

LM-79-08 Test Report

For

ETI Solid State Lighting (Zhuhai) Ltd

No.1, Zhongzhu Road South, Science & Technology Innovation Coast, High Tech District, Zhuhai City,
Guangdong Prov., China 519085

Inseparable SSL Luminaire

Model Name(s):

565721##

Representative (Tested) Model:

56572111

Model Difference: ## can be 11-30 identical to Color Tunable, tunable 3000K, 4000K and 5000K.

Prepare by:

Derek Lai

Engineer: Derek Lai

Date: 2019-07-31

Review by:

Vincent Yuan

Technical Lead: Vincent Yuan

Issue Date: 2019-08-16

Revised Date: N/A

- Note:
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.

Product Information:

| | |
|------------------------|---------------------------------------|
| Client Name: | ETI Solid State Lighting (Zhuhai) Ltd |
| Brand Name: | ETI, Commercial Electric |
| Model Number: | 565721##(##=11-30) |
| Product Type: | Inseparable SSL Luminaire |
| Rating Input: | 120Vac, 60Hz, 14W |
| Declared CCT: | 3000K/4000K/5000K |
| Declared Light Output: | 900 lm for all CCT |
| LED Manufacturer: | Samsung Electronics Co., LTD. |
| LED Model: | SPMWHX228FD5WAW0XX |
| LED Quantity: | 90 pcs |

Test Information:

| | |
|------------------------------|--|
| Standard Lamp: | Total Spectral Radiant Flux Standard Lamp, trace to NIST. 1. D908S for Gonio 2. D215S for Integrating Sphere |
| Date of Receipt Samples: | 2019-07-28 |
| Quantity of Receipt Samples: | 1 pcs |
| Sample Number: | 190728001-S1 |

Laboratory Information:

| | |
|----------------------------|--|
| Test Laboratory: | Dongguan New Testing Centre Co., Ltd |
| Laboratory Address: | 3F, No. 1 the 1 st North Industry Road, Songshan Lake Science & Technology Park, Dongguan, Guangdong, China |
| Laboratory Contact Name: | Neil Zhong |
| Laboratory Contact E-mail: | Neil_ntc@163.com |

Report Information:

| | |
|------------------------------|---------------|
| Issued Date of Test Report: | 2019-08-16 |
| Revised Date of Test Report: | N/A |
| Test Report No.: | NTCLR19070116 |
| Remark (If applicable): | N/A |

| Test Specification: | |
|----------------------------|---|
| Date of Test | 2019-07-30 |
| Test Item | 1. Total Luminous Flux 2. Luminous Distribution Intensity 3. Luminous Efficacy 4. Correlated Color Temperature 5. Color Rendering Index 6. Chromaticity Coordinate |
| Reference Standard | IES LM-79-2008 Electrical and Photometric Measurements of Solid-State Lighting Products ANSI C78.377-2017 Specifications for the Chromaticity of Solid State Lighting Products CIE 13.3-1995 Method of Measuring and Specifying Color Rendering Properties of Light Sources CIE 15-2004 Technical Report Colorimetry |

| Test Methods: |
|---|
| <p>1. Photometric and Electrical Measurements – Light Distribution Method:</p> <p>Photometric parameters were measured using the goniophotometer and software. The ambient temperature shall be maintained at $25\text{ }^{\circ}\text{C} \pm 1\text{ }^{\circ}\text{C}$, measured at a point not more than 1 m from the sample and at the same height as the sample. The sample was operated at required Voltage and Frequency. It was stabilized before measurement was made. Luminous Flux, Luminaire Efficacy and Zonal Lumen were calculated from the software taken at 1° vertical intervals and 15° horizontal intervals.</p> |
| <p>2. Photometric and Electrical Measurements – Integrating Sphere Method:</p> <p>Photometric parameters were measured using an integrating sphere, as spectroradiometer and software. The ambient temperature condition inside the sphere was measured at $25\text{ }^{\circ}\text{C} \pm 1\text{ }^{\circ}\text{C}$. The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere. The sample was operated at require Voltage and Frequency. It was stabilized before measurement was made. Chromaticity Coordinates, Correlated Color Temperature and Color Rendering Index were calculated from the spectral radiant flux measurements taken at least 1 nm intervals over the rage of 380 to 780 nm.</p> |

Integrating Sphere Test Results for 3000K:

Test Condition:

| Test Ambient (°C) | Test Humidity (%) | Orientation | Stabilization Time (minute) | Test Time (minute) |
|-------------------|-------------------|-------------|-----------------------------|--------------------|
| 24.8 | 41.4 | Face Down | 90 | 10 |

Electrical Data:

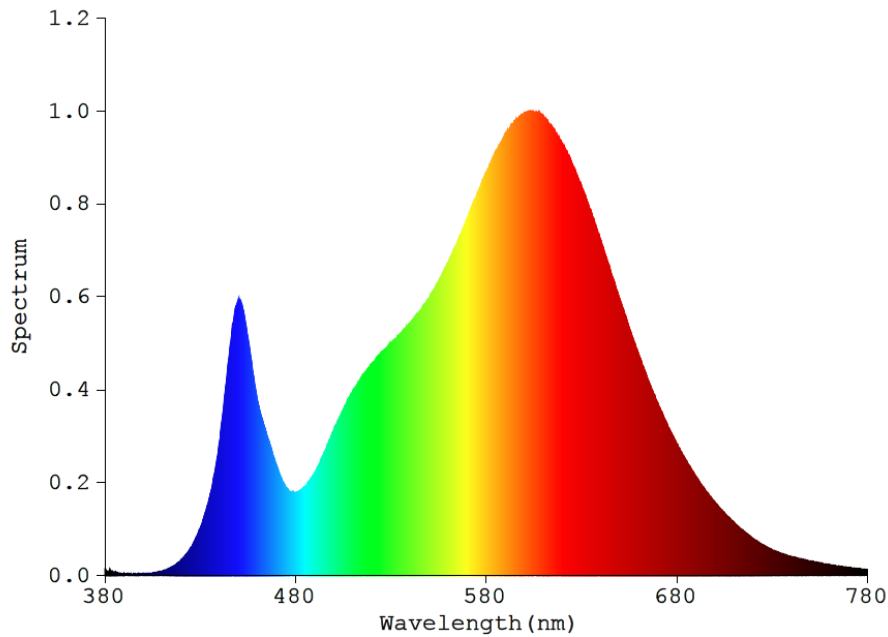
| Voltage (V) | Frequency (Hz) | Current (A) | Wattage (W) | Power Factor |
|-------------|----------------|-------------|-------------|--------------|
| 120.0 | 60 | 0.1079 | 12.54 | 0.9688 |

Color Data:

| Parameter | Result |
|------------------|----------|
| CCT(K) | 3005 |
| Ra | 83.2 |
| R9 | 11 |
| Chromaticity, x | 0.4320 |
| Chromaticity, y | 0.3945 |
| Chromaticity, u' | 0.2515 |
| Chromaticity, v' | 0.5168 |
| Duv | -0.00318 |

| Special Color Rendering | | | |
|-------------------------|----|-----|----|
| R1 | 82 | R9 | 11 |
| R2 | 92 | R10 | 81 |
| R3 | 96 | R11 | 81 |
| R4 | 81 | R12 | 74 |
| R5 | 82 | R13 | 84 |
| R6 | 90 | R14 | 98 |
| R7 | 82 | R15 | 75 |
| R8 | 60 | - | - |

