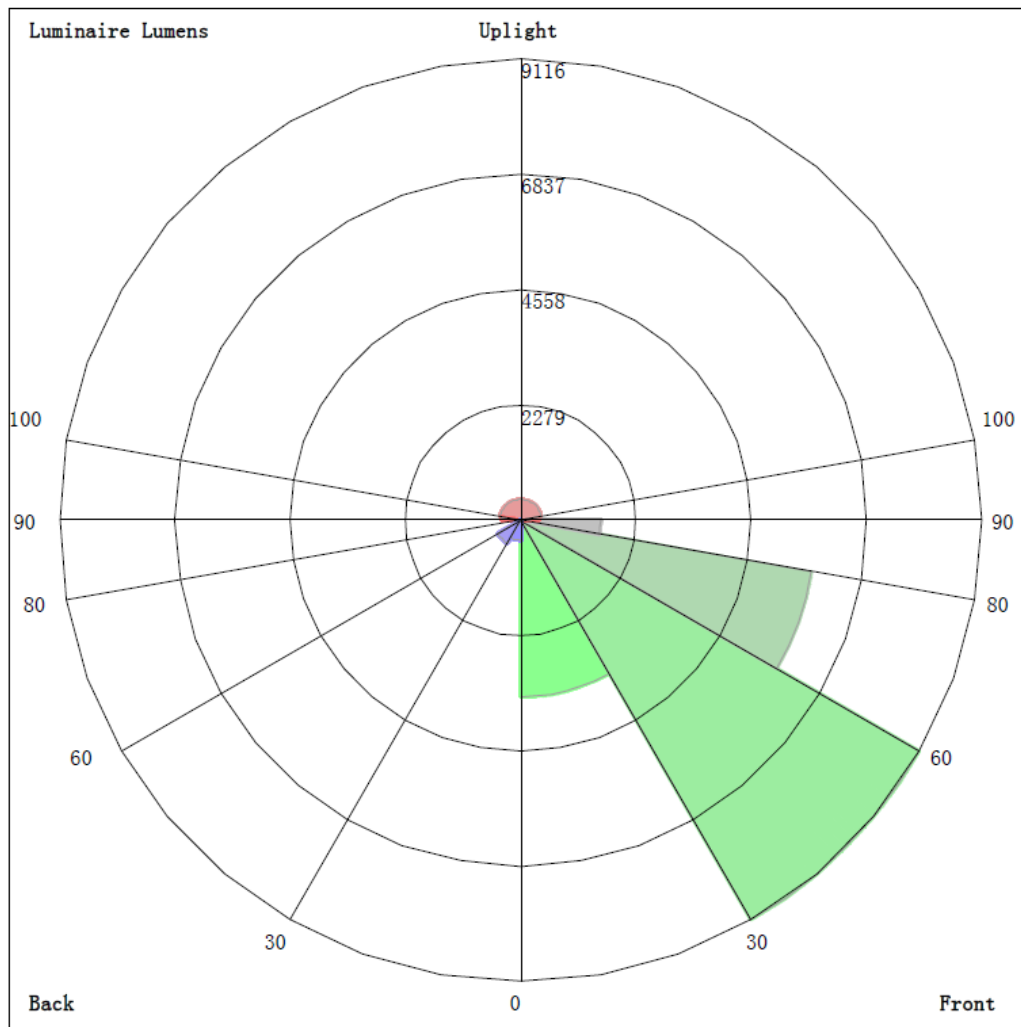
ZONAL FLUX DIAGRAM:

| γ   | C0                       | C45    | C90    | C135   | C180   | C225   | C270   | C315   | γ       | Φ zone  | Φ total | ℓlum, lamp |
|-----|--------------------------|--------|--------|--------|--------|--------|--------|--------|---------|---------|---------|------------|
| 10  | 80.99                    | 434.8  | 603.5  | 434.8  | 80.99  | 59.86  | 170.0  | 59.86  | 0- 10   | 187.7   | 187.7   | 0.86,0.86  |
| 20  | 81.61                    | 970.2  | 1383   | 970.2  | 81.61  | 165.5  | 99.27  | 165.5  | 10- 20  | 1128    | 1315    | 6.02,6.02  |
| 30  | 76.00                    | 1400   | 1326   | 1400   | 76.00  | 72.22  | 54.97  | 72.22  | 20- 30  | 2571    | 3887    | 17.8,17.8  |
| 40  | 69.35                    | 1182   | 965.5  | 1182   | 69.35  | 55.72  | 17.17  | 55.72  | 30- 40  | 3204    | 7091    | 32.4,32.4  |
| 50  | 57.89                    | 810.5  | 889.9  | 810.5  | 57.89  | 21.77  | 2.937  | 21.77  | 40- 50  | 3243    | 10333   | 47.3,47.3  |
| 60  | 46.12                    | 711.2  | 891.9  | 711.2  | 46.12  | 7.324  | 0.6975 | 7.324  | 50- 60  | 3190    | 13523   | 61.9,61.9  |
| 70  | 32.19                    | 666.4  | 868.7  | 666.4  | 32.19  | 3.359  | 0.1998 | 3.359  | 60- 70  | 3088    | 16611   | 76,76      |
| 80  | 13.75                    | 595.2  | 705.8  | 595.2  | 13.75  | 2.603  | 0.4623 | 2.603  | 70- 80  | 2857    | 19468   | 89.1,89.1  |
| 90  | 3.413                    | 140.8  | 151.0  | 140.8  | 3.413  | 1.855  | 0.7065 | 1.855  | 80- 90  | 1595    | 21062   | 96.4,96.4  |
| 100 | 2.730                    | 50.69  | 69.48  | 50.69  | 2.730  | 1.239  | 0.8432 | 1.239  | 90-100  | 375.8   | 21438   | 98.1,98.1  |
| 110 | 1.997                    | 22.67  | 32.47  | 22.67  | 1.997  | 1.135  | 0.8718 | 1.135  | 100-110 | 176.1   | 21614   | 98.9,98.9  |
| 120 | 1.363                    | 18.33  | 21.88  | 18.33  | 1.363  | 1.065  | 0.8446 | 1.065  | 110-120 | 93.65   | 21708   | 99.3,99.3  |
| 130 | 1.057                    | 11.69  | 21.19  | 11.69  | 1.057  | 1.038  | 0.9423 | 1.038  | 120-130 | 65.51   | 21773   | 99.6,99.6  |
| 140 | 0.8670                   | 7.627  | 12.77  | 7.627  | 0.8670 | 0.9332 | 0.9802 | 0.9332 | 130-140 | 43.47   | 21817   | 99.8,99.8  |
| 150 | 0.6825                   | 5.084  | 8.164  | 5.084  | 0.6825 | 0.8126 | 0.8986 | 0.8126 | 140-150 | 21.59   | 21838   | 99.9,99.9  |
| 160 | 0.5498                   | 3.123  | 4.535  | 3.123  | 0.5498 | 0.7657 | 0.6848 | 0.7657 | 150-160 | 10.35   | 21849   | 100,100    |
| 170 | 0.4719                   | 0.3482 | 1.174  | 0.3482 | 0.4719 | 0.6044 | 0.4001 | 0.6044 | 160-170 | 3.312   | 21852   | 100,100    |
| 180 | 0.5372                   | 0.4876 | 0.4601 | 0.4876 | 0.5372 | 0.5242 | 0.4395 | 0.5242 | 170-180 | 0.4412  | 21852   | 100,100    |
| DEG | LUMINOUS INTENSITY:×10cd |        |        |        |        |        |        |        |         | UNIT:lm |         |            |

