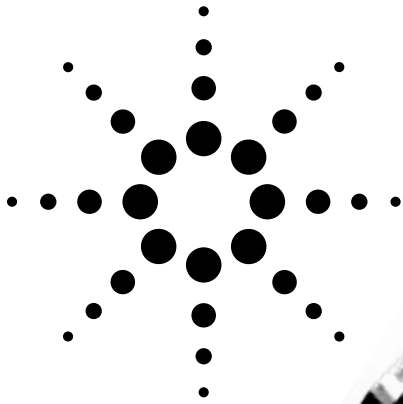


# Agilent HSMx-C660 Right Angle Surface Mount Chip LEDs

## Data Sheet



### Features

- Right Angle Mounting
- Compatible with IR Reflow Soldering Process
- Available in a Wide Variety of Colors
- Available in 8 mm Tape on 178 mm (7") Diameter Reels

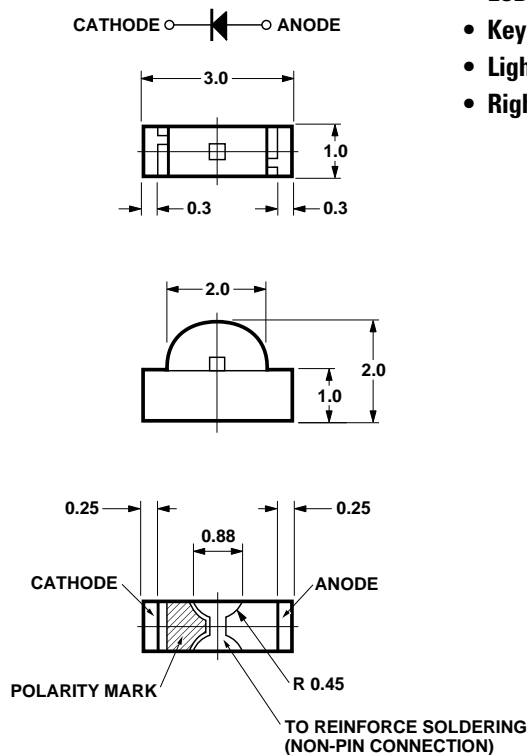
### Description

The HSMx-C660 series of chip-type LEDs are designed to illuminate at a right angle to the direction of mounting. When mounted on a PC board, these devices will emit light in a direction parallel to the board.

The small 3.0 x 2.0 mm footprint of the HSMx-C660 is designed for applications where space is limited. These devices are available in four colors and use untinted, non-diffused optics.

The HSMx-C660 series of parts are compatible with IR reflow soldering process only.

### Package Dimensions



### Applications

- LCD Backlighting
- Keypad Side/Backlighting
- Light Piping
- Right Angle Indicator

| Footprint (mm)  | Parts per Reel | DH AS AlGaAs | High Efficiency Red | Yellow    | Green     |
|-----------------|----------------|--------------|---------------------|-----------|-----------|
| 3.0 x 2.0 x 1.0 | 3000           | HSMH-C660    | HSMS-C660           | HSMY-C660 | HSMG-C660 |



### Absolute Maximum Ratings at $T_A = 25^\circ\text{C}$

| Parameter                                   | HSMx-C660   | Units            |
|---------------------------------------------|-------------|------------------|
| DC Forward Current <sup>[1]</sup>           | 25          | mA               |
| Power Dissipation                           | 65          | mW               |
| Reverse Voltage ( $I_R = 100 \mu\text{A}$ ) | 5           | V                |
| Operating Temperature Range                 | -30 to +85  | $^\circ\text{C}$ |
| Storage Temperature Range <sup>[2]</sup>    | -40 to +100 | $^\circ\text{C}$ |

