

# Agilent HLMP-Cxxx T-1<sup>3/4</sup> (5 mm) Super Bright Precision Optical Performance InGaN LED Lamps Data Sheet

**HLMP-CB18, HLMP-CB19, HLMP-CM18, HLMP-CM19, HLMP-CE18,  
HLMP-CE19, HLMP-CB28, HLMP-CB29, HLMP-CM28, HLMP-CM29,  
HLMP-CE28, HLMP-CE29, HLMP-CB38, HLMP-CB39, HLMP-CM38,  
HLMP-CM39, HLMP-CE38, HLMP-CE39**

## Description

These Super Bright Precision Optical Performance LED lamps are based on flip chip InGaN material, which is the brightest and most efficient technology for LEDs in the blue, green, and cyan region of the spectrum. The 470 nm typical dominant wavelength for blue and 530 nm typical wavelength for green is well suited to color mixing in full color signs. The 500 nm typical dominant wavelength for cyan is suitable for traffic signal application.

These LED lamps are untinted, non-diffused, T-1<sup>3/4</sup> packages incorporating second generation

optics producing well defined spatial radiation patterns at specific viewing cone angles.

These lamps are made with an advanced optical grade epoxy, offering superior temperature and moisture resistance in outdoor signal and sign applications. The high maximum LED junction temperature limit of +130°C enables high temperature operation in bright sunlight conditions. The package epoxy contains both UV-a and UV-b inhibitors to reduce the effects of long-term exposure to direct sunlight.

## Features

- Well defined spatial radiation pattern
- High luminous output
- Available in blue green and cyan color
- Viewing angle: 15°, 23° and 30°
- Standoff or non-standoff leads
- Superior resistance to moisture
- New InGaN flip chip die technology with protective diode
- ESD class 3

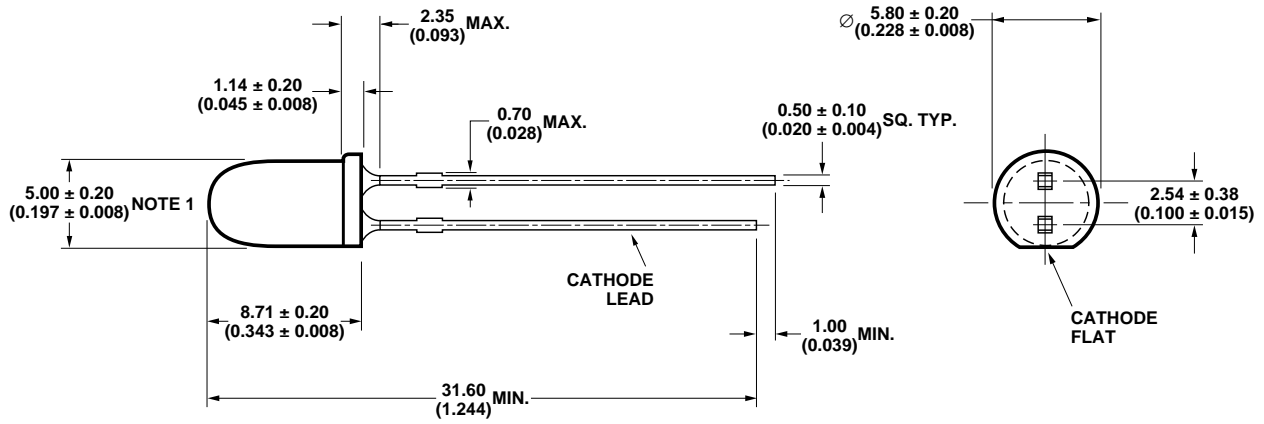
## Applications

- Traffic signals
- Commercial outdoor advertising
- Front panel backlighting
- Front panel indicators