| Zonal (lm) |         | Total (lm) |          | Percent |
|------------|---------|------------|----------|---------|
| 0-10       | 187.69  | 0-10       | 187.69   | 0.86%   |
| 10-20      | 1127.79 | 0-20       | 1315.48  | 6.02%   |
| 20-30      | 2571.14 | 0-30       | 3886.62  | 17.79%  |
| 30-40      | 3203.95 | 0-40       | 7090.57  | 32.45%  |
| 40-50      | 3242.85 | 0-50       | 10333.42 | 47.29%  |
| 50-60      | 3189.59 | 0-60       | 13523.01 | 61.88%  |
| 60-70      | 3087.52 | 0-70       | 16610.53 | 76.01%  |
| 70-80      | 2857.14 | 0-80       | 19467.67 | 89.09%  |
| 80-90      | 1594.51 | 0-90       | 21062.18 | 96.39%  |
| 90-100     | 375.83  | 0-100      | 21438.01 | 98.11%  |
| 100-110    | 176.11  | 0-110      | 21614.12 | 98.91%  |
| 110-120    | 93.65   | 0-120      | 21707.77 | 99.34%  |
| 120-130    | 65.51   | 0-130      | 21773.28 | 99.64%  |
| 130-140    | 43.47   | 0-140      | 21816.75 | 99.84%  |
| 140-150    | 21.59   | 0-150      | 21838.34 | 99.94%  |
| 150-160    | 10.35   | 0-160      | 21848.69 | 99.98%  |
| 160-170    | 3.31    | 0-170      | 21852.00 | 100.00% |
| 170-180    | 0.44    | 0-180      | 21852.44 | 100.00% |

## 4.2 Goniophotometer Test

LCS/BUG

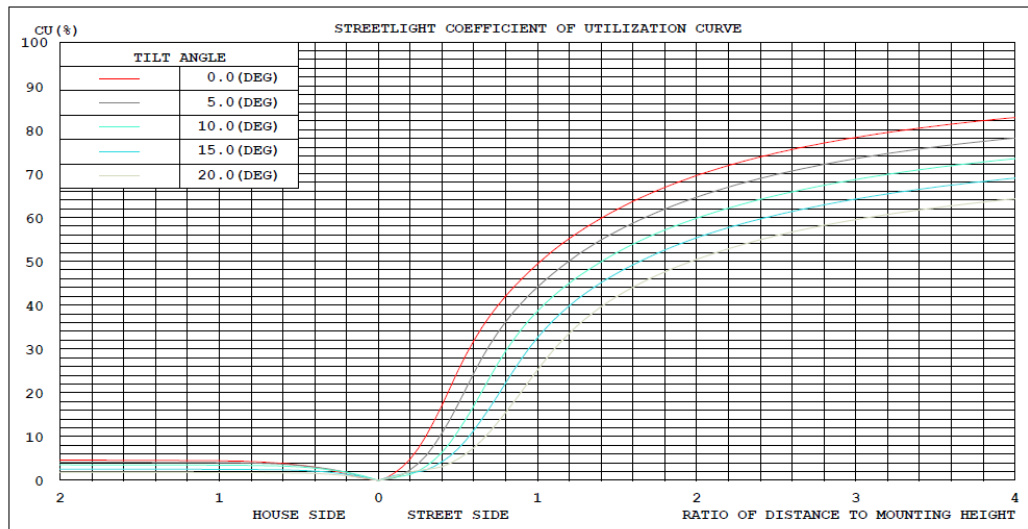


### LUMINAIRE CLASSIFICATION SYSTEM (LCS)

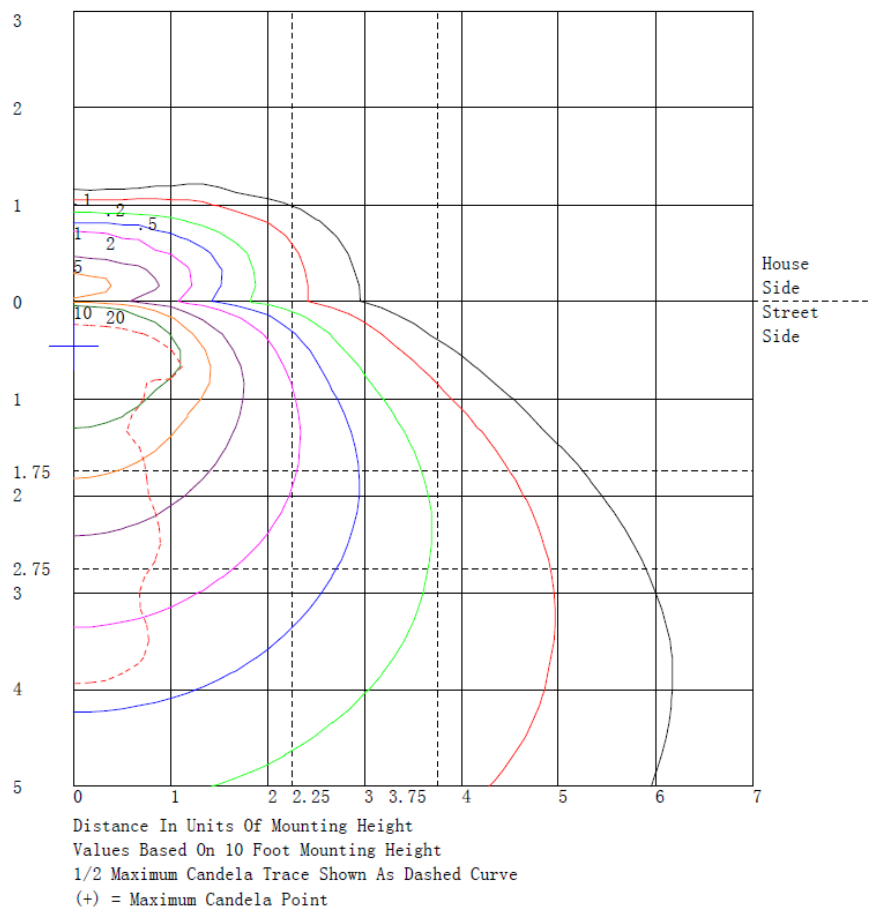
|                               | Lumens          | % Lamp      | % Luminaire  |
|-------------------------------|-----------------|-------------|--------------|
| FL - Front-Low (0-30)         | 3492.8          | N.A.        | 16.0         |
| FM - Front-Medium (30-60)     | 9115.8          | N.A.        | 41.7         |
| FH - Front-High (60-80)       | 5845.5          | N.A.        | 26.8         |
| FVH - Front-Very High (80-90) | 1578.6          | N.A.        | 7.2          |
| BL - Back-Low (0-30)          | 393.8           | N.A.        | 1.8          |
| BM - Back-Medium (30-60)      | 520.6           | N.A.        | 2.4          |
| BH - Back-High (60-80)        | 99.1            | N.A.        | 0.5          |
| BVH - Back-Very High (80-90)  | 15.9            | N.A.        | 0.1          |
| UL - Uplight-Low (90-100)     | 375.8           | N.A.        | 1.7          |
| UH - Uplight-High (100-180)   | 414.4           | N.A.        | 1.9          |
| <b>Total</b>                  | <b>21852.3</b>  | <b>N.A.</b> | <b>100.0</b> |
| <b>BUG Rating</b>             | <b>B1-U3-G5</b> |             |              |