**Notes:**

1. Derate linearly as shown on Figure 4.
2. Maximum temperature for the tape and reel packaging is  $60^\circ\text{C}$ .

### Optical Characteristics at $T_A = 25^\circ\text{C}$

| Part No.  | Color               | Luminous Intensity $I_v$ (mcd) @ $I_F = 20 \text{ mA}$ |      | Peak Wavelength $\lambda_{\text{peak}}$ (nm) Typ. | Color Dominant Wavelength $\lambda_d$ <sup>[1]</sup> (nm) Typ. | Viewing Angle $2\theta^{1/2}$ (degrees) <sup>[2]</sup> Typ. | Luminous Efficacy $\eta_v$ (lm/W) |
|-----------|---------------------|--------------------------------------------------------|------|---------------------------------------------------|----------------------------------------------------------------|-------------------------------------------------------------|-----------------------------------|
|           |                     | Min.                                                   | Typ. |                                                   |                                                                |                                                             |                                   |
| HSMH-C660 | DH AlGaAs Red       | 6.3                                                    | 16.0 | 650                                               | 639                                                            | 155                                                         | 80                                |
| HSMS-C660 | High Efficiency Red | 1.6                                                    | 5.0  | 639                                               | 626                                                            | 155                                                         | 145                               |
| HSMY-C660 | Yellow              | 1.6                                                    | 5.0  | 589                                               | 586                                                            | 155                                                         | 500                               |
| HSMG-C660 | Green               | 4.0                                                    | 9.0  | 570                                               | 572                                                            | 155                                                         | 595                               |

**Notes:**

1. The dominant wavelength,  $\lambda_d$ , is derived from the CIE Chromaticity Diagram and represents the perceived color of the device.
2.  $\theta^{1/2}$  is the off-axis angle where the luminous intensity is  $1/2$  the peak intensity.

### Electrical Characteristics at $T_A = 25^\circ\text{C}$

| Part No.  | Color               | Forward Voltage $V_F$ (Volts) @ $I_F = 20 \text{ mA}$ |      | Reverse Breakdown $V_R$ (Volts) @ $I_R = 100 \mu\text{A}$ Min. | Capacitance C (pF) $V_F = 0$ , $f = 1 \text{ MHz}$ Typ. | Thermal Resistance $R_{\theta_{J-PIN}}$ ( $^\circ\text{C}/\text{W}$ ) |
|-----------|---------------------|-------------------------------------------------------|------|----------------------------------------------------------------|---------------------------------------------------------|-----------------------------------------------------------------------|
|           |                     | Typ.                                                  | Max. |                                                                |                                                         |                                                                       |
| HSMH-C660 | DH AlGaAs Red       | 1.8                                                   | 2.2  | 5                                                              | 4.5                                                     | 300                                                                   |
| HSMS-C660 | High Efficiency Red | 1.9                                                   | 2.6  | 5                                                              | 4.0                                                     | 300                                                                   |
| HSMY-C660 | Yellow              | 2.1                                                   | 2.6  | 5                                                              | 3.0                                                     | 300                                                                   |
| HSMG-C660 | Green               | 2.2                                                   | 2.6  | 5                                                              | 8.0                                                     | 300                                                                   |

### Color Bin Limits<sup>[1]</sup>

| Bin ID | Green Color Bins <sup>[1]</sup> |      |
|--------|---------------------------------|------|
|        | Dom. Wavelength [nm]            |      |
|        | MIN.                            | MAX. |
| A      | 561                             | 565  |
| B      | 564                             | 568  |
| C      | 567                             | 571  |
| D      | 570                             | 574  |
| E      | 573                             | 577  |

Note:

1. Bin categories are established for classification of products.

Products may not be available in all categories.

Please contact your Agilent representative for information on currently available bins.

| Bin ID | Yellow/Amber Color Bins <sup>[1]</sup> |       |
|--------|----------------------------------------|-------|
|        | Dom. Wavelength [nm]                   |       |
|        | MIN.                                   | MAX.  |
| A      | 581.5                                  | 585.0 |
| B      | 584.0                                  | 587.5 |
| C      | 586.5                                  | 590.0 |
| D      | 589.0                                  | 592.5 |
| H      | 591.5                                  | 595.0 |
| J      | 594.0                                  | 597.5 |

For HSMC, HSMH, HSMS, HSMZ (Red Color)  
No color binning available.

### Light Intensity (Iv) Bin Limits<sup>[1]</sup>

| Bin ID | Intensity (mcd) |        |
|--------|-----------------|--------|
|        | min.            | max.   |
| A      | 0.10            | 0.20   |
| B      | 0.16            | 0.32   |
| C      | 0.25            | 0.50   |
| D      | 0.40            | 0.80   |
| E      | 0.63            | 1.25   |
| F      | 1.00            | 2.00   |
| G      | 1.60            | 3.20   |
| H      | 2.50            | 5.00   |
| J      | 4.00            | 8.00   |
| K      | 6.30            | 12.50  |
| L      | 10.00           | 20.00  |
| M      | 16.00           | 32.00  |
| N      | 25.00           | 50.00  |
| P      | 40.00           | 80.00  |
| Q      | 63.00           | 125.00 |
| R      | 100.00          | 200.00 |
| S      | 160.00          | 320.00 |
| T      | 250.00          | 500.00 |