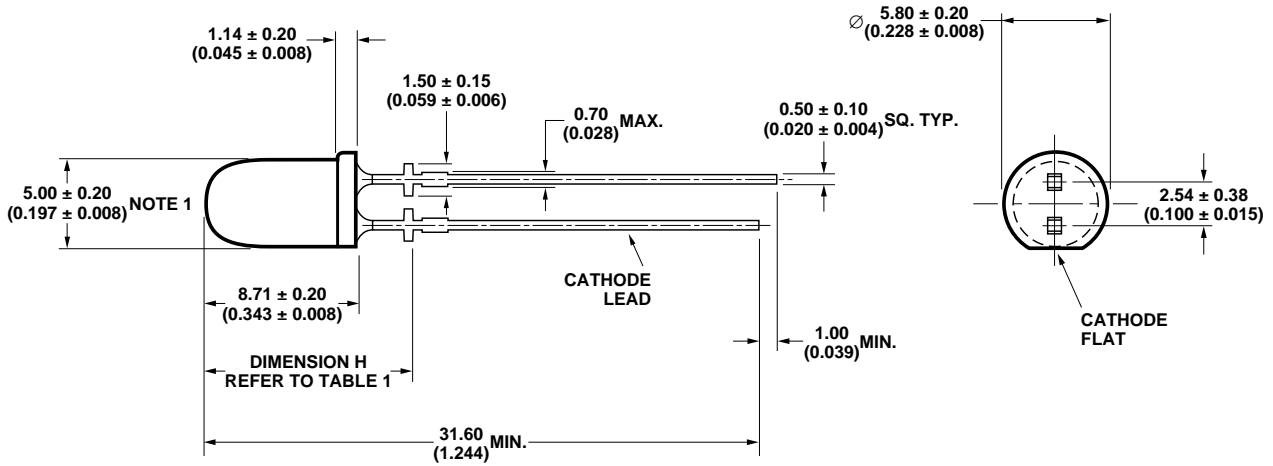


# Package Dimensions

**PACKAGE DIMENSION A**



**PACKAGE DIMENSION B**



- NOTES:**  
 1. MEASURED JUST ABOVE FLANGE.  
 2. DIMENSIONS IN MILLIMETERS (INCHES).

| DIMENSION H:   |                                       |
|----------------|---------------------------------------|
| 23 & 30 DEGREE | = 12.67 ± 0.25 mm (0.499 ± 0.01 INCH) |
| 15 DEGREE      | = 12.93 ± 0.25 mm (0.509 ± 0.01 INCH) |

## Device Selection Guide

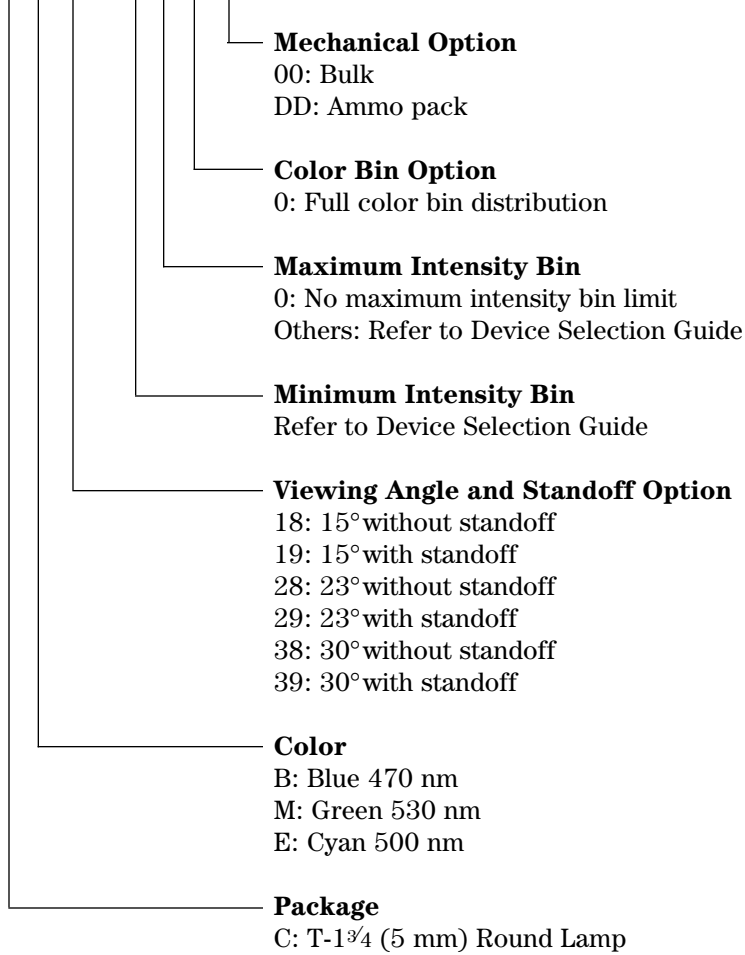
| Part Number     | Color | Typical Viewing Angle (Degree) | Intensity (cd) at 20 mA |      |      | Standoff | Package Dimension |
|-----------------|-------|--------------------------------|-------------------------|------|------|----------|-------------------|
|                 |       |                                | Min.                    | Typ. | Max. |          |                   |
| HLMP-CB18-TW0xx | Blue  | 15                             | 2.50                    | 3.50 | 7.20 | No       | A                 |
| HLMP-CB19-TW0xx | Blue  | 15                             | 2.50                    | 3.50 | 7.20 | Yes      | B                 |
| HLMP-CM18-X10xx | Green | 15                             | 7.20                    | 12.0 | 21.0 | No       | A                 |
| HLMP-CM19-X10xx | Green | 15                             | 7.20                    | 12.0 | 21.0 | Yes      | B                 |
| HLMP-CE18-WZ0xx | Cyan  | 15                             | 5.50                    | 11.8 | 16.0 | No       | A                 |
| HLMP-CE19-WZ0xx | Cyan  | 15                             | 5.50                    | 11.8 | 16.0 | Yes      | B                 |