## 4.2 Goniophotometer Test

### Coefficients of Utilization



## Isolines



## 4.2 Goniophotometer Test

### Luminous Distribution Intensity Data

Table--1

UNIT: ×10cd

| C (DEG)<br>γ (DEG) | 0    | 5    | 10   | 15   | 20   | 25   | 30   | 35   | 40   | 45   | 50   | 55   | 60   | 65   | 70   | 75   | 80   | 85   | 90   |
|--------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 0                  | 81.2 | 81.4 | 81.6 | 81.9 | 82.0 | 82.2 | 82.4 | 82.7 | 83.0 | 83.3 | 83.6 | 83.8 | 84.1 | 84.4 | 84.7 | 85.0 | 85.3 | 85.5 | 85.8 |
| 5                  | 81.0 | 96.0 | 119  | 151  | 198  | 248  | 295  | 327  | 351  | 366  | 369  | 367  | 363  | 361  | 359  | 358  | 359  | 360  | 362  |
| 10                 | 81.0 | 173  | 248  | 305  | 336  | 356  | 369  | 391  | 413  | 435  | 453  | 472  | 492  | 521  | 549  | 575  | 591  | 600  | 603  |
| 15                 | 81.7 | 201  | 297  | 368  | 399  | 418  | 438  | 493  | 560  | 637  | 723  | 810  | 893  | 961  | 1017 | 1063 | 1096 | 1116 | 1124 |
| 20                 | 81.6 | 194  | 294  | 381  | 438  | 495  | 564  | 696  | 837  | 970  | 1051 | 1114 | 1168 | 1231 | 1287 | 1333 | 1362 | 1378 | 1383 |
| 25                 | 79.6 | 180  | 285  | 396  | 514  | 636  | 760  | 881  | 1003 | 1127 | 1263 | 1392 | 1504 | 1574 | 1621 | 1651 | 1668 | 1674 | 1672 |
| 30                 | 76.0 | 167  | 275  | 401  | 549  | 709  | 879  | 1070 | 1249 | 1400 | 1474 | 1508 | 1510 | 1478 | 1431 | 1380 | 1352 | 1334 | 1326 |
| 35                 | 72.9 | 176  | 297  | 435  | 604  | 780  | 956  | 1134 | 1283 | 1384 | 1358 | 1290 | 1207 | 1172 | 1145 | 1123 | 1098 | 1080 | 1070 |
| 40                 | 69.4 | 186  | 321  | 473  | 671  | 865  | 1034 | 1127 | 1175 | 1182 | 1124 | 1048 | 975  | 967  | 974  | 987  | 980  | 972  | 966  |
| 45                 | 65.2 | 190  | 328  | 478  | 677  | 861  | 1006 | 1020 | 990  | 939  | 913  | 892  | 879  | 891  | 909  | 930  | 944  | 955  | 960  |
| 50                 | 57.9 | 160  | 278  | 411  | 594  | 766  | 899  | 898  | 859  | 811  | 826  | 850  | 876  | 882  | 884  | 883  | 886  | 889  | 890  |
| 55                 | 51.1 | 164  | 279  | 398  | 538  | 667  | 770  | 791  | 786  | 770  | 778  | 791  | 806  | 826  | 847  | 866  | 884  | 897  | 903  |
| 60                 | 46.1 | 146  | 246  | 346  | 457  | 559  | 645  | 679  | 698  | 711  | 745  | 779  | 811  | 835  | 854  | 869  | 881  | 889  | 892  |
| 65                 | 38.6 | 120  | 202  | 286  | 377  | 464  | 544  | 603  | 651  | 693  | 731  | 765  | 794  | 820  | 842  | 860  | 874  | 883  | 887  |
| 70                 | 32.2 | 81.0 | 140  | 208  | 294  | 384  | 472  | 545  | 610  | 666  | 713  | 751  | 783  | 810  | 832  | 849  | 860  | 867  | 869  |
| 75                 | 24.1 | 51.8 | 95.6 | 155  | 242  | 337  | 431  | 508  | 576  | 635  | 680  | 717  | 749  | 780  | 806  | 827  | 840  | 847  | 849  |
| 80                 | 13.8 | 31.4 | 66.9 | 120  | 202  | 294  | 387  | 466  | 537  | 595  | 633  | 660  | 678  | 691  | 699  | 703  | 706  | 707  | 706  |
| 85                 | 6.91 | 19.2 | 46.9 | 90.0 | 163  | 241  | 312  | 348  | 369  | 379  | 383  | 382  | 378  | 377  | 375  | 373  | 371  | 369  | 367  |
| 90                 | 3.41 | 13.7 | 27.8 | 45.6 | 71.5 | 97.9 | 121  | 132  | 138  | 141  | 145  | 148  | 150  | 151  | 152  | 152  | 151  | 152  | 151  |
| 95                 | 2.66 | 7.58 | 14.1 | 22.1 | 33.3 | 44.9 | 55.5 | 61.4 | 65.8 | 69.6 | 75.0 | 80.1 | 84.5 | 86.8 | 88.3 | 89.0 | 89.3 | 89.3 | 89.0 |
| 100                | 2.73 | 6.04 | 10.0 | 14.7 | 20.3 | 26.4 | 32.7 | 38.9 | 45.0 | 50.7 | 55.8 | 60.2 | 63.8 | 66.0 | 67.5 | 68.5 | 69.1 | 69.5 | 69.5 |
| 105                | 2.28 | 4.70 | 7.49 | 10.6 | 14.4 | 18.4 | 22.1 | 24.7 | 27.3 | 30.1 | 34.5 | 39.1 | 43.7 | 47.7 | 51.1 | 53.7 | 54.8 | 55.2 | 55.0 |
| 110                | 2.00 | 3.85 | 5.99 | 8.41 | 11.4 | 14.5 | 17.4 | 19.3 | 21.0 | 22.7 | 25.1 | 27.5 | 29.6 | 30.9 | 31.8 | 32.3 | 32.6 | 32.6 | 32.5 |
| 115                | 1.68 | 3.04 | 4.71 | 6.70 | 9.33 | 12.0 | 14.6 | 16.2 | 17.6 | 18.8 | 20.2 | 21.5 | 22.8 | 24.4 | 25.9 | 27.1 | 27.4 | 27.5 | 27.4 |
| 120                | 1.36 | 2.44 | 3.77 | 5.37 | 7.31 | 9.45 | 11.7 | 14.2 | 16.4 | 18.3 | 19.0 | 19.2 | 19.4 | 20.2 | 21.0 | 21.8 | 22.0 | 22.0 | 21.9 |
| 125                | 1.17 | 2.01 | 3.07 | 4.35 | 5.89 | 7.63 | 9.53 | 11.7 | 14.0 | 16.0 | 17.6 | 18.9 | 19.8 | 20.2 | 20.2 | 20.1 | 19.9 | 19.8 | 19.6 |
| 130                | 1.06 | 1.76 | 2.63 | 3.67 | 4.99 | 6.40 | 7.85 | 8.97 | 10.2 | 11.7 | 14.2 | 16.8 | 19.2 | 20.6 | 21.5 | 22.0 | 21.9 | 21.5 | 21.2 |
| 135                | 0.96 | 1.55 | 2.27 | 3.13 | 4.22 | 5.38 | 6.53 | 7.42 | 8.29 | 9.22 | 10.4 | 11.6 | 13.1 | 14.9 | 16.7 | 18.3 | 19.3 | 19.9 | 20.1 |
| 140                | 0.87 | 1.28 | 1.82 | 2.50 | 3.38 | 4.34 | 5.30 | 6.10 | 6.87 | 7.63 | 8.45 | 9.26 | 10.0 | 10.8 | 11.5 | 12.0 | 12.4 | 12.7 | 12.8 |
| 145                | 0.77 | 0.56 | 0.68 | 1.12 | 2.10 | 3.24 | 4.38 | 5.09 | 5.70 | 6.27 | 6.98 | 7.66 | 8.30 | 8.81 | 9.23 | 9.56 | 9.80 | 9.94 | 9.99 |
| 150                | 0.68 | 0.42 | 0.45 | 0.78 | 1.60 | 2.58 | 3.56 | 4.14 | 4.63 | 5.08 | 5.63 | 6.16 | 6.66 | 7.09 | 7.47 | 7.77 | 7.98 | 8.11 | 8.16 |
| 155                | 0.61 | 0.38 | 0.39 | 0.63 | 1.24 | 1.98 | 2.75 | 3.30 | 3.77 | 4.18 | 4.51 | 4.79 | 5.03 | 5.27 | 5.48 | 5.66 | 5.83 | 5.95 | 6.02 |
| 160                | 0.55 | 0.51 | 0.50 | 0.51 | 0.46 | 0.51 | 0.73 | 1.47 | 2.32 | 3.12 | 3.49 | 3.73 | 3.88 | 4.07 | 4.22 | 4.34 | 4.44 | 4.50 | 4.54 |
| 165                | 0.49 | 0.49 | 0.48 | 0.46 | 0.43 | 0.41 | 0.41 | 0.40 | 0.48 | 0.70 | 1.34 | 2.04 | 2.68 | 2.91 | 3.01 | 3.03 | 3.09 | 3.13 | 3.14 |
| 170                | 0.47 | 0.46 | 0.45 | 0.44 | 0.42 | 0.41 | 0.39 | 0.38 | 0.36 | 0.35 | 0.33 | 0.32 | 0.32 | 0.32 | 0.35 | 0.44 | 0.71 | 0.98 | 1.17 |
| 175                | 0.50 | 0.49 | 0.49 | 0.48 | 0.47 | 0.46 | 0.45 | 0.44 | 0.43 | 0.42 | 0.41 | 0.40 | 0.39 | 0.38 | 0.37 | 0.37 | 0.36 | 0.36 | 0.36 |
| 180                | 0.54 | 0.54 | 0.53 | 0.53 | 0.52 | 0.52 | 0.51 | 0.51 | 0.50 | 0.49 | 0.48 | 0.47 | 0.46 | 0.45 | 0.44 | 0.44 | 0.44 | 0.45 | 0.46 |