Note:

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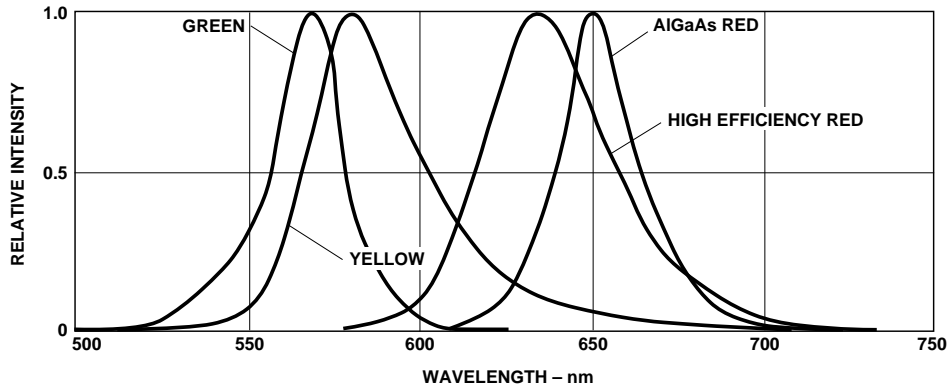


Figure 1. Relative Intensity vs. Wavelength.

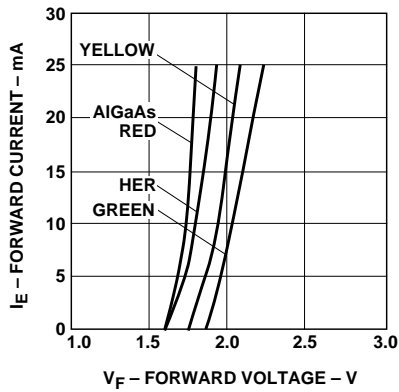


Figure 2. Forward Current vs. Forward Voltage.

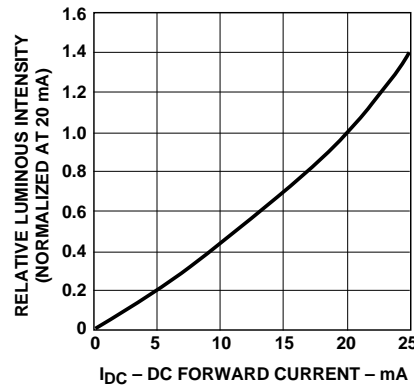


Figure 3. Relative Luminous Intensity vs. DC Forward Current.

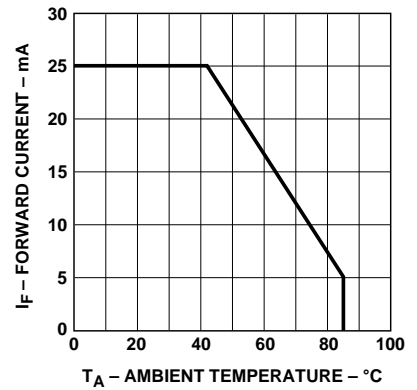


Figure 4. Maximum DC Current vs. Ambient Temperature.

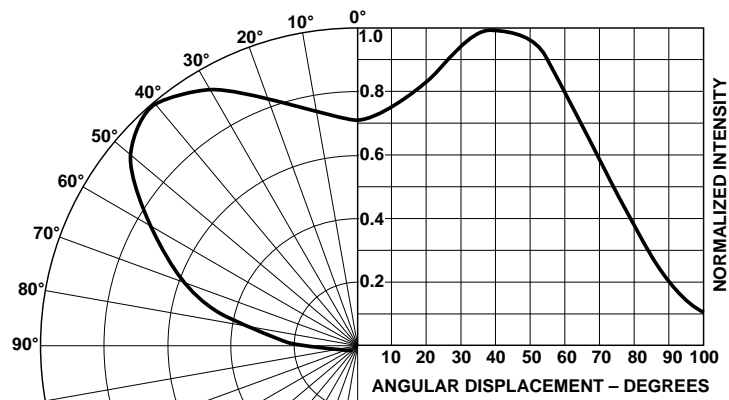
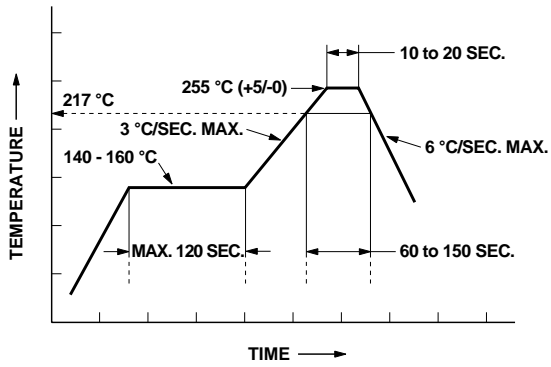


