

---

# Bicolor Surface Mount Chip LEDs

## Technical Data

**HSMF-C655**  
**HSMF-C656**  
**HSMF-C657**

---

### Features

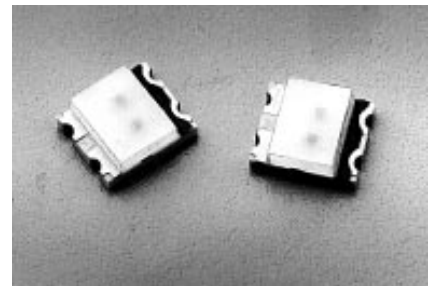
- **Small Size**
- **Diffuse Optics**
- **Compatible with IR Solder Processes**
- **Three Combinations Available: Red/Green, Orange/Green, Yellow/Green**
- **Available in 8 mm Tape on 7" (178 mm) Diameter Reels**

### Applications

- **Symbol Backlighting**
- **Status Indication**
- **Front Panel Indicator**

### Description

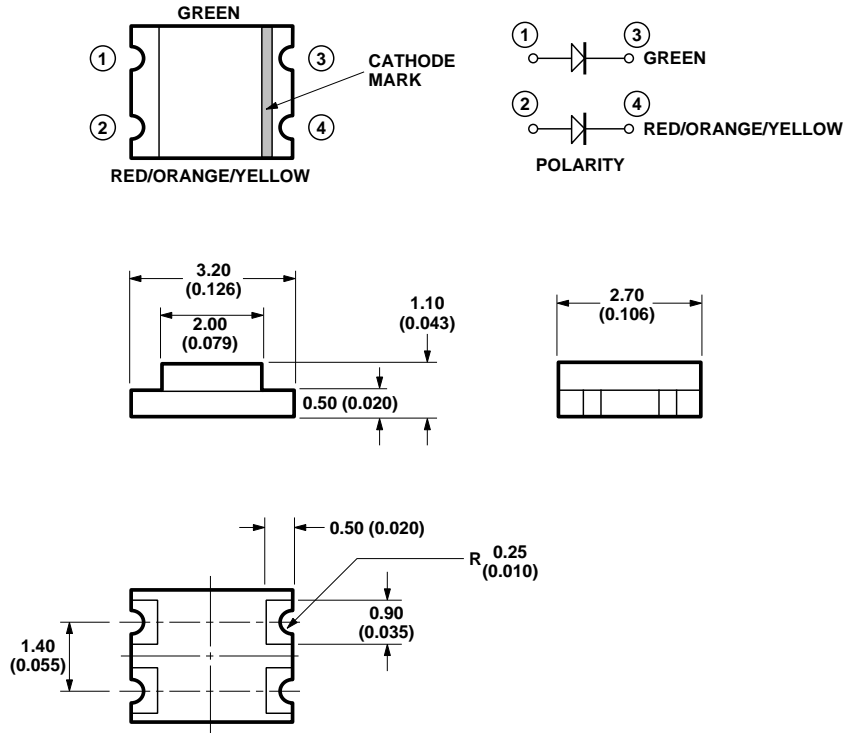
The HSMF-C65x series of bicolor chip-type LEDs are designed in an industry standard package for ease of handling and use. These bicolor LEDs are available as high efficiency red/green, yellow/green, and orange/green.



The small size, low 1.1 mm profile and wide viewing angle make these LEDs excellent for backlighting applications and front panel illumination. They are compatible with IR reflow soldering processes.

| <b>Part Number</b> | <b>Color</b>                  | <b>Parts/Reel</b> |
|--------------------|-------------------------------|-------------------|
| HSMF-C655          | High Efficiency Red/<br>Green | 3000              |
| HSMF-C656          | Yellow/<br>Green              | 3000              |
| HSMF-C657          | Orange/<br>Green              | 3000              |