Spectrum Diagram:



Integrating Sphere Test Results for 5000K:

Test Condition:

| Test Ambient (°C) | Test Humidity (%) | Orientation | Stabilization Time (minute) | Test Time (minute) |
|-------------------|-------------------|-------------|-----------------------------|--------------------|
| 24.7 | 40.6 | Face Down | 90 | 10 |

Electrical Data:

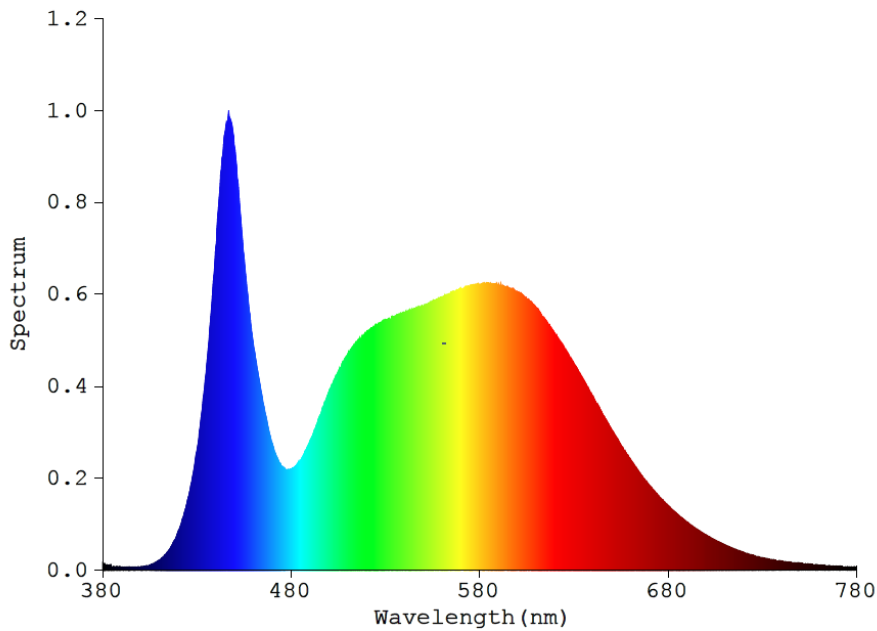
| Voltage (V) | Frequency (Hz) | Current (A) | Wattage (W) | Power Factor |
|-------------|----------------|-------------|-------------|--------------|
| 120.0 | 60 | 0.1095 | 12.74 | 0.9698 |

Color Data:

| Parameter | Result |
|------------------|----------|
| CCT(K) | 5001 |
| Ra | 83.4 |
| R9 | 14 |
| Chromaticity, x | 0.3449 |
| Chromaticity, y | 0.3504 |
| Chromaticity, u' | 0.2118 |
| Chromaticity, v' | 0.4841 |
| Duv | -0.00054 |

| Special Color Rendering | | | |
|-------------------------|----|-----|----|
| R1 | 83 | R9 | 14 |
| R2 | 87 | R10 | 69 |
| R3 | 90 | R11 | 85 |
| R4 | 85 | R12 | 68 |
| R5 | 84 | R13 | 83 |
| R6 | 83 | R14 | 94 |
| R7 | 86 | R15 | 78 |
| R8 | 70 | - | - |

Spectrum Diagram:



Goniophotometer Test Results for 3000K:

Test Condition:

| Test Ambient (°C) | Test Humidity (%) | Orientation | Stabilization Time (minute) | Test Time (minute) |
|-------------------|-------------------|-------------|-----------------------------|--------------------|
| 24.8 | 41.4 | Face Down | 90 | 25 |

Electrical Data:

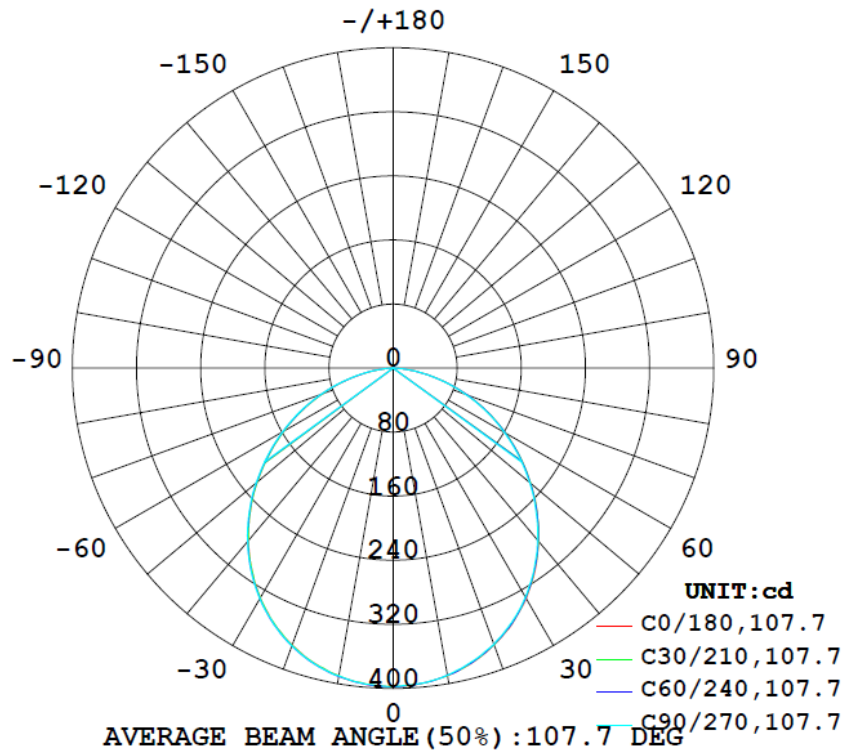
| Voltage (V) | Frequency (Hz) | Current (A) | Wattage (W) | Power Factor |
|-------------|----------------|-------------|-------------|--------------|
| 120.0 | 60 | 0.1079 | 12.54 | 0.9688 |

Goniophotometer Data:

| Parameter | Results |
|-----------------------------------|---------|
| Total Luminous (lm) | 1077.8 |
| Luminous Efficacy (lm/w) | 85.95 |
| Zonal Lumens Distribution (0-60°) | 80.3% |
| Beam Angle (°) | 107.7 |

Luminous Intensity Distribution Diagram:

LUMINOUS INTENSITY DISTRIBUTION DIAGRAM

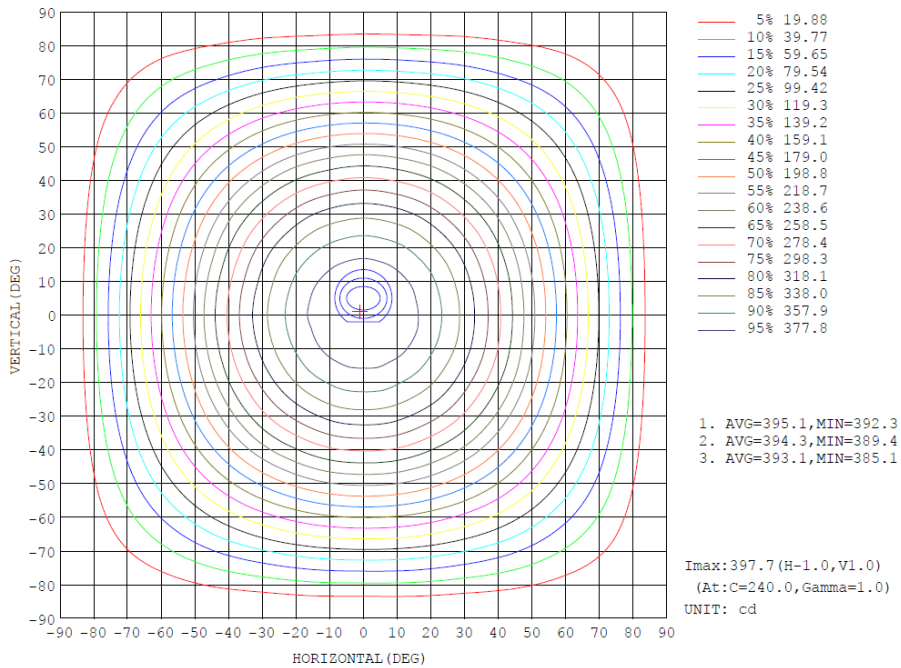


Zonal Flux Diagram:

ZONAL FLUX DIAGRAM:

| γ | C0 | C45 | C90 | C135 | C180 | C225 | C270 | C315 | γ | Φ zone | Φ total | %lum, lamp |
|-----|--|--------|--------|--------|--------|--------|--------|--------|---------|---------|---------|------------|
| 10 | 390.0 | 390.3 | 389.4 | 389.1 | 390.3 | 390.1 | 390.3 | 389.9 | 0- 10 | 37.58 | 37.58 | 3.49,3.49 |
| 20 | 367.9 | 368.1 | 366.8 | 366.8 | 368.1 | 368.4 | 369.3 | 368.3 | 10- 20 | 107.5 | 145.0 | 13.5,13.5 |
| 30 | 332.0 | 331.7 | 329.8 | 329.9 | 331.5 | 330.9 | 332.8 | 331.8 | 20- 30 | 161.9 | 306.9 | 28.5,28.5 |
| 40 | 282.2 | 282.6 | 279.9 | 280.1 | 281.1 | 280.9 | 282.4 | 282.3 | 30- 40 | 192.4 | 499.4 | 46.3,46.3 |
| 50 | 223.9 | 224.9 | 222.2 | 221.3 | 221.6 | 221.2 | 223.5 | 223.9 | 40- 50 | 195.2 | 694.5 | 64.4,64.4 |
| 60 | 161.5 | 161.5 | 159.5 | 158.1 | 158.1 | 158.1 | 159.8 | 161.3 | 50- 60 | 171.1 | 865.7 | 80.3,80.3 |
| 70 | 98.36 | 98.58 | 96.40 | 95.04 | 94.65 | 94.16 | 96.42 | 97.67 | 60- 70 | 126.8 | 992.4 | 92.1,92.1 |
| 80 | 38.08 | 38.83 | 37.17 | 36.37 | 35.52 | 34.53 | 36.95 | 37.78 | 70- 80 | 69.41 | 1062 | 98.5,98.5 |
| 90 | 0.0006 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 80- 90 | 15.58 | 1077 | 100,100 |
| 100 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 90-100 | 0.0000 | 1077 | 100,100 |
| 110 | 0 | 0 | 0 | 0 | 0.0139 | 0.0155 | 0.0196 | 0.0142 | 100-110 | 0.0039 | 1077 | 100,100 |
| 120 | 0 | 0 | 0 | 0 | 0.0319 | 0.0384 | 0.0388 | 0.0321 | 110-120 | 0.0118 | 1077 | 100,100 |
| 130 | 0.0391 | 0.0308 | 0.0321 | 0.0372 | 0.0942 | 0.1009 | 0.1005 | 0.0866 | 120-130 | 0.0341 | 1077 | 100,100 |
| 140 | 0.0759 | 0.0674 | 0.0741 | 0.0687 | 0.1505 | 0.1693 | 0.1624 | 0.1495 | 130-140 | 0.0693 | 1078 | 100,100 |
| 150 | 0.0997 | 0.0928 | 0.0913 | 0.1047 | 0.2056 | 0.2280 | 0.2204 | 0.2105 | 140-150 | 0.0837 | 1078 | 100,100 |
| 160 | 0.1296 | 0.1193 | 0.1047 | 0.1261 | 0.2619 | 0.2671 | 0.2509 | 0.2427 | 150-160 | 0.0795 | 1078 | 100,100 |
| 170 | 0.1631 | 0.1693 | 0.1326 | 0.1536 | 0.2416 | 0.2645 | 0.2274 | 0.2457 | 160-170 | 0.0550 | 1078 | 100,100 |
| 180 | 0.1986 | 0.2094 | 0.1985 | 0.1828 | 0.1976 | 0.2088 | 0.1985 | 0.1831 | 170-180 | 0.0192 | 1078 | 100,100 |
| DEG | LUMINOUS INTENSITY:cd Less than 35% Percent = 13.6 % | | | | | | | | | UNIT:lm | | |

Isocandela Diagram:



Luminous Distribution Intensity Data:

Table--1 UNIT: cd

| C (DEG) \ y (DEG) | 0 | 15 | 30 | 45 | 60 | 75 | 90 | 105 | 120 | 135 | 150 | 165 | 180 | 195 | 210 | 225 | 240 | 255 | 270 |
|-------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 0 | 397 | 397 | 397 | 397 | 397 | 397 | 397 | 397 | 397 | 397 | 397 | 397 | 397 | 397 | 397 | 397 | 397 | 397 | 397 |
| 5 | 395 | 396 | 395 | 396 | 395 | 395 | 395 | 395 | 395 | 395 | 395 | 395 | 396 | 396 | 396 | 395 | 396 | 396 | 396 |
| 10 | 390 | 390 | 390 | 390 | 389 | 390 | 389 | 389 | 389 | 389 | 390 | 390 | 390 | 390 | 390 | 391 | 391 | 391 | 390 |
| 15 | 381 | 382 | 380 | 381 | 381 | 380 | 379 | 380 | 380 | 380 | 380 | 381 | 381 | 381 | 381 | 381 | 382 | 381 | 382 |
| 20 | 368 | 368 | 368 | 368 | 367 | 367 | 367 | 367 | 367 | 367 | 367 | 367 | 368 | 368 | 368 | 368 | 369 | 368 | 369 |
| 25 | 352 | 352 | 351 | 351 | 351 | 351 | 350 | 350 | 350 | 350 | 350 | 350 | 352 | 351 | 352 | 351 | 353 | 352 | 353 |
| 30 | 332 | 333 | 331 | 332 | 331 | 331 | 330 | 330 | 330 | 330 | 330 | 330 | 332 | 331 | 331 | 331 | 333 | 332 | 333 |
| 35 | 309 | 310 | 308 | 309 | 307 | 307 | 306 | 307 | 306 | 306 | 306 | 307 | 307 | 307 | 307 | 308 | 309 | 308 | 309 |
| 40 | 282 | 284 | 282 | 283 | 281 | 281 | 280 | 281 | 280 | 280 | 280 | 280 | 281 | 280 | 281 | 281 | 282 | 282 | 282 |
| 45 | 254 | 255 | 254 | 254 | 254 | 253 | 252 | 253 | 251 | 252 | 251 | 252 | 252 | 251 | 252 | 252 | 254 | 252 | 254 |
| 50 | 224 | 226 | 224 | 225 | 223 | 224 | 222 | 221 | 221 | 221 | 221 | 221 | 222 | 221 | 221 | 221 | 223 | 222 | 223 |
| 55 | 193 | 194 | 193 | 193 | 193 | 192 | 191 | 191 | 190 | 190 | 190 | 189 | 190 | 190 | 189 | 190 | 191 | 191 | 192 |
| 60 | 162 | 163 | 162 | 161 | 161 | 161 | 160 | 160 | 159 | 158 | 158 | 157 | 158 | 157 | 158 | 158 | 159 | 159 | 160 |
| 65 | 130 | 131 | 130 | 130 | 130 | 129 | 128 | 127 | 127 | 126 | 126 | 126 | 126 | 126 | 126 | 126 | 127 | 127 | 128 |
| 70 | 98.4 | 99.0 | 98.5 | 98.6 | 98.0 | 97.5 | 96.4 | 96.6 | 96.8 | 95.0 | 94.2 | 94.2 | 94.7 | 93.7 | 94.0 | 94.2 | 95.1 | 95.1 | 96.4 |
| 75 | 66.8 | 68.1 | 67.0 | 67.6 | 66.7 | 66.9 | 65.7 | 65.8 | 64.5 | 64.5 | 63.3 | 63.4 | 63.8 | 62.6 | 63.3 | 63.0 | 64.2 | 63.9 | 65.4 |
| 80 | 38.1 | 39.1 | 38.3 | 38.8 | 38.0 | 38.2 | 37.2 | 37.5 | 36.3 | 36.4 | 35.3 | 35.4 | 35.5 | 34.4 | 35.0 | 34.5 | 35.9 | 35.6 | 37.0 |
| 85 | 13.4 | 14.4 | 13.6 | 14.2 | 13.3 | 13.7 | 12.7 | 13.2 | 12.0 | 12.3 | 11.2 | 11.4 | 11.6 | 10.5 | 11.2 | 10.7 | 11.7 | 11.4 | 12.6 |
| 90 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 95 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 100 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 105 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| 110 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 |
| 115 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.02 | 0.02 | 0.02 | 0.03 | 0.03 | 0.03 |
| 120 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.03 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 |
| 125 | 0.02 | 0.02 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.02 | 0.02 | 0.02 | 0.07 | 0.06 | 0.06 | 0.07 | 0.07 | 0.06 | 0.06 |
| 130 | 0.04 | 0.04 | 0.03 | 0.03 | 0.04 | 0.04 | 0.03 | 0.03 | 0.04 | 0.04 | 0.03 | 0.04 | 0.09 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 |
| 135 | 0.05 | 0.05 | 0.06 | 0.04 | 0.05 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.11 | 0.12 | 0.13 | 0.14 | 0.14 | 0.13 | 0.14 |
| 140 | 0.08 | 0.07 | 0.07 | 0.07 | 0.07 | 0.08 | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 | 0.15 | 0.14 | 0.16 | 0.17 | 0.17 | 0.17 | 0.16 |
| 145 | 0.09 | 0.09 | 0.09 | 0.08 | 0.08 | 0.08 | 0.08 | 0.08 | 0.08 | 0.09 | 0.08 | 0.08 | 0.18 | 0.17 | 0.19 | 0.20 | 0.20 | 0.20 | 0.19 |
| 150 | 0.10 | 0.10 | 0.10 | 0.09 | 0.09 | 0.10 | 0.09 | 0.09 | 0.09 | 0.10 | 0.10 | 0.09 | 0.21 | 0.21 | 0.21 | 0.23 | 0.23 | 0.22 | 0.22 |
| 155 | 0.10 | 0.11 | 0.12 | 0.11 | 0.11 | 0.12 | 0.10 | 0.10 | 0.11 | 0.12 | 0.11 | 0.11 | 0.23 | 0.23 | 0.23 | 0.25 | 0.25 | 0.24 | 0.24 |
| 160 | 0.13 | 0.14 | 0.12 | 0.12 | 0.12 | 0.12 | 0.10 | 0.12 | 0.13 | 0.13 | 0.12 | 0.13 | 0.26 | 0.26 | 0.25 | 0.27 | 0.27 | 0.26 | 0.25 |
| 165 | 0.14 | 0.16 | 0.15 | 0.14 | 0.13 | 0.13 | 0.12 | 0.13 | 0.14 | 0.14 | 0.13 | 0.13 | 0.25 | 0.25 | 0.25 | 0.26 | 0.26 | 0.26 | 0.25 |
| 170 | 0.16 | 0.17 | 0.17 | 0.17 | 0.14 | 0.13 | 0.13 | 0.13 | 0.15 | 0.15 | 0.16 | 0.15 | 0.24 | 0.24 | 0.25 | 0.26 | 0.26 | 0.23 | 0.23 |
| 175 | 0.20 | 0.20 | 0.19 | 0.19 | 0.17 | 0.17 | 0.16 | 0.16 | 0.17 | 0.17 | 0.17 | 0.18 | 0.23 | 0.24 | 0.25 | 0.25 | 0.25 | 0.23 | 0.22 |
| 180 | 0.20 | 0.21 | 0.21 | 0.21 | 0.20 | 0.20 | 0.20 | 0.18 | 0.18 | 0.18 | 0.18 | 0.19 | 0.20 | 0.21 | 0.21 | 0.21 | 0.21 | 0.20 | 0.20 |