| C (DEG)<br>γ (DEG) | 95   | 100  | 105  | 110  | 115  | 120  | 125  | 130  | 135  | 140  | 145  | 150  | 155  | 160  | 165  | 170  | 175  | 180  | 185  |
|--------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 0                  | 85.5 | 85.3 | 85.0 | 84.7 | 84.4 | 84.1 | 83.8 | 83.6 | 83.3 | 83.0 | 82.7 | 82.4 | 82.2 | 82.0 | 81.9 | 81.6 | 81.4 | 81.2 | 83.7 |
| 5                  | 360  | 359  | 358  | 359  | 361  | 363  | 367  | 369  | 366  | 351  | 327  | 295  | 248  | 198  | 151  | 119  | 96.0 | 81.0 | 76.5 |
| 10                 | 600  | 591  | 575  | 549  | 521  | 492  | 472  | 453  | 435  | 413  | 391  | 369  | 356  | 336  | 305  | 248  | 173  | 81.0 | 71.1 |
| 15                 | 1116 | 1096 | 1063 | 1017 | 961  | 893  | 810  | 723  | 637  | 560  | 493  | 438  | 418  | 399  | 368  | 297  | 201  | 81.7 | 59.5 |
| 20                 | 1378 | 1362 | 1333 | 1287 | 1231 | 1168 | 1114 | 1051 | 970  | 837  | 696  | 564  | 495  | 438  | 381  | 294  | 194  | 81.6 | 48.4 |
| 25                 | 1674 | 1668 | 1651 | 1621 | 1574 | 1504 | 1392 | 1263 | 1127 | 1003 | 881  | 760  | 636  | 514  | 396  | 285  | 180  | 79.6 | 54.3 |
| 30                 | 1334 | 1352 | 1380 | 1431 | 1478 | 1510 | 1508 | 1474 | 1400 | 1249 | 1070 | 879  | 709  | 549  | 401  | 275  | 167  | 76.0 | 79.5 |
| 35                 | 1080 | 1098 | 1123 | 1145 | 1172 | 1207 | 1290 | 1358 | 1384 | 1283 | 1134 | 956  | 780  | 604  | 435  | 297  | 176  | 72.9 | 101  |
| 40                 | 972  | 980  | 987  | 974  | 967  | 975  | 1048 | 1124 | 1182 | 1175 | 1127 | 1034 | 865  | 671  | 473  | 321  | 186  | 69.4 | 105  |
| 45                 | 955  | 944  | 930  | 909  | 891  | 879  | 892  | 913  | 939  | 990  | 1020 | 1006 | 861  | 677  | 478  | 328  | 190  | 65.2 | 91.0 |
| 50                 | 889  | 886  | 883  | 884  | 882  | 876  | 850  | 826  | 811  | 859  | 898  | 899  | 766  | 594  | 411  | 278  | 160  | 57.9 | 74.0 |
| 55                 | 897  | 884  | 866  | 847  | 826  | 806  | 791  | 778  | 770  | 786  | 791  | 770  | 667  | 538  | 398  | 279  | 164  | 51.1 | 62.3 |
| 60                 | 889  | 881  | 869  | 854  | 835  | 811  | 779  | 745  | 711  | 698  | 679  | 645  | 559  | 457  | 346  | 246  | 146  | 46.1 | 52.4 |
| 65                 | 883  | 874  | 860  | 842  | 820  | 794  | 765  | 731  | 693  | 651  | 603  | 544  | 464  | 377  | 286  | 202  | 120  | 38.6 | 41.4 |
| 70                 | 867  | 860  | 849  | 832  | 810  | 783  | 751  | 713  | 666  | 610  | 545  | 472  | 384  | 294  | 208  | 140  | 81.0 | 32.2 | 31.3 |
| 75                 | 847  | 840  | 827  | 806  | 780  | 749  | 717  | 680  | 635  | 576  | 508  | 431  | 337  | 242  | 155  | 95.6 | 51.8 | 24.1 | 21.7 |
| 80                 | 707  | 706  | 703  | 699  | 691  | 678  | 660  | 633  | 595  | 537  | 466  | 387  | 294  | 202  | 120  | 66.9 | 31.4 | 13.8 | 11.9 |
| 85                 | 369  | 371  | 373  | 375  | 377  | 378  | 382  | 383  | 379  | 369  | 348  | 312  | 241  | 163  | 90.0 | 46.9 | 19.2 | 6.91 | 6.67 |
| 90                 | 152  | 152  | 152  | 152  | 151  | 150  | 148  | 145  | 141  | 138  | 132  | 121  | 97.9 | 71.5 | 45.6 | 27.8 | 13.7 | 3.41 | 3.60 |
| 95                 | 89.3 | 89.3 | 89.0 | 88.3 | 86.8 | 84.5 | 80.1 | 75.0 | 69.6 | 65.8 | 61.4 | 55.5 | 44.9 | 33.3 | 22.1 | 14.1 | 7.58 | 2.66 | 2.75 |
| 100                | 69.5 | 69.1 | 68.5 | 67.5 | 66.0 | 63.8 | 60.2 | 55.8 | 50.7 | 45.0 | 38.9 | 32.7 | 26.4 | 20.3 | 14.7 | 10.0 | 6.04 | 2.73 | 2.58 |
| 105                | 55.2 | 54.8 | 53.7 | 51.1 | 47.7 | 43.7 | 39.1 | 34.5 | 30.1 | 27.3 | 24.7 | 22.1 | 18.4 | 14.4 | 10.6 | 7.49 | 4.70 | 2.28 | 2.18 |
| 110                | 32.6 | 32.6 | 32.3 | 31.8 | 30.9 | 29.6 | 27.5 | 25.1 | 22.7 | 21.0 | 19.3 | 17.4 | 14.5 | 11.4 | 8.41 | 5.99 | 3.85 | 2.00 | 1.92 |
| 115                | 27.5 | 27.4 | 27.1 | 25.9 | 24.4 | 22.8 | 21.5 | 20.2 | 18.8 | 17.6 | 16.2 | 14.6 | 12.0 | 9.33 | 6.70 | 4.71 | 3.04 | 1.68 | 1.66 |
| 120                | 22.0 | 22.0 | 21.8 | 21.0 | 20.2 | 19.4 | 19.2 | 19.0 | 18.3 | 16.4 | 14.2 | 11.7 | 9.45 | 7.31 | 5.37 | 3.77 | 2.44 | 1.36 | 1.46 |
| 125                | 19.8 | 19.9 | 20.1 | 20.2 | 20.2 | 19.8 | 18.9 | 17.6 | 16.0 | 14.0 | 11.7 | 9.53 | 7.63 | 5.89 | 4.35 | 3.07 | 2.01 | 1.17 | 1.34 |
| 130                | 21.5 | 21.9 | 22.0 | 21.5 | 20.6 | 19.2 | 16.8 | 14.2 | 11.7 | 10.2 | 8.97 | 7.85 | 6.40 | 4.99 | 3.67 | 2.63 | 1.76 | 1.06 | 1.20 |
| 135                | 19.9 | 19.3 | 18.3 | 16.7 | 14.9 | 13.1 | 11.6 | 10.4 | 9.22 | 8.29 | 7.42 | 6.53 | 5.38 | 4.22 | 3.13 | 2.27 | 1.55 | 0.96 | 1.08 |
| 140                | 12.7 | 12.4 | 12.0 | 11.5 | 10.8 | 10.0 | 9.26 | 8.45 | 7.63 | 6.87 | 6.10 | 5.30 | 4.34 | 3.38 | 2.50 | 1.82 | 1.28 | 0.87 | 1.00 |
| 145                | 9.94 | 9.80 | 9.56 | 9.23 | 8.81 | 8.30 | 7.66 | 6.98 | 6.27 | 5.70 | 5.09 | 4.38 | 3.24 | 2.10 | 1.12 | 0.68 | 0.56 | 0.77 | 0.88 |
| 150                | 8.11 | 7.98 | 7.77 | 7.47 | 7.09 | 6.66 | 6.16 | 5.63 | 5.08 | 4.63 | 4.14 | 3.56 | 2.58 | 1.60 | 0.78 | 0.45 | 0.42 | 0.68 | 0.80 |
| 155                | 5.95 | 5.83 | 5.66 | 5.48 | 5.27 | 5.03 | 4.79 | 4.51 | 4.18 | 3.77 | 3.30 | 2.75 | 1.98 | 1.24 | 0.63 | 0.39 | 0.38 | 0.61 | 0.77 |
| 160                | 4.50 | 4.44 | 4.34 | 4.22 | 4.07 | 3.88 | 3.73 | 3.49 | 3.12 | 2.32 | 1.47 | 0.73 | 0.51 | 0.46 | 0.51 | 0.50 | 0.51 | 0.55 | 0.60 |
| 165                | 3.13 | 3.09 | 3.03 | 3.01 | 2.91 | 2.68 | 2.04 | 1.34 | 0.70 | 0.48 | 0.40 | 0.41 | 0.41 | 0.43 | 0.46 | 0.48 | 0.49 | 0.49 | 0.50 |
| 170                | 0.98 | 0.71 | 0.44 | 0.35 | 0.32 | 0.32 | 0.32 | 0.33 | 0.35 | 0.36 | 0.38 | 0.39 | 0.41 | 0.42 | 0.44 | 0.45 | 0.46 | 0.47 | 0.54 |
| 175                | 0.36 | 0.36 | 0.37 | 0.37 | 0.38 | 0.39 | 0.40 | 0.41 | 0.42 | 0.43 | 0.44 | 0.45 | 0.46 | 0.47 | 0.48 | 0.49 | 0.49 | 0.50 | 0.54 |
| 180                | 0.45 | 0.44 | 0.44 | 0.44 | 0.45 | 0.46 | 0.47 | 0.48 | 0.49 | 0.50 | 0.51 | 0.51 | 0.52 | 0.52 | 0.53 | 0.53 | 0.54 | 0.54 | 0.54 |