| HLMP-CB28-RU0xx | Blue  | 23                             | 1.50                    | 2.40 | 4.20 | No       | A                 |
| HLMP-CB29-RU0xx | Blue  | 23                             | 1.50                    | 2.40 | 4.20 | Yes      | B                 |
| HLMP-CM28-WZ0xx | Green | 23                             | 5.50                    | 9.30 | 16.0 | No       | A                 |
| HLMP-CM29-WZ0xx | Green | 23                             | 5.50                    | 9.30 | 16.0 | Yes      | B                 |
| HLMP-CE28-VY0xx | Cyan  | 23                             | 4.20                    | 7.40 | 12.0 | No       | A                 |
| HLMP-CE29-VY0xx | Cyan  | 23                             | 4.20                    | 7.40 | 12.0 | Yes      | B                 |
| HLMP-CB38-QT0xx | Blue  | 30                             | 1.15                    | 1.50 | 3.20 | No       | A                 |
| HLMP-CB39-QT0xx | Blue  | 30                             | 1.15                    | 1.50 | 3.20 | Yes      | B                 |
| HLMP-CM38-UX0xx | Green | 30                             | 3.20                    | 5.00 | 9.30 | No       | A                 |
| HLMP-CM39-UX0xx | Green | 30                             | 3.20                    | 5.00 | 9.30 | Yes      | B                 |
| HLMP-CE38-TW0xx | Cyan  | 30                             | 2.50                    | 3.90 | 7.20 | No       | A                 |
| HLMP-CE39-TW0xx | Cyan  | 30                             | 2.50                    | 3.90 | 7.20 | Yes      | B                 |