Figure 5. HSMx-C660 Intensity vs. Angle, Vertical Axis.



\* THE TIME FROM 25 °C TO PEAK TEMPERATURE = 6 MINUTES MAX.

Figure 6. Recommended Pb-Free Reflow Soldering Profile.

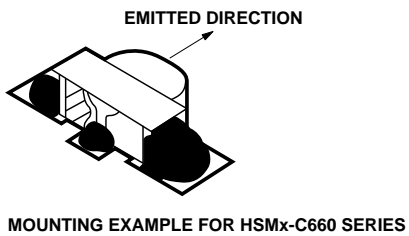
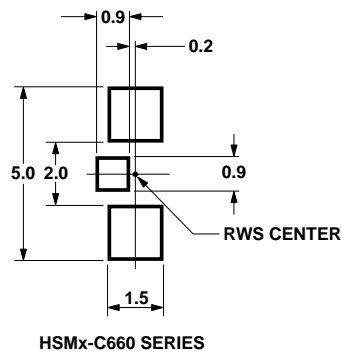


Figure 7. Recommended Solder Patterns.

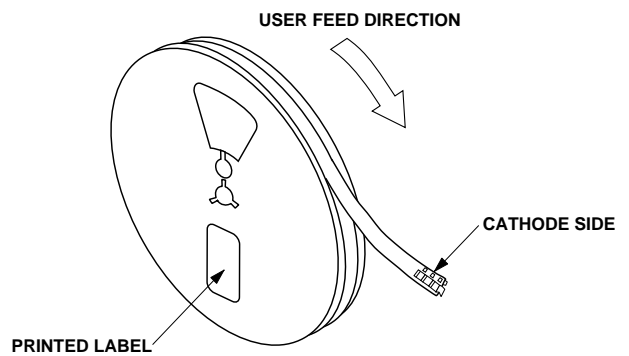


Figure 8. Reeling Orientation for the HSMx-C660.