Table--2 UNIT: cd

| C (DEG) \ y (DEG) | 285 | 300 | 315 | 330 | 345 | | | | | | | | | | | | | | |
|-------------------|------|------|------|------|------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| 0 | 397 | 397 | 397 | 397 | 397 | | | | | | | | | | | | | | |
| 5 | 396 | 396 | 395 | 396 | 396 | | | | | | | | | | | | | | |
| 10 | 391 | 391 | 390 | 390 | 390 | | | | | | | | | | | | | | |
| 15 | 382 | 382 | 381 | 381 | 381 | | | | | | | | | | | | | | |
| 20 | 369 | 369 | 368 | 369 | 369 | | | | | | | | | | | | | | |
| 25 | 353 | 353 | 352 | 352 | 353 | | | | | | | | | | | | | | |
| 30 | 332 | 333 | 332 | 333 | 332 | | | | | | | | | | | | | | |
| 35 | 309 | 309 | 309 | 310 | 309 | | | | | | | | | | | | | | |
| 40 | 282 | 283 | 282 | 284 | 283 | | | | | | | | | | | | | | |
| 45 | 254 | 255 | 254 | 255 | 255 | | | | | | | | | | | | | | |
| 50 | 223 | 225 | 224 | 225 | 225 | | | | | | | | | | | | | | |
| 55 | 192 | 193 | 193 | 193 | 194 | | | | | | | | | | | | | | |
| 60 | 161 | 161 | 161 | 162 | 162 | | | | | | | | | | | | | | |
| 65 | 128 | 129 | 129 | 130 | 131 | | | | | | | | | | | | | | |
| 70 | 96.1 | 97.4 | 97.7 | 98.5 | 98.9 | | | | | | | | | | | | | | |
| 75 | 65.3 | 66.7 | 66.4 | 67.6 | 67.3 | | | | | | | | | | | | | | |
| 80 | 36.8 | 38.0 | 37.8 | 38.8 | 38.6 | | | | | | | | | | | | | | |
| 85 | 12.4 | 13.5 | 13.2 | 14.1 | 13.8 | | | | | | | | | | | | | | |
| 90 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | | | | | | | | | | | | | |
| 95 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | | | | | | | | | | | | | |
| 100 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | | | | | | | | | | | | | |
| 105 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | | | | | | | | | | | | | | |
| 110 | 0.02 | 0.02 | 0.01 | 0.01 | 0.01 | | | | | | | | | | | | | | |
| 115 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | | | | | | | | | | | | | | |
| 120 | 0.04 | 0.04 | 0.03 | 0.03 | 0.03 | | | | | | | | | | | | | | |
| 125 | 0.06 | 0.06 | 0.05 | 0.05 | 0.06 | | | | | | | | | | | | | | |
| 130 | 0.10 | 0.09 | 0.09 | 0.09 | 0.09 | | | | | | | | | | | | | | |
| 135 | 0.13 | 0.12 | 0.11 | 0.12 | 0.12 | | | | | | | | | | | | | | |
| 140 | 0.15 | 0.14 | 0.15 | 0.15 | 0.13 | | | | | | | | | | | | | | |
| 145 | 0.18 | 0.19 | 0.18 | 0.18 | 0.17 | | | | | | | | | | | | | | |
| 150 | 0.22 | 0.21 | 0.21 | 0.21 | 0.20 | | | | | | | | | | | | | | |
| 155 | 0.24 | 0.24 | 0.24 | 0.23 | 0.21 | | | | | | | | | | | | | | |
| 160 | 0.25 | 0.25 | 0.24 | 0.25 | 0.25 | | | | | | | | | | | | | | |
| 165 | 0.25 | 0.24 | 0.24 | 0.25 | 0.25 | | | | | | | | | | | | | | |
| 170 | 0.23 | 0.23 | 0.25 | 0.25 | 0.25 | | | | | | | | | | | | | | |
| 175 | 0.23 | 0.22 | 0.23 | 0.23 | 0.24 | | | | | | | | | | | | | | |
| 180 | 0.18 | 0.18 | 0.18 | 0.18 | 0.19 | | | | | | | | | | | | | | |

Goniophotometer Test Results for 5000K:

Test Condition:

| Test Ambient (°C) | Test Humidity (%) | Orientation | Stabilization Time (minute) | Test Time (minute) |
|-------------------|-------------------|-------------|-----------------------------|--------------------|
| 24.7 | 40.6 | Face Down | 90 | 25 |

Electrical Data:

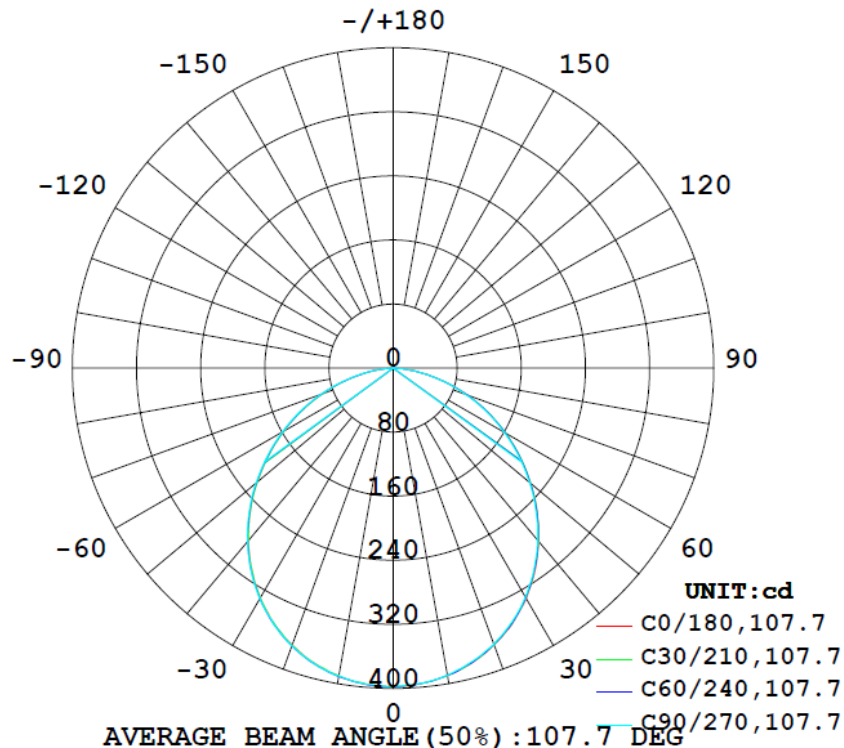
| Voltage (V) | Frequency (Hz) | Current (A) | Wattage (W) | Power Factor |
|-------------|----------------|-------------|-------------|--------------|
| 120.0 | 60 | 0.1095 | 12.74 | 0.9698 |

Goniophotometer Data:

| Parameter | Results |
|-----------------------------------|---------|
| Total Luminous (lm) | 1099.8 |
| Luminous Efficacy (lm/w) | 86.33 |
| Zonal Lumens Distribution (0-60°) | 80.3% |
| Beam Angle (°) | 107.7 |

Luminous Intensity Distribution Diagram:

LUMINOUS INTENSITY DISTRIBUTION DIAGRAM

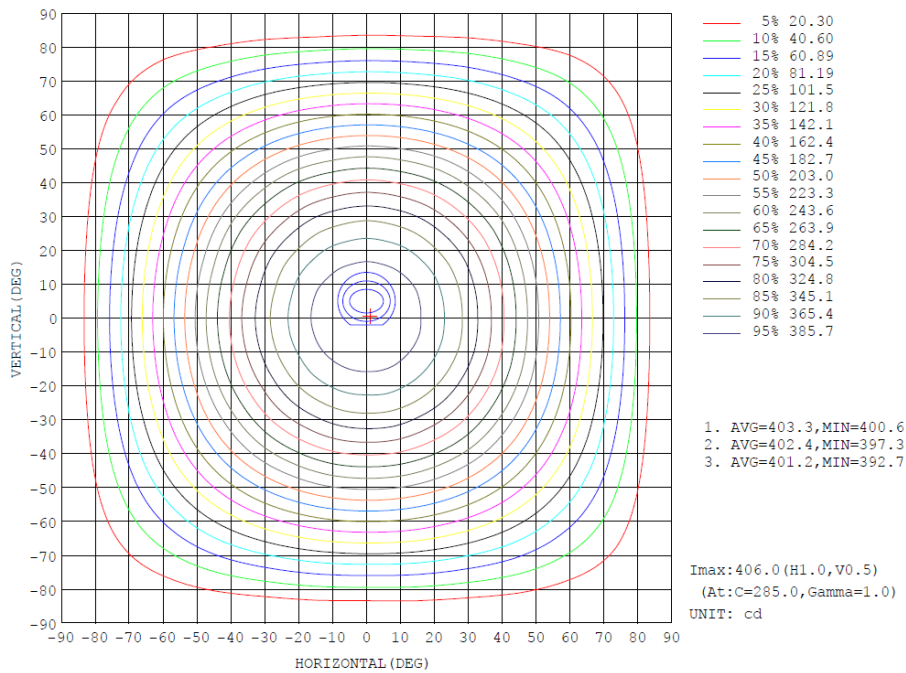


Zonal Flux Diagram:

ZONAL FLUX DIAGRAM:

| γ | C0 | C45 | C90 | C135 | C180 | C225 | C270 | C315 | γ | φ zone | φ total | lum, lamp |
|-----|--|--------|--------|--------|--------|--------|--------|--------|---------|---------|---------|-----------|
| 10 | 397.8 | 397.8 | 397.4 | 397.7 | 398.6 | 398.5 | 398.9 | 398.6 | 0- 10 | 38.36 | 38.36 | 3.49,3.49 |
| 20 | 375.2 | 375.3 | 374.4 | 374.7 | 375.9 | 376.0 | 377.2 | 376.5 | 10- 20 | 109.7 | 148.0 | 13.5,13.5 |
| 30 | 337.7 | 338.2 | 336.6 | 336.8 | 338.3 | 338.2 | 340.0 | 339.0 | 20- 30 | 165.1 | 313.2 | 28.5,28.5 |
| 40 | 287.5 | 288.0 | 286.6 | 285.4 | 287.1 | 287.1 | 288.8 | 288.4 | 30- 40 | 196.3 | 509.5 | 46.3,46.3 |
| 50 | 228.1 | 229.1 | 226.9 | 226.2 | 227.0 | 226.2 | 228.8 | 229.0 | 40- 50 | 199.1 | 708.5 | 64.4,64.4 |
| 60 | 164.4 | 164.7 | 163.0 | 161.3 | 162.0 | 161.7 | 163.5 | 164.8 | 50- 60 | 174.6 | 883.2 | 80.3,80.3 |
| 70 | 99.95 | 100.3 | 98.73 | 96.92 | 96.95 | 96.00 | 98.60 | 100.0 | 60- 70 | 129.4 | 1013 | 92.1,92.1 |
| 80 | 38.51 | 39.43 | 37.82 | 36.99 | 36.75 | 35.74 | 38.05 | 38.90 | 70- 80 | 70.89 | 1083 | 98.5,98.5 |
| 90 | 0.0001 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0009 | 80- 90 | 15.95 | 1099 | 100,100 |
| 100 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 90-100 | 0.0000 | 1099 | 100,100 |
| 110 | 0 | 0 | 0 | 0 | 0.0166 | 0.0185 | 0.0242 | 0.0172 | 100-110 | 0.0053 | 1099 | 100,100 |
| 120 | 0 | 0 | 0 | 0.0001 | 0.0379 | 0.0434 | 0.0435 | 0.0374 | 110-120 | 0.0137 | 1099 | 100,100 |
| 130 | 0.0433 | 0.0359 | 0.0364 | 0.0412 | 0.1000 | 0.1065 | 0.1062 | 0.0923 | 120-130 | 0.0378 | 1099 | 100,100 |
| 140 | 0.0812 | 0.0730 | 0.0792 | 0.0730 | 0.1565 | 0.1766 | 0.1697 | 0.1571 | 130-140 | 0.0738 | 1100 | 100,100 |
| 150 | 0.1061 | 0.0993 | 0.0951 | 0.1098 | 0.2127 | 0.2363 | 0.2292 | 0.2220 | 140-150 | 0.0879 | 1100 | 100,100 |
| 160 | 0.1389 | 0.1264 | 0.1088 | 0.1340 | 0.2710 | 0.2769 | 0.2604 | 0.2519 | 150-160 | 0.0830 | 1100 | 100,100 |
| 170 | 0.1672 | 0.1758 | 0.1403 | 0.1591 | 0.2537 | 0.2750 | 0.2379 | 0.2540 | 160-170 | 0.0573 | 1100 | 100,100 |
| 180 | 0.2070 | 0.2185 | 0.2047 | 0.1913 | 0.2066 | 0.2179 | 0.2053 | 0.1913 | 170-180 | 0.0200 | 1100 | 100,100 |
| DEG | LUMINOUS INTENSITY:cd Less than 35% Percent = 13.6 % | | | | | | | | | UNIT:lm | | |

Isocandela Diagram:



Luminous Distribution Intensity Data:

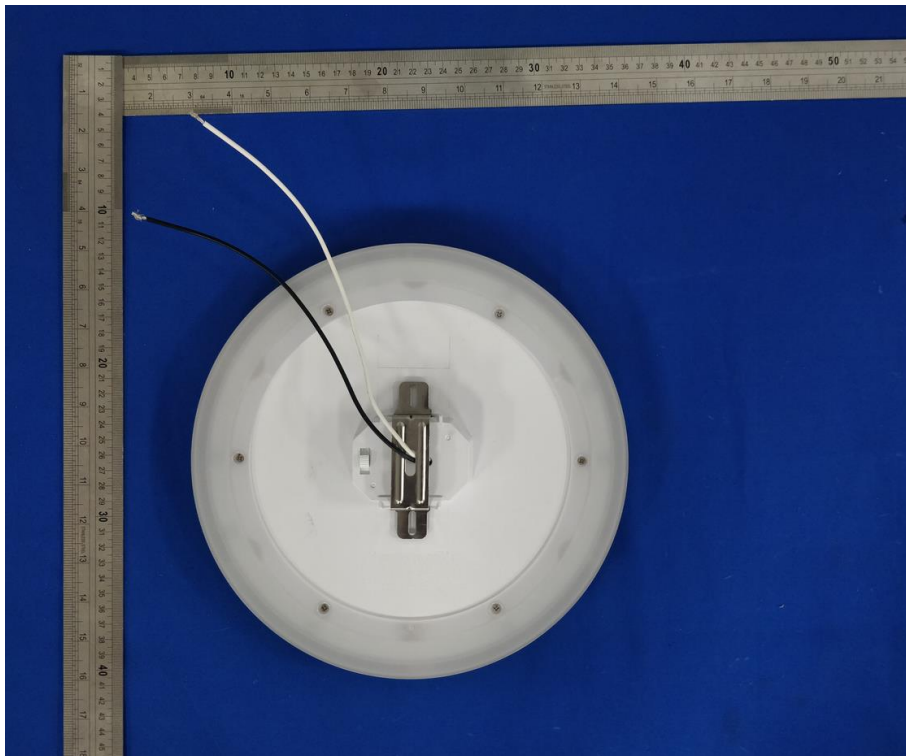
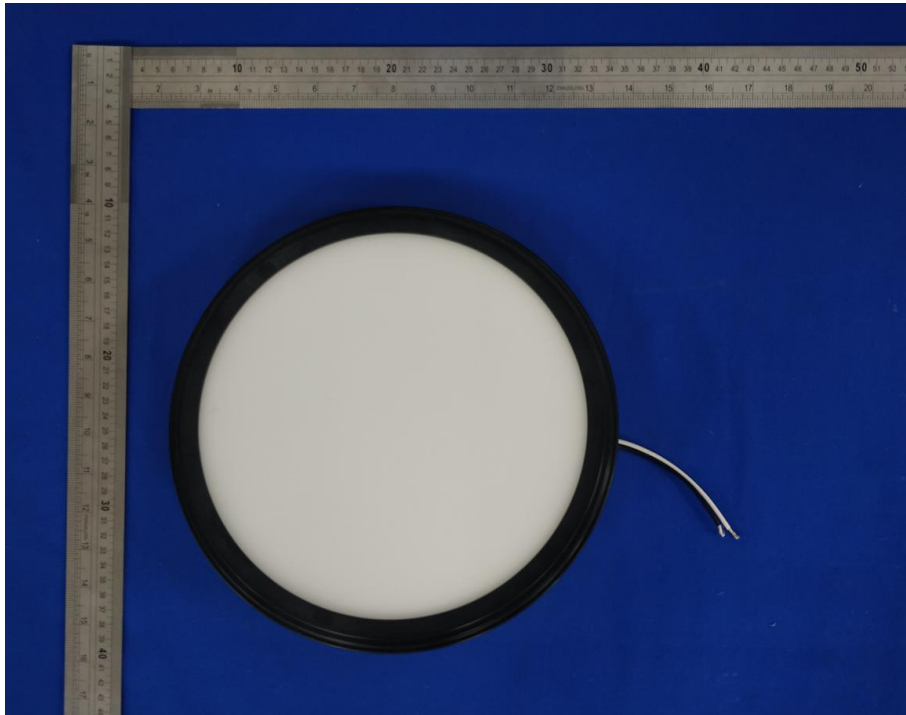
Table--1 UNIT: cd