### Notes:

1. Tolerance for luminous intensity measurement is  $\pm 15\%$ .
2. The luminous intensity is measured on the mechanical axis of the lamp package.
3. The optical axis is closely aligned with the package mechanical axis.
4. LED light output is bright enough to cause injuries to the eyes. Precautions must be taken to prevent looking directly at the LED with unaided eyes.

## Ordering Information

**HLMP** - **x** **x** **xx** - **x** **x** **x** **xx**



## Absolute Maximum Ratings at T<sub>A</sub> = 25°C

| Parameter                                  | Value          | Unit |
|--|----------------|------|
| DC Forward Current <sup>[1]</sup>          | 30             | mA   |
| Peak Pulsed Forward Current <sup>[2]</sup> | 100            | mA   |
| Average Forward Current                    | 30             | mA   |
| Power Dissipation                          | 120            | mW   |
| LED Junction Temperature                   | 130            | °C   |
| Operating Temperature Range                | -40 to +85     | °C   |
| Storage Temperature Range                  | -40 to +100    | °C   |
| TTW Soldering Temperature <sup>[3]</sup>   | 250 for 5 secs | °C   |
| Solder Dipping Temperature <sup>[3]</sup>  | 260 for 5 secs | °C   |

Notes:

1. Derate linearly as shown in Figure 3.
2. Duty factor 30%, 1KHz.
3. 1.59 mm (0.060 inch) above seating plane.

**Electrical Characteristics at T<sub>A</sub> = 25°C**

| Parameters                         | Symbol              | Blue |      |      | Green |      |      | Cyan |      |      | Units | Test Condition  |
|------------------------------------|---------------------|------|------|------|-------|------|------|------|------|------|-------|---|
|                                    |                     | Min. | Typ. | Max. | Min.  | Typ. | Max. | Min. | Typ. | Max. |       |   |
| Forward Voltage                    | V <sub>F</sub>      | 3.4  | 4.0  |      | 3.2   | 4.0  |      | 3.3  | 4.0  |      | V     | I <sub>F</sub> = 20 mA  |
| Capacitance                        | C                   | 53   |      |      | 53    |      |      | 53   |      |      | pF    | V <sub>F</sub> = 0, f = 1 MHz   |
| Viewing Angle <sup>[1]</sup>       |                     |      |      |      |       |      |      |      |      |      |       |   |
| Cx18/Cx19                          | 2θ <sub>1/2</sub>   | 15   |      |      | 15    |      |      | 15   |      |      | Deg   | I <sub>F</sub> = 20 mA  |
| Cx28/Cx29                          |                     | 23   |      |      | 23    |      |      | 23   |      |      |       |   |
| Cx38/Cx39                          |                     | 30   |      |      | 30    |      |      | 30   |      |      |       |   |
| Reverse Voltage <sup>[2]</sup>     | V <sub>R</sub>      | 0.6  |      |      | 0.6   |      |      | 0.6  |      |      | V     | I <sub>R</sub> = 10 μA  |
| Thermal Resistance                 | Rθ <sub>J-PIN</sub> | 240  |      |      | 240   |      |      | 240  |      |      | °C/W  | LED Junction to cathode lead  |
| Dominant Wavelength <sup>[3]</sup> | λ <sub>d</sub>      | 460  | 470  | 480  | 520   | 530  | 540  | 490  | 500  | 510  | nm    | I <sub>F</sub> = 20 mA  |
| Peak Wavelength                    | λ <sub>PEAK</sub>   | 466  |      |      | 523   |      |      | 495  |      |      | nm    | Peak of wavelength of spectral distribution at I <sub>F</sub> = 20 mA           |
| Spectral Half Width                | Δλ <sub>1/2</sub>   | 21   |      |      | 30    |      |      | 26   |      |      |       | Wavelength width at spectral distribution power point at I <sub>F</sub> = 20 mA |
| Luminous Efficacy <sup>[4]</sup>   | η <sub>v</sub>      | 62   |      |      | 588   |      |      | 220  |      |      | lm/W  | Emitted luminous power/Emitted radiant power                                    |

**Notes:**

1. 2θ<sub>1/2</sub> is the off-axis angle where the luminous intensity is 1/2 the on axis intensity.
2. The reverse voltage of the product is equivalent to the forward voltage of the protective chip at I<sub>R</sub> = 10 μA.
3. The dominant wavelength, λ<sub>d</sub>, is derived from the Chromaticity Diagram and represents the color of the lamp.
4. The radiant intensity, I<sub>e</sub> in watts/steradian, may be found from the equation I<sub>e</sub> = I<sub>v</sub>/η<sub>v</sub>, where I<sub>v</sub> is the luminous intensity in candelas and η<sub>v</sub> is the luminous efficacy in lumens/watt.

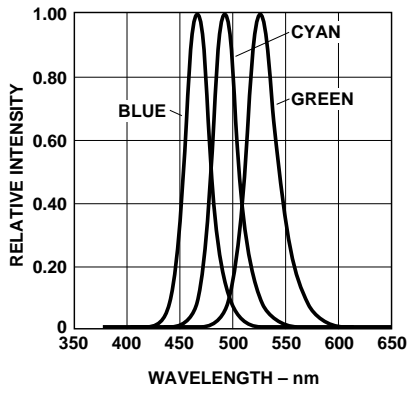


Figure 1. Relative intensity vs. wavelength.

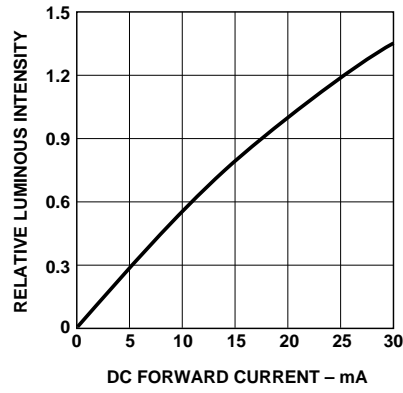


Figure 2. Relative luminous intensity vs. forward current.

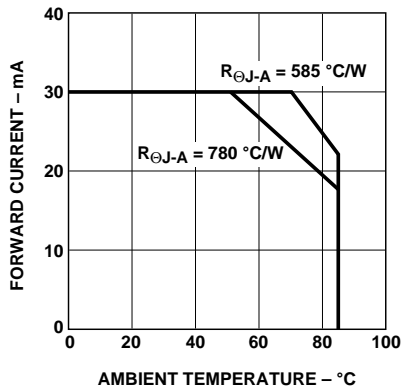


Figure 3. Forward current vs. ambient temperature.