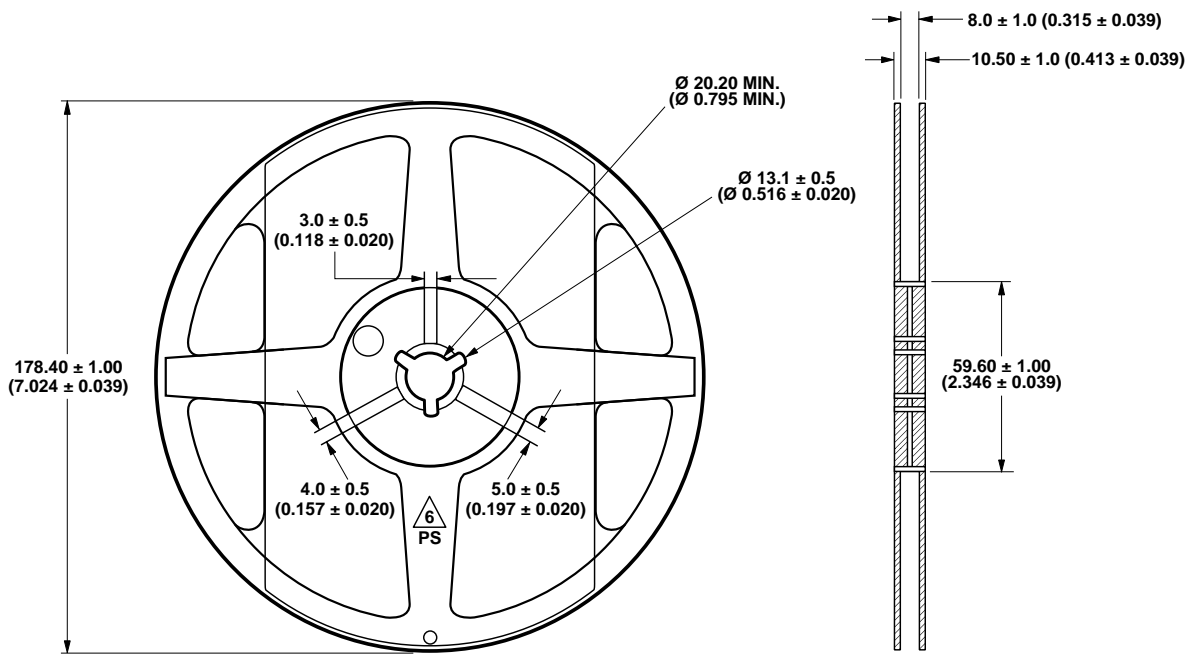
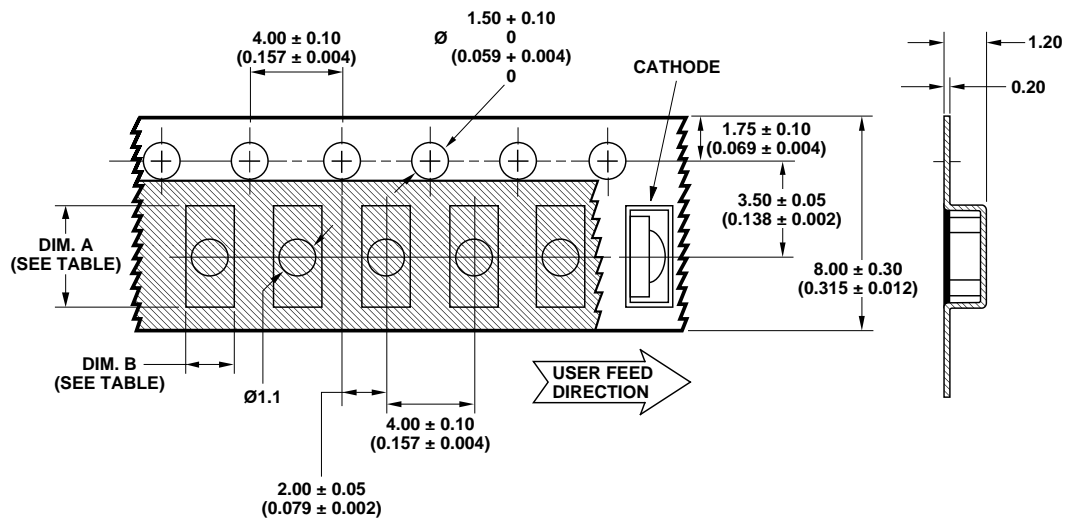
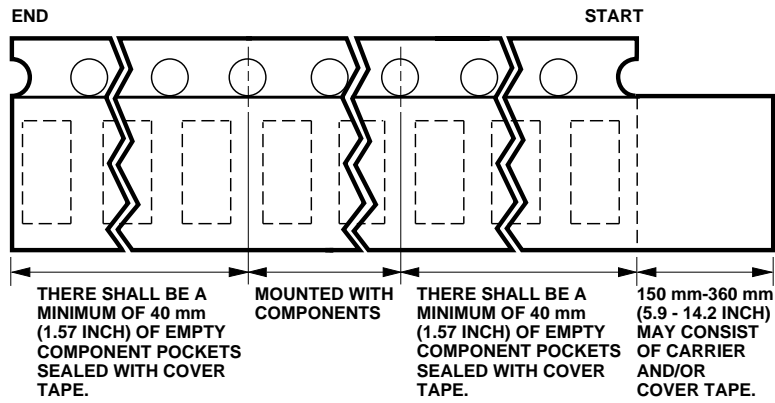


Figure 9. Reel Dimensions.



| Part Number | DIM. A<br>± 0.10 (0.004) | DIM. B<br>± 0.10 (0.004) |
|-------------|--------------------------|--------------------------|
| HSMx-C660   | 3.35                     | 2.30                     |

Figure 10. Tape Dimensions.



**Figure 11. Tape Leader and Trailer Dimensions.**

Storage Condition: 5 to 30°C @ 60% RH max.

Baking is required under the condition:

- a) the blue silica gel indicator becoming white/transparent color
- b) the pack has been opened for more than 1 week

Baking recommended condition: 60 +/- 5°C for 20 hours.

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