| C (DEG) y (DEG) | 0 | 15 | 30 | 45 | 60 | 75 | 90 | 105 | 120 | 135 | 150 | 165 | 180 | 195 | 210 | 225 | 240 | 255 | 270 |
|--------------------|-------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 0 | 406 | 406 | 406 | 406 | 406 | 406 | 406 | 406 | 406 | 406 | 406 | 406 | 406 | 406 | 406 | 406 | 406 | 406 | 406 |
| 5 | 404 | 404 | 403 | 404 | 403 | 404 | 403 | 403 | 403 | 404 | 403 | 404 | 403 | 403 | 403 | 404 | 404 | 404 | 404 |
| 10 | 398 | 398 | 398 | 398 | 398 | 399 | 397 | 398 | 397 | 398 | 397 | 398 | 399 | 398 | 399 | 398 | 399 | 399 | 399 |
| 15 | 388 | 388 | 388 | 389 | 388 | 388 | 388 | 388 | 388 | 388 | 388 | 388 | 389 | 388 | 389 | 389 | 390 | 389 | 390 |
| 20 | 375 | 375 | 375 | 375 | 375 | 375 | 374 | 375 | 374 | 375 | 374 | 375 | 376 | 375 | 376 | 376 | 377 | 376 | 377 |
| 25 | 358 | 359 | 358 | 358 | 358 | 358 | 358 | 358 | 357 | 358 | 357 | 358 | 359 | 358 | 359 | 359 | 359 | 359 | 360 |
| 30 | 338 | 338 | 338 | 338 | 337 | 338 | 337 | 337 | 336 | 337 | 336 | 337 | 338 | 337 | 338 | 338 | 339 | 338 | 340 |
| 35 | 314 | 315 | 314 | 314 | 313 | 314 | 313 | 313 | 312 | 313 | 311 | 313 | 314 | 313 | 314 | 314 | 315 | 315 | 316 |
| 40 | 287 | 289 | 288 | 288 | 287 | 287 | 287 | 286 | 285 | 285 | 285 | 286 | 287 | 285 | 287 | 287 | 288 | 287 | 289 |
| 45 | 259 | 260 | 259 | 260 | 258 | 258 | 258 | 258 | 256 | 256 | 255 | 257 | 258 | 256 | 258 | 257 | 259 | 258 | 260 |
| 50 | 228 | 230 | 229 | 229 | 227 | 228 | 227 | 227 | 226 | 226 | 225 | 226 | 227 | 225 | 227 | 226 | 228 | 227 | 229 |
| 55 | 197 | 197 | 197 | 197 | 196 | 196 | 195 | 195 | 194 | 194 | 193 | 193 | 194 | 193 | 194 | 194 | 195 | 195 | 196 |
| 60 | 164 | 165 | 165 | 165 | 164 | 164 | 163 | 163 | 162 | 161 | 161 | 161 | 162 | 161 | 161 | 162 | 162 | 163 | 164 |
| 65 | 132 | 133 | 133 | 133 | 132 | 132 | 131 | 130 | 129 | 129 | 128 | 128 | 129 | 128 | 129 | 129 | 130 | 130 | 131 |
| 70 | 100.0 | 101 | 100 | 100 | 99.7 | 99.6 | 98.7 | 98.3 | 97.5 | 96.9 | 95.8 | 96.1 | 97.0 | 95.5 | 96.2 | 96.0 | 97.2 | 97.8 | 98.6 |
| 75 | 67.9 | 69.4 | 68.4 | 68.8 | 67.8 | 68.0 | 66.9 | 67.0 | 65.8 | 65.8 | 64.6 | 64.8 | 65.6 | 63.8 | 64.8 | 64.7 | 65.8 | 65.7 | 67.1 |
| 80 | 38.5 | 40.0 | 39.1 | 39.4 | 38.6 | 38.9 | 37.8 | 38.0 | 37.0 | 37.0 | 36.0 | 36.1 | 36.7 | 35.1 | 36.0 | 35.7 | 36.7 | 36.7 | 38.0 |
| 85 | 13.3 | 14.7 | 13.8 | 14.2 | 13.4 | 13.9 | 12.9 | 13.2 | 12.2 | 12.3 | 11.4 | 11.7 | 12.3 | 10.8 | 11.6 | 11.3 | 12.2 | 12.0 | 13.2 |
| 90 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 95 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 100 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 105 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.02 |
| 110 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.01 | 0.02 | 0.02 | 0.02 | 0.02 |
| 115 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.03 | 0.02 | 0.03 | 0.03 | 0.03 | 0.03 |
| 120 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 |
| 125 | 0.02 | 0.02 | 0.01 | 0.02 | 0.02 | 0.01 | 0.01 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 |
| 130 | 0.04 | 0.04 | 0.03 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.05 | 0.10 | 0.10 | 0.10 | 0.11 | 0.11 | 0.11 | 0.11 |
| 135 | 0.06 | 0.06 | 0.06 | 0.05 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.12 | 0.12 | 0.14 | 0.14 | 0.15 | 0.14 | 0.14 |
| 140 | 0.08 | 0.07 | 0.08 | 0.07 | 0.08 | 0.08 | 0.08 | 0.08 | 0.07 | 0.08 | 0.07 | 0.08 | 0.16 | 0.15 | 0.17 | 0.18 | 0.18 | 0.17 | 0.17 |
| 145 | 0.09 | 0.09 | 0.09 | 0.09 | 0.09 | 0.09 | 0.09 | 0.09 | 0.09 | 0.09 | 0.09 | 0.08 | 0.18 | 0.18 | 0.19 | 0.21 | 0.21 | 0.20 | 0.20 |
| 150 | 0.11 | 0.11 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.11 | 0.10 | 0.10 | 0.21 | 0.21 | 0.22 | 0.24 | 0.24 | 0.23 | 0.23 |
| 155 | 0.11 | 0.12 | 0.12 | 0.12 | 0.11 | 0.12 | 0.10 | 0.11 | 0.11 | 0.12 | 0.12 | 0.11 | 0.24 | 0.24 | 0.24 | 0.25 | 0.26 | 0.25 | 0.25 |
| 160 | 0.14 | 0.15 | 0.13 | 0.13 | 0.12 | 0.12 | 0.11 | 0.12 | 0.14 | 0.13 | 0.13 | 0.14 | 0.27 | 0.27 | 0.26 | 0.28 | 0.28 | 0.27 | 0.26 |
| 165 | 0.15 | 0.16 | 0.15 | 0.14 | 0.13 | 0.13 | 0.12 | 0.14 | 0.15 | 0.15 | 0.14 | 0.14 | 0.26 | 0.26 | 0.26 | 0.28 | 0.27 | 0.27 | 0.26 |
| 170 | 0.17 | 0.18 | 0.18 | 0.18 | 0.15 | 0.14 | 0.14 | 0.14 | 0.15 | 0.16 | 0.16 | 0.16 | 0.25 | 0.26 | 0.26 | 0.27 | 0.27 | 0.24 | 0.24 |
| 175 | 0.20 | 0.21 | 0.20 | 0.20 | 0.18 | 0.18 | 0.16 | 0.17 | 0.18 | 0.18 | 0.18 | 0.19 | 0.24 | 0.25 | 0.26 | 0.26 | 0.26 | 0.24 | 0.23 |
| 180 | 0.21 | 0.22 | 0.22 | 0.22 | 0.21 | 0.21 | 0.20 | 0.19 | 0.19 | 0.19 | 0.19 | 0.20 | 0.21 | 0.22 | 0.22 | 0.22 | 0.21 | 0.21 | 0.21 |