## Package Dimensions



### Notes:

1. Dimensions in mm.
2. Tolerance  $\pm 0.1$  mm unless otherwise noted.

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

| Parameter                                   | HSMF-C65x  | Units            |
|---|------------|------------------|
| DC Forward Current <sup>[1], [2]</sup>      | 25         | mA               |
| Power Dissipation                           | 65         | mW               |
| Reverse Voltage ( $I_R = 100 \mu\text{A}$ ) | 5          | V                |
| LED Junction Temperature                    | 95         | $^\circ\text{C}$ |
| Operating Temperature Range                 | -25 to +80 | $^\circ\text{C}$ |
| Storage Temperature Range                   | -30 to +85 | $^\circ\text{C}$ |

### Notes:

1. Derate Linearly as shown in Figure 4.
2. Maximum current is for entire package.

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

| Color               | Luminous Intensity $I_V$ (mcd) @ $I_F = 20\text{ mA}$ |      | Peak Wavelength $\lambda_{\text{peak}}$ (nm) Typ. | Color Dominant Wavelength $\lambda_d^{[1]}$ (nm) Typ. | Viewing Angle $2\theta_{1/2}$ (degrees) <sup>[2]</sup> Typ. | Luminous Efficacy $\eta_V$ (lm/W) <sup>[3]</sup> |
|---------------------|---|------|---|---|---|--|
|                     | Min.  | Typ. |   |   |   |  |
| High Efficiency Red | 1.6   | 5.0  | 639   | 626   | 155   | 145  |
| Orange              | 1.6   | 4.0  | 606   | 604   | 155   | 380  |
| Yellow              | 1.6   | 5.0  | 584   | 586   | 155   | 500  |
| Green               | 4.0   | 9.0  | 570   | 572   | 155   | 595  |

**Notes:**

1. The dominant wavelength,  $\lambda_d$ , is derived from the 1931 CIE chromaticity diagram and represents the perceived color of the device with respect to standard illuminant D65.
2.  $\theta_{1/2}$  is the off-axis angle where the luminous intensity is  $1/2$  the peak intensity.
3. The luminous efficacy,  $\eta_V$ , is the ratio of luminous flux to radiant flux,  $\phi_V/\phi_e$ .

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

| 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. |   |  |  |
| High Efficiency Red | 1.9  | 2.6  | 5   | 4  | 325  |
| Orange              | 2.1  | 2.6  | 5   | 4  | 325  |
| Yellow              | 2.1  | 2.6  | 5   | 3  | 325  |
| Green               | 2.2  | 3.0  | 5   | 8  | 325  |

| <b>Green Color Bins [1]</b> |             |             |
|-----------------------------|-------------|-------------|
| <b>Dom. Wavelength (nm)</b> |             |             |
| <b>Bin ID</b>               | <b>Min.</b> | <b>Max.</b> |
| A                           | 561.5       | 564.5       |
| B                           | 564.5       | 567.5       |
| C                           | 567.5       | 570.5       |
| D                           | 570.5       | 573.5       |
| E                           | 573.5       | 576.5       |

Tolerance:  $\pm 0.5$  nm.

| <b>Orange Color Bins [1]</b> |             |             |
|------------------------------|-------------|-------------|
| <b>Dom. Wavelength (nm)</b>  |             |             |
| <b>Bin ID</b>                | <b>Min.</b> | <b>Max.</b> |
| A                            | 597.0       | 600.0       |
| B                            | 600.0       | 603.0       |
| C                            | 603.0       | 606.0       |
| D                            | 606.0       | 609.0       |
| E                            | 609.0       | 612.0       |
| F                            | 612.0       | 615.0       |

Tolerance:  $\pm 1$  nm.

| <b>Yellow/Amber Color Bins [1]</b> |             |             |
|------------------------------------|-------------|-------------|
| <b>Dom. Wavelength (nm)</b>        |             |             |
| <b>Bin ID</b>                      | <b>Min.</b> | <b>Max.</b> |
| A                                  | 582.0       | 584.5       |
| B                                  | 584.5       | 587.0       |
| C                                  | 587.0       | 589.5       |
| D                                  | 589.5       | 592.0       |
| E                                  | 592.0       | 594.5       |
| F                                  | 594.5       | 597.0       |

Tolerance:  $\pm 0.5$  nm.