Table--3

UNIT: ×10cd

| C (DEG)<br>y (DEG) | 190  | 195  | 200  | 205  | 210  | 215  | 220  | 225  | 230  | 235  | 240  | 245  | 250  | 255  | 260  | 265  | 270  | 275  | 280  |
|--------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 0                  | 85.5 | 86.8 | 87.3 | 87.4 | 87.3 | 87.2 | 87.1 | 86.9 | 86.9 | 86.9 | 86.9 | 86.8 | 86.7 | 86.5 | 86.3 | 86.0 | 85.8 | 86.0 | 86.3 |
| 5                  | 72.1 | 67.9 | 63.7 | 59.6 | 55.7 | 51.8 | 48.1 | 44.7 | 41.7 | 39.2 | 37.3 | 36.5 | 36.2 | 36.3 | 36.4 | 36.6 | 36.8 | 36.6 | 36.4 |
| 10                 | 62.3 | 54.4 | 45.9 | 39.7 | 36.7 | 40.1 | 47.9 | 59.9 | 78.6 | 99.2 | 119  | 134  | 145  | 155  | 162  | 167  | 170  | 167  | 162  |
| 15                 | 45.7 | 40.3 | 43.0 | 54.2 | 74.1 | 113  | 153  | 187  | 192  | 187  | 177  | 175  | 172  | 167  | 155  | 143  | 134  | 143  | 155  |
| 20                 | 34.0 | 38.5 | 76.5 | 122  | 165  | 177  | 176  | 165  | 141  | 113  | 90.0 | 90.0 | 96.0 | 104  | 103  | 101  | 99.3 | 101  | 103  |
| 25                 | 45.7 | 53.8 | 95.9 | 142  | 178  | 163  | 134  | 101  | 87.8 | 78.4 | 71.7 | 64.5 | 58.7 | 54.5 | 52.8 | 52.3 | 52.7 | 52.3 | 52.8 |
| 30                 | 84.2 | 90.0 | 101  | 110  | 115  | 103  | 88.2 | 72.2 | 63.5 | 57.4 | 53.7 | 53.5 | 54.7 | 56.3 | 56.0 | 55.4 | 55.0 | 55.4 | 56.0 |
| 35                 | 121  | 130  | 128  | 119  | 105  | 87.1 | 69.2 | 54.2 | 51.9 | 53.0 | 55.0 | 51.6 | 47.4 | 43.1 | 39.8 | 37.4 | 36.0 | 37.4 | 39.8 |
| 40                 | 126  | 134  | 119  | 97.0 | 73.3 | 65.2 | 59.9 | 55.7 | 47.2 | 38.7 | 31.0 | 26.2 | 22.8 | 20.5 | 18.7 | 17.6 | 17.2 | 17.6 | 18.7 |
| 45                 | 106  | 110  | 98.1 | 79.7 | 59.9 | 50.9 | 44.2 | 38.5 | 30.6 | 23.3 | 16.9 | 13.1 | 10.5 | 8.92 | 7.77 | 7.21 | 7.13 | 7.21 | 7.77 |
| 50                 | 83.3 | 85.7 | 77.9 | 65.7 | 51.5 | 40.6 | 30.5 | 21.8 | 15.6 | 11.0 | 7.66 | 5.52 | 4.25 | 3.60 | 3.10 | 2.91 | 2.94 | 2.91 | 3.10 |
| 55                 | 68.2 | 68.5 | 60.7 | 49.5 | 36.9 | 27.4 | 19.0 | 12.1 | 8.06 | 5.54 | 4.06 | 2.83 | 2.10 | 1.73 | 1.52 | 1.47 | 1.53 | 1.47 | 1.52 |
| 60                 | 54.6 | 52.8 | 44.5 | 34.0 | 23.2 | 16.5 | 11.3 | 7.32 | 4.83 | 3.28 | 2.37 | 1.58 | 1.09 | 0.83 | 0.69 | 0.66 | 0.70 | 0.66 | 0.69 |
| 65                 | 41.4 | 38.6 | 30.8 | 21.7 | 13.0 | 8.80 | 6.08 | 4.41 | 3.06 | 2.20 | 1.67 | 1.08 | 0.65 | 0.36 | 0.25 | 0.24 | 0.28 | 0.24 | 0.25 |
| 70                 | 29.1 | 25.7 | 19.9 | 13.7 | 8.05 | 5.56 | 4.12 | 3.36 | 2.47 | 1.82 | 1.33 | 0.84 | 0.46 | 0.20 | 0.13 | 0.14 | 0.20 | 0.14 | 0.13 |
| 75                 | 19.1 | 16.1 | 12.3 | 8.56 | 5.33 | 3.95 | 3.21 | 2.85 | 2.24 | 1.73 | 1.30 | 0.89 | 0.56 | 0.32 | 0.26 | 0.27 | 0.32 | 0.27 | 0.26 |
| 80                 | 10.1 | 8.47 | 6.86 | 5.43 | 4.22 | 3.51 | 3.00 | 2.60 | 2.11 | 1.66 | 1.26 | 0.92 | 0.64 | 0.45 | 0.41 | 0.42 | 0.46 | 0.42 | 0.41 |
| 85                 | 6.29 | 5.77 | 5.00 | 4.18 | 3.40 | 2.95 | 2.59 | 2.28 | 1.89 | 1.52 | 1.19 | 0.92 | 0.72 | 0.58 | 0.54 | 0.56 | 0.59 | 0.56 | 0.54 |