Table--2 UNIT: cd

| C (DEG) y (DEG) | 285 | 300 | 315 | 330 | 345 | | | | | | | | | | | | | | |
|--------------------|------|------|------|------|------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| 0 | 406 | 406 | 406 | 406 | 406 | | | | | | | | | | | | | | |
| 5 | 404 | 404 | 404 | 404 | 403 | | | | | | | | | | | | | | |
| 10 | 399 | 399 | 399 | 399 | 398 | | | | | | | | | | | | | | |
| 15 | 390 | 389 | 389 | 389 | 389 | | | | | | | | | | | | | | |
| 20 | 376 | 376 | 376 | 377 | 376 | | | | | | | | | | | | | | |
| 25 | 360 | 360 | 359 | 360 | 359 | | | | | | | | | | | | | | |
| 30 | 339 | 339 | 339 | 339 | 339 | | | | | | | | | | | | | | |
| 35 | 315 | 315 | 315 | 316 | 315 | | | | | | | | | | | | | | |
| 40 | 288 | 289 | 288 | 289 | 288 | | | | | | | | | | | | | | |
| 45 | 259 | 260 | 259 | 260 | 259 | | | | | | | | | | | | | | |
| 50 | 228 | 229 | 229 | 230 | 229 | | | | | | | | | | | | | | |
| 55 | 196 | 197 | 197 | 197 | 197 | | | | | | | | | | | | | | |
| 60 | 164 | 164 | 165 | 165 | 165 | | | | | | | | | | | | | | |
| 65 | 131 | 132 | 133 | 133 | 133 | | | | | | | | | | | | | | |
| 70 | 98.9 | 99.6 | 100 | 101 | 101 | | | | | | | | | | | | | | |
| 75 | 67.0 | 68.1 | 68.1 | 69.0 | 68.7 | | | | | | | | | | | | | | |
| 80 | 38.0 | 39.0 | 38.9 | 39.7 | 39.3 | | | | | | | | | | | | | | |
| 85 | 13.0 | 14.0 | 13.8 | 14.6 | 14.1 | | | | | | | | | | | | | | |
| 90 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | | | | | | | | | | | | | |
| 95 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | | | | | | | | | | | | | |
| 100 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | | | | | | | | | | | | | |
| 105 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | | | | | | | | | | | | | | |
| 110 | 0.02 | 0.02 | 0.02 | 0.02 | 0.01 | | | | | | | | | | | | | | |
| 115 | 0.03 | 0.03 | 0.02 | 0.02 | 0.02 | | | | | | | | | | | | | | |
| 120 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | | | | | | | | | | | | | | |
| 125 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | | | | | | | | | | | | | | |
| 130 | 0.10 | 0.10 | 0.09 | 0.09 | 0.09 | | | | | | | | | | | | | | |
| 135 | 0.14 | 0.13 | 0.12 | 0.13 | 0.12 | | | | | | | | | | | | | | |
| 140 | 0.16 | 0.15 | 0.16 | 0.16 | 0.14 | | | | | | | | | | | | | | |
| 145 | 0.19 | 0.19 | 0.19 | 0.19 | 0.17 | | | | | | | | | | | | | | |
| 150 | 0.23 | 0.22 | 0.22 | 0.22 | 0.21 | | | | | | | | | | | | | | |
| 155 | 0.25 | 0.25 | 0.24 | 0.24 | 0.22 | | | | | | | | | | | | | | |
| 160 | 0.26 | 0.25 | 0.25 | 0.26 | 0.26 | | | | | | | | | | | | | | |
| 165 | 0.26 | 0.25 | 0.25 | 0.26 | 0.26 | | | | | | | | | | | | | | |
| 170 | 0.24 | 0.24 | 0.25 | 0.26 | 0.26 | | | | | | | | | | | | | | |
| 175 | 0.23 | 0.22 | 0.24 | 0.24 | 0.25 | | | | | | | | | | | | | | |
| 180 | 0.19 | 0.19 | 0.19 | 0.19 | 0.20 | | | | | | | | | | | | | | |

Photo of Sample:



Equipment List:

| Equipment ID | Equipment Name | Last Cal. | Due Cal. |
|--------------|------------------------------|------------|------------|
| NTC-F01-001 | Goniophotometer System | 2018-11-16 | 2019-11-15 |
| NTC-F01-006 | 2.0 meter Integrating Sphere | 2018-11-16 | 2019-11-15 |
| NTC-F01-012 | Standard Lamp | 2018-11-13 | 2019-11-12 |
| NTC-F01-013 | Standard Lamp | 2018-11-13 | 2019-11-12 |
| NTC-F01-031 | Digital Power Meter | 2018-08-29 | 2019-08-28 |
| NTC-F01-019 | Temperature & Humidity Meter | 2018-11-12 | 2019-11-11 |

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