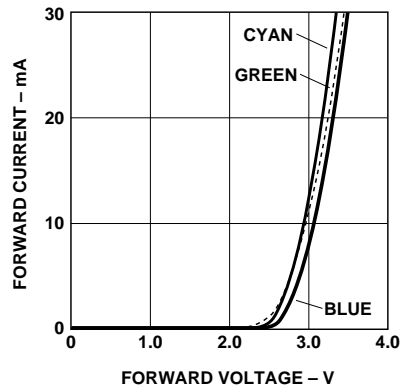


Figure 4. Forward current vs. forward voltage.

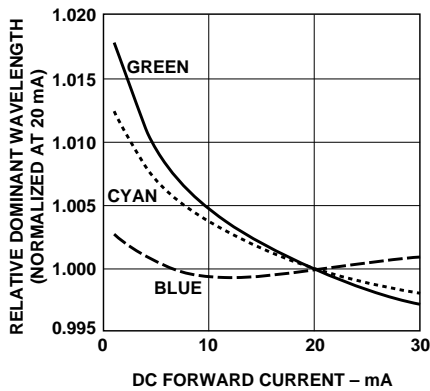


Figure 5. Relative dominant wavelength vs DC forward current.

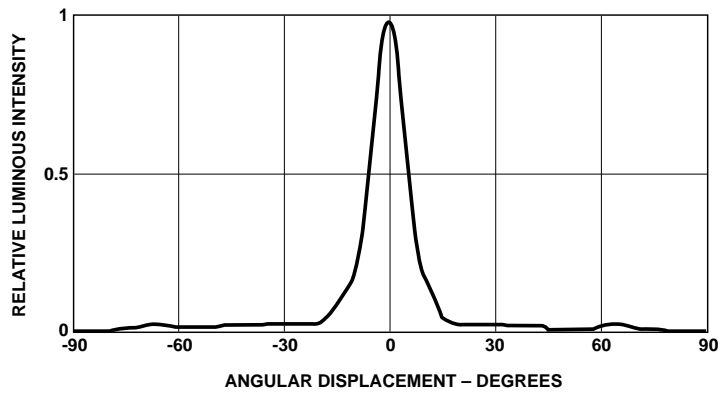


Figure 6. Spatial radiation pattern – 15 degree lamps.

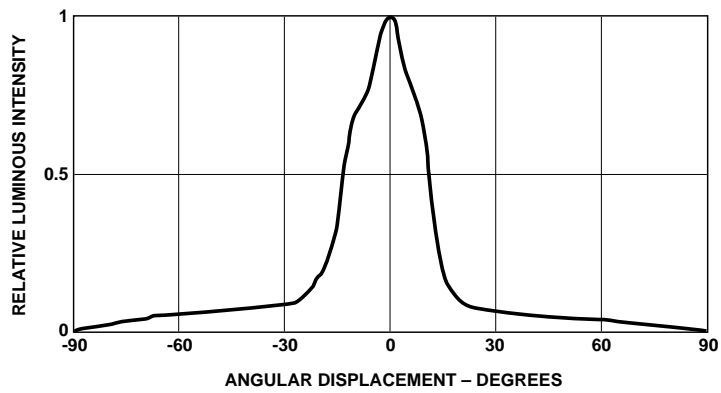


Figure 7. Spatial radiation pattern – 23 degree lamps.

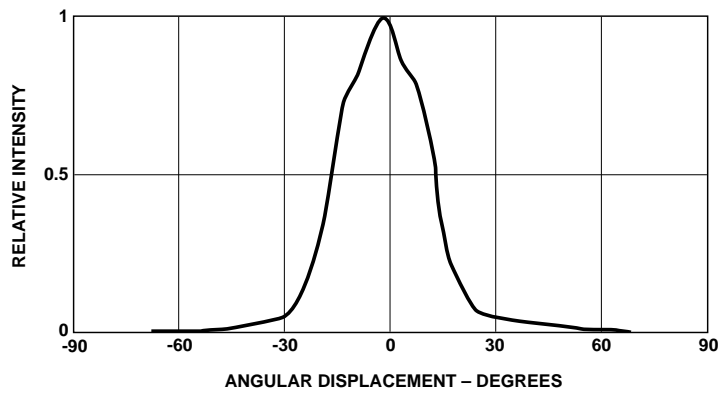


Figure 8. Spatial radiation pattern – 30 degree lamps.