| 90                 | 3.64 | 3.56 | 3.25 | 2.88 | 2.49 | 2.26 | 2.05 | 1.85 | 1.58 | 1.32 | 1.08 | 0.90 | 0.77 | 0.69 | 0.67 | 0.68 | 0.71 | 0.68 | 0.67 |
| 95                 | 2.74 | 2.65 | 2.40 | 2.11 | 1.82 | 1.67 | 1.54 | 1.43 | 1.24 | 1.07 | 0.91 | 0.83 | 0.79 | 0.77 | 0.76 | 0.77 | 0.79 | 0.77 | 0.76 |
| 100                | 2.41 | 2.22 | 1.99 | 1.76 | 1.55 | 1.43 | 1.33 | 1.24 | 1.11 | 0.99 | 0.89 | 0.84 | 0.83 | 0.82 | 0.83 | 0.83 | 0.84 | 0.83 | 0.83 |
| 105                | 2.07 | 1.93 | 1.76 | 1.58 | 1.42 | 1.32 | 1.25 | 1.18 | 1.08 | 0.98 | 0.91 | 0.87 | 0.86 | 0.86 | 0.87 | 0.88 | 0.88 | 0.88 | 0.87 |
| 110                | 1.83 | 1.72 | 1.58 | 1.45 | 1.32 | 1.25 | 1.19 | 1.14 | 1.05 | 0.96 | 0.89 | 0.87 | 0.86 | 0.86 | 0.86 | 0.87 | 0.87 | 0.87 | 0.86 |
| 115                | 1.62 | 1.55 | 1.44 | 1.33 | 1.22 | 1.17 | 1.13 | 1.09 | 1.01 | 0.94 | 0.88 | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 |
| 120                | 1.50 | 1.49 | 1.40 | 1.29 | 1.17 | 1.13 | 1.10 | 1.06 | 1.00 | 0.93 | 0.88 | 0.85 | 0.85 | 0.85 | 0.84 | 0.84 | 0.84 | 0.84 | 0.84 |
| 125                | 1.44 | 1.47 | 1.38 | 1.26 | 1.13 | 1.09 | 1.07 | 1.06 | 1.01 | 0.95 | 0.91 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.88 | 0.89 | 0.89 |
| 130                | 1.29 | 1.33 | 1.28 | 1.19 | 1.11 | 1.08 | 1.06 | 1.04 | 1.00 | 0.97 | 0.94 | 0.93 | 0.94 | 0.94 | 0.95 | 0.94 | 0.94 | 0.94 | 0.95 |
| 135                | 1.16 | 1.19 | 1.17 | 1.12 | 1.07 | 1.04 | 1.02 | 1.00 | 0.97 | 0.95 | 0.94 | 0.94 | 0.96 | 0.97 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 |
| 140                | 1.08 | 1.12 | 1.10 | 1.06 | 1.00 | 0.97 | 0.95 | 0.93 | 0.92 | 0.92 | 0.92 | 0.93 | 0.95 | 0.97 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 |
| 145                | 0.96 | 1.00 | 1.00 | 0.97 | 0.93 | 0.91 | 0.88 | 0.87 | 0.87 | 0.87 | 0.88 | 0.90 | 0.92 | 0.94 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| 150                | 0.88 | 0.92 | 0.92 | 0.89 | 0.86 | 0.84 | 0.82 | 0.81 | 0.82 | 0.83 | 0.85 | 0.86 | 0.87 | 0.88 | 0.89 | 0.90 | 0.90 | 0.90 | 0.89 |
| 155                | 0.80 | 0.85 | 0.85 | 0.83 | 0.80 | 0.79 | 0.78 | 0.77 | 0.78 | 0.79 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.79 | 0.80 | 0.80 |
| 160                | 0.74 | 0.79 | 0.79 | 0.77 | 0.75 | 0.75 | 0.76 | 0.77 | 0.77 | 0.76 | 0.76 | 0.75 | 0.74 | 0.73 | 0.72 | 0.70 | 0.68 | 0.70 | 0.72 |
| 165                | 0.66 | 0.70 | 0.71 | 0.71 | 0.69 | 0.70 | 0.71 | 0.72 | 0.71 | 0.69 | 0.68 | 0.65 | 0.63 | 0.61 | 0.59 | 0.58 | 0.56 | 0.58 | 0.59 |
| 170                | 0.59 | 0.63 | 0.63 | 0.63 | 0.62 | 0.62 | 0.61 | 0.60 | 0.58 | 0.55 | 0.51 | 0.48 | 0.44 | 0.41 | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 |
| 175                | 0.57 | 0.59 | 0.60 | 0.59 | 0.58 | 0.58 | 0.57 | 0.56 | 0.53 | 0.50 | 0.47 | 0.45 | 0.43 | 0.42 | 0.42 | 0.42 | 0.42 | 0.42 | 0.42 |
| 180                | 0.52 | 0.52 | 0.52 | 0.52 | 0.52 | 0.52 | 0.52 | 0.52 | 0.52 | 0.51 | 0.50 | 0.48 | 0.47 | 0.45 | 0.45 | 0.44 | 0.44 | 0.44 | 0.45 |