**Note:**

- Bin categories are established for classification of products. Products may not be available in all bin categories. Please contact your Agilent representative for information on currently available bins.

### Luminous Intensity Bin Limits<sup>[1]</sup>

| Bin ID | Minimum (mcd) | Maximum (mcd) |
|--------|---------------|---------------|
| A      | 0.11          | 0.18          |
| B      | 0.18          | 0.29          |
| C      | 0.29          | 0.45          |
| D      | 0.45          | 0.72          |
| E      | 0.72          | 1.10          |
| F      | 1.10          | 1.80          |
| G      | 1.80          | 2.80          |
| H      | 2.80          | 4.50          |
| J      | 4.50          | 7.20          |
| K      | 7.20          | 11.20         |
| L      | 11.20         | 18.00         |
| M      | 18.00         | 28.50         |
| N      | 28.50         | 45.00         |
| P      | 45.00         | 71.50         |
| Q      | 71.50         | 112.50        |
| R      | 112.50        | 180.00        |
| S      | 180.00        | 285.00        |
| T      | 285.00        | 450.00        |
| U      | 450.00        | 715.00        |
| V      | 715.00        | 1125.00       |
| W      | 1125.00       | 1800.00       |
| X      | 1800.00       | 2850.00       |
| Y      | 2850.00       | 4500.00       |

Tolerance:  $\pm 15\%$ .

**Note:**

1. Bin categories are established for classification of products. Products may not be available in all bin categories. Please contact your Agilent representative for information on currently available bins.

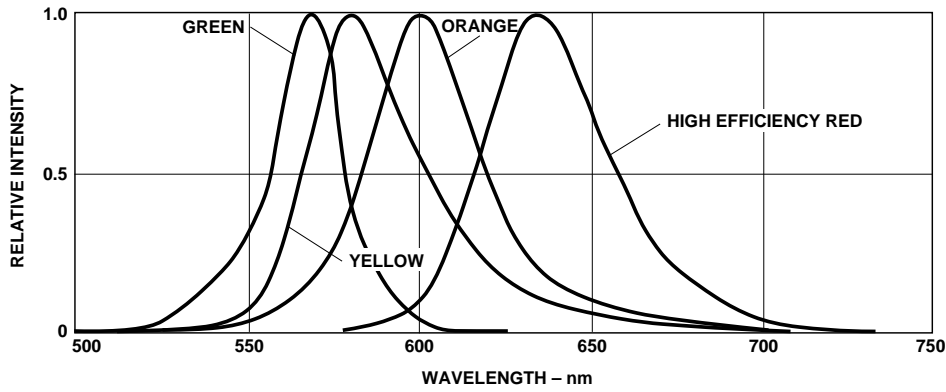


Figure 1. Relative Intensity vs. Wavelength.

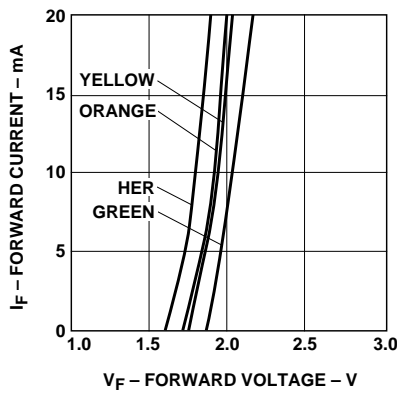


Figure 2. Forward Current vs. Forward Voltage.

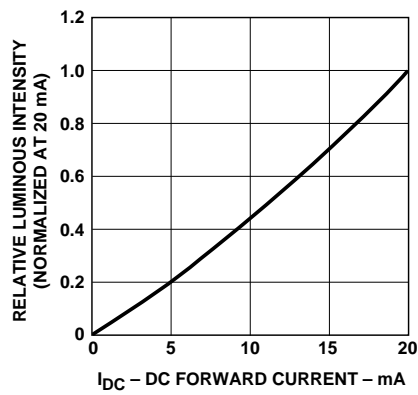


Figure 3. Relative Luminous Intensity vs. DC Forward Current.

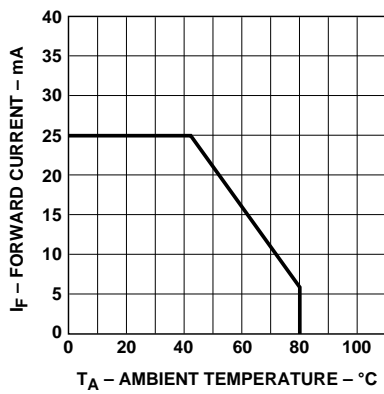


Figure 4. Maximum DC Current vs. Ambient Temperature.

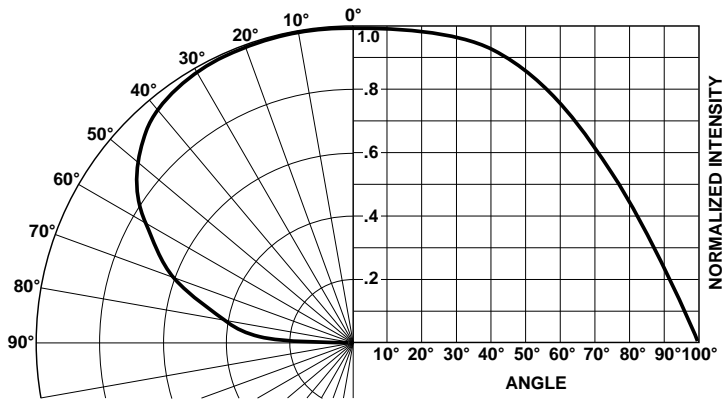


Figure 5. Intensity vs. Angle.

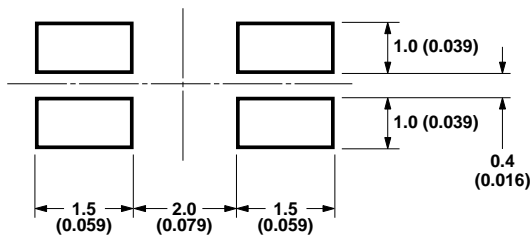


Figure 7. Recommended Solder Pattern.

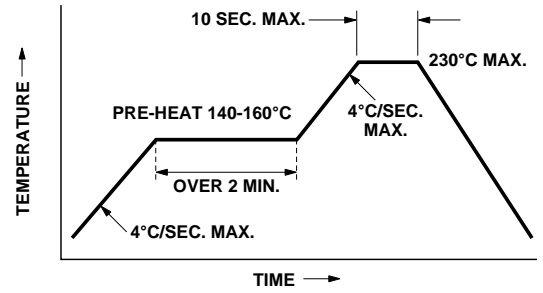


Figure 6. Recommended Reflow Soldering Profile.

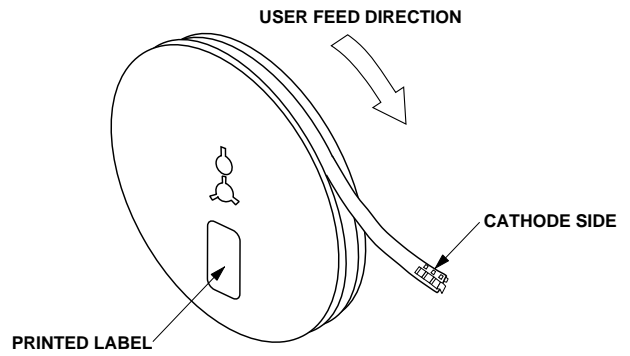


Figure 8. Reeling Orientation.