### Intensity Bin Limit Table

| Bin | Intensity (mcd) at 20 mA |       |
|-----|--------------------------|-------|
|     | Min                      | Max   |
| N   | 680                      | 880   |
| P   | 880                      | 1150  |
| Q   | 1150                     | 1500  |
| R   | 1500                     | 1900  |
| S   | 1900                     | 2500  |
| T   | 2500                     | 3200  |
| U   | 3200                     | 4200  |
| V   | 4200                     | 5500  |
| W   | 5500                     | 7200  |
| X   | 7200                     | 9300  |
| Y   | 9300                     | 12000 |
| Z   | 12000                    | 16000 |
| 1   | 16000                    | 21000 |

Tolerance for each bin limit is  $\pm 15\%$ .

### Blue Color Bin Table

| Bin | Min. Dom | Max. Dom | Xmin.  | Ymin.  | Xmax.  | Ymax.  |
|-----|----------|----------|--------|--------|--------|--------|
| 1   | 460.0    | 464.0    | 0.1440 | 0.0297 | 0.1766 | 0.0966 |
|     |          |          | 0.1818 | 0.0904 | 0.1374 | 0.0374 |
| 2   | 464.0    | 468.0    | 0.1374 | 0.0374 | 0.1699 | 0.1062 |
|     |          |          | 0.1766 | 0.0966 | 0.1291 | 0.0495 |
| 3   | 468.0    | 472.0    | 0.1291 | 0.0495 | 0.1616 | 0.1209 |
|     |          |          | 0.1699 | 0.1062 | 0.1187 | 0.0671 |
| 4   | 472.0    | 476.0    | 0.1187 | 0.0671 | 0.1517 | 0.1423 |
|     |          |          | 0.1616 | 0.1209 | 0.1063 | 0.0945 |
| 5   | 476.0    | 480.0    | 0.1063 | 0.0945 | 0.1397 | 0.1728 |
|     |          |          | 0.1517 | 0.1423 | 0.0913 | 0.1327 |

Tolerance for each bin limit is  $\pm 0.5$  nm.

### Green Color Bin Table

| Bin | Min. Dom | Max. Dom | Xmin.  | Ymin.  | Xmax.  | Ymax.  |
|-----|----------|----------|--------|--------|--------|--------|
| 1   | 520.0    | 524.0    | 0.0743 | 0.8338 | 0.1856 | 0.6556 |
|     |          |          | 0.1650 | 0.6586 | 0.1060 | 0.8292 |
| 2   | 524.0    | 528.0    | 0.1060 | 0.8292 | 0.2068 | 0.6463 |
|     |          |          | 0.1856 | 0.6556 | 0.1387 | 0.8148 |
| 3   | 528.0    | 532.0    | 0.1387 | 0.8148 | 0.2273 | 0.6344 |
|     |          |          | 0.2068 | 0.6463 | 0.1702 | 0.7965 |
| 4   | 532.0    | 536.0    | 0.1702 | 0.7965 | 0.2469 | 0.6213 |
|     |          |          | 0.2273 | 0.6344 | 0.2003 | 0.7764 |
| 5   | 536.0    | 540.0    | 0.2003 | 0.7764 | 0.2659 | 0.6070 |
|     |          |          | 0.2469 | 0.6213 | 0.2296 | 0.7543 |

Tolerance for each bin limit is  $\pm 0.5$  nm.

### Cyan Color Bin Table

| Bin | Min. Dom | Max. Dom | Xmin.  | Ymin.  | Xmax.  | Ymax.  |
|-----|----------|----------|--------|--------|--------|--------|
| 3   | 500.0    | 505.0    | 0.0082 | 0.5384 | 0.1027 | 0.5584 |
|     |          |          | 0.1057 | 0.4769 | 0.0039 | 0.6548 |
| 4   | 505.0    | 510.0    | 0.0039 | 0.6548 | 0.1097 | 0.6251 |
|     |          |          | 0.1027 | 0.5584 | 0.0139 | 0.7502 |
| 7   | 498.0    | 503.0    | 0.0132 | 0.4882 | 0.1028 | 0.5273 |
|     |          |          | 0.1092 | 0.4417 | 0.0040 | 0.6104 |
| 8   | 503.0    | 508.0    | 0.0040 | 0.6104 | 0.1056 | 0.6007 |
|     |          |          | 0.1028 | 0.5273 | 0.0080 | 0.7153 |

Tolerance for each bin limit is  $\pm 0.5$  nm.

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