| C (DEG)<br>y (DEG) | 285  | 290  | 295  | 300  | 305  | 310  | 315  | 320  | 325  | 330  | 335  | 340  | 345  | 350  | 355  |  |  |  |  |
|--------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|--|--|--|--|
| 0                  | 86.5 | 86.7 | 86.8 | 86.9 | 86.9 | 86.9 | 86.9 | 87.1 | 87.2 | 87.3 | 87.4 | 87.3 | 86.8 | 85.5 | 83.7 |  |  |  |  |
| 5                  | 36.3 | 36.2 | 36.5 | 37.3 | 39.2 | 41.7 | 44.7 | 48.1 | 51.8 | 55.7 | 59.6 | 63.7 | 67.9 | 72.1 | 76.5 |  |  |  |  |
| 10                 | 155  | 145  | 134  | 119  | 99.2 | 78.6 | 59.9 | 47.9 | 40.1 | 36.7 | 39.7 | 45.9 | 54.4 | 62.3 | 71.1 |  |  |  |  |
| 15                 | 167  | 172  | 175  | 177  | 187  | 192  | 187  | 153  | 113  | 74.1 | 54.2 | 43.0 | 40.3 | 45.7 | 59.5 |  |  |  |  |
| 20                 | 104  | 96.0 | 90.0 | 90.0 | 113  | 141  | 165  | 176  | 177  | 165  | 122  | 76.5 | 38.5 | 34.0 | 48.4 |  |  |  |  |
| 25                 | 54.5 | 58.7 | 64.5 | 71.7 | 78.4 | 87.8 | 101  | 134  | 163  | 178  | 142  | 95.9 | 53.8 | 45.7 | 54.3 |  |  |  |  |
| 30                 | 56.3 | 54.7 | 53.5 | 53.7 | 57.4 | 63.5 | 72.2 | 88.2 | 103  | 115  | 110  | 101  | 90.0 | 84.2 | 79.5 |  |  |  |  |
| 35                 | 43.1 | 47.4 | 51.6 | 55.0 | 53.0 | 51.9 | 54.2 | 69.2 | 87.1 | 105  | 119  | 128  | 130  | 121  | 101  |  |  |  |  |
| 40                 | 20.5 | 22.8 | 26.2 | 31.0 | 38.7 | 47.2 | 55.7 | 59.9 | 65.2 | 73.3 | 97.0 | 119  | 134  | 126  | 105  |  |  |  |  |
| 45                 | 8.92 | 10.5 | 13.1 | 16.9 | 23.3 | 30.6 | 38.5 | 44.2 | 50.9 | 59.9 | 79.7 | 98.1 | 110  | 106  | 91.0 |  |  |  |  |
| 50                 | 3.60 | 4.25 | 5.52 | 7.66 | 11.0 | 15.6 | 21.8 | 30.5 | 40.6 | 51.5 | 65.7 | 77.9 | 85.7 | 83.3 | 74.0 |  |  |  |  |
| 55                 | 1.73 | 2.10 | 2.83 | 4.06 | 5.54 | 8.06 | 12.1 | 19.0 | 27.4 | 36.9 | 49.5 | 60.7 | 68.5 | 68.2 | 62.3 |  |  |  |  |
| 60                 | 0.83 | 1.09 | 1.58 | 2.37 | 3.28 | 4.83 | 7.32 | 11.3 | 16.5 | 23.2 | 34.0 | 44.5 | 52.8 | 54.6 | 52.4 |  |  |  |  |
| 65                 | 0.36 | 0.65 | 1.08 | 1.67 | 2.20 | 3.06 | 4.41 | 6.08 | 8.80 | 13.0 | 21.7 | 30.8 | 38.6 | 41.4 | 41.4 |  |  |  |  |
| 70                 | 0.20 | 0.46 | 0.84 | 1.33 | 1.82 | 2.47 | 3.36 | 4.12 | 5.56 | 8.05 | 13.7 | 19.9 | 25.7 | 29.1 | 31.3 |  |  |  |  |
| 75                 | 0.32 | 0.56 | 0.89 | 1.30 | 1.73 | 2.24 | 2.85 | 3.21 | 3.95 | 5.33 | 8.56 | 12.3 | 16.1 | 19.1 | 21.7 |  |  |  |  |
| 80                 | 0.45 | 0.64 | 0.92 | 1.26 | 1.66 | 2.11 | 2.60 | 3.00 | 3.51 | 4.22 | 5.43 | 6.86 | 8.47 | 10.1 | 11.9 |  |  |  |  |
| 85                 | 0.58 | 0.72 | 0.92 | 1.19 | 1.52 | 1.89 | 2.28 | 2.59 | 2.95 | 3.40 | 4.18 | 5.00 | 5.77 | 6.29 | 6.67 |  |  |  |  |
| 90                 | 0.69 | 0.77 | 0.90 | 1.08 | 1.32 | 1.58 | 1.85 | 2.05 | 2.26 | 2.49 | 2.88 | 3.25 | 3.56 | 3.64 | 3.60 |  |  |  |  |
| 95                 | 0.77 | 0.79 | 0.83 | 0.91 | 1.07 | 1.24 | 1.43 | 1.54 | 1.67 | 1.82 | 2.11 | 2.40 | 2.65 | 2.74 | 2.75 |  |  |  |  |
| 100                | 0.82 | 0.83 | 0.84 | 0.89 | 0.99 | 1.11 | 1.24 | 1.33 | 1.43 | 1.55 | 1.76 | 1.99 | 2.22 | 2.41 | 2.58 |  |  |  |  |
| 105                | 0.86 | 0.86 | 0.87 | 0.91 | 0.98 | 1.08 | 1.18 | 1.25 | 1.32 | 1.42 | 1.58 | 1.76 | 1.93 | 2.07 | 2.18 |  |  |  |  |
| 110                | 0.86 | 0.86 | 0.87 | 0.89 | 0.96 | 1.05 | 1.14 | 1.19 | 1.25 | 1.32 | 1.45 | 1.58 | 1.72 | 1.83 | 1.92 |  |  |  |  |
| 115                | 0.85 | 0.85 | 0.85 | 0.88 | 0.94 | 1.01 | 1.09 | 1.13 | 1.17 | 1.22 | 1.33 | 1.44 | 1.55 | 1.62 | 1.66 |  |  |  |  |
| 120                | 0.85 | 0.85 | 0.85 | 0.88 | 0.93 | 1.00 | 1.06 | 1.10 | 1.13 | 1.17 | 1.29 | 1.40 | 1.49 | 1.50 | 1.46 |  |  |  |  |
| 125                | 0.89 | 0.89 | 0.89 | 0.91 | 0.95 | 1.01 | 1.06 | 1.07 | 1.09 | 1.13 | 1.26 | 1.38 | 1.47 | 1.44 | 1.34 |  |  |  |  |
| 130                | 0.94 | 0.94 | 0.93 | 0.94 | 0.97 | 1.00 | 1.04 | 1.06 | 1.08 | 1.11 | 1.19 | 1.28 | 1.33 | 1.29 | 1.20 |  |  |  |  |
| 135                | 0.97 | 0.96 | 0.94 | 0.94 | 0.95 | 0.97 | 1.00 | 1.02 | 1.04 | 1.07 | 1.12 | 1.17 | 1.19 | 1.16 | 1.08 |  |  |  |  |
| 140                | 0.97 | 0.95 | 0.93 | 0.92 | 0.92 | 0.92 | 0.93 | 0.95 | 0.97 | 1.00 | 1.06 | 1.10 | 1.12 | 1.08 | 1.00 |  |  |  |  |
| 145                | 0.94 | 0.92 | 0.90 | 0.88 | 0.87 | 0.87 | 0.87 | 0.88 | 0.91 | 0.93 | 0.97 | 1.00 | 1.00 | 0.96 | 0.88 |  |  |  |  |
| 150                | 0.88 | 0.87 | 0.86 | 0.85 | 0.83 | 0.82 | 0.81 | 0.82 | 0.84 | 0.86 | 0.89 | 0.92 | 0.92 | 0.88 | 0.80 |  |  |  |  |
| 155                | 0.80 | 0.80 | 0.80 | 0.80 | 0.79 | 0.78 | 0.77 | 0.78 | 0.79 | 0.80 | 0.83 | 0.85 | 0.85 | 0.80 | 0.72 |  |  |  |  |
| 160                | 0.73 | 0.74 | 0.75 | 0.76 | 0.76 | 0.77 | 0.77 | 0.76 | 0.75 | 0.75 | 0.77 | 0.79 | 0.79 | 0.74 | 0.66 |  |  |  |  |
| 165                | 0.61 | 0.63 | 0.65 | 0.68 | 0.69 | 0.71 | 0.72 | 0.71 | 0.70 | 0.69 | 0.71 | 0.71 | 0.70 | 0.66 | 0.59 |  |  |  |  |
| 170                | 0.41 | 0.44 | 0.48 | 0.51 | 0.55 | 0.58 | 0.60 | 0.61 | 0.62 | 0.62 | 0.63 | 0.63 | 0.63 | 0.59 | 0.54 |  |  |  |  |
| 175                | 0.42 | 0.43 | 0.45 | 0.47 | 0.50 | 0.53 | 0.56 | 0.57 | 0.58 | 0.58 | 0.59 | 0.60 | 0.59 | 0.57 | 0.54 |  |  |  |  |
| 180                | 0.45 | 0.47 | 0.48 | 0.50 | 0.51 | 0.52 | 0.52 | 0.52 | 0.52 | 0.52 | 0.52 | 0.52 | 0.52 | 0.52 | 0.53 |  |  |  |  |

## 4.0 LM-79 Measurement and Test Results

### 4.3 THD and PF Test

|                         |                     |                       |              |
|-------------------------|---------------------|-----------------------|--------------|
| <b>Model No.</b>        | W34L @ 150W / 4000K | <b>Sample ID</b>      | 230612001-S1 |
| <b>Temperature (°C)</b> | 25.4                | <b>Humidity (%RH)</b> | 41.0         |

|   |
|---|
| <b>Test Method</b>  |
| <p>The samples were tested according to the ANSI C82.77:2014</p> <p>The total harmonic distortion shall be measured to the 40th order.</p> <p>The ambient temperature shall be maintained at <math>25 \pm 1^{\circ}\text{C}</math>. The sample measurements were made using a digital power meter and power supply. The sample was operated at rated voltage and was stabilized before measurement. The total harmonic distortion was calculated.</p> |

### Test Results

| Voltage (Vac) | Frequency (Hz) | Current (A) | Power (W) | Power Factor | iTHD(%) |
|---------------|----------------|-------------|-----------|--------------|---------|
| 120.0         | 60             | 1.153       | 137.9     | 0.997        | 3.53    |
| 277.0         | 60             | 0.520       | 134.4     | 0.932        | 8.91    |



## 5.0 Equipment List:

| Equipment ID | Equipment Name               | Last Cal.  | Due Cal.   |
|--------------|------------------------------|------------|------------|
| NTC-F01-001  | Goniophotometer System       | 2022-11-09 | 2023-11-08 |
| NTC-F01-006  | 2.0 meter Integrating Sphere | 2022-11-09 | 2023-11-08 |
| NTC-F01-012  | Standard Lamp                | 2022-11-09 | 2023-11-08 |
| NTC-F01-013  | Standard Lamp                | 2022-11-09 | 2023-11-08 |
| NTC-F01-031  | Digital Power Meter          | 2022-08-31 | 2023-08-30 |
| NTC-F01-019  | Temperature & Humidity Meter | 2022-11-12 | 2023-11-11 |

\*\*\*\*\*End of Report\*\*\*\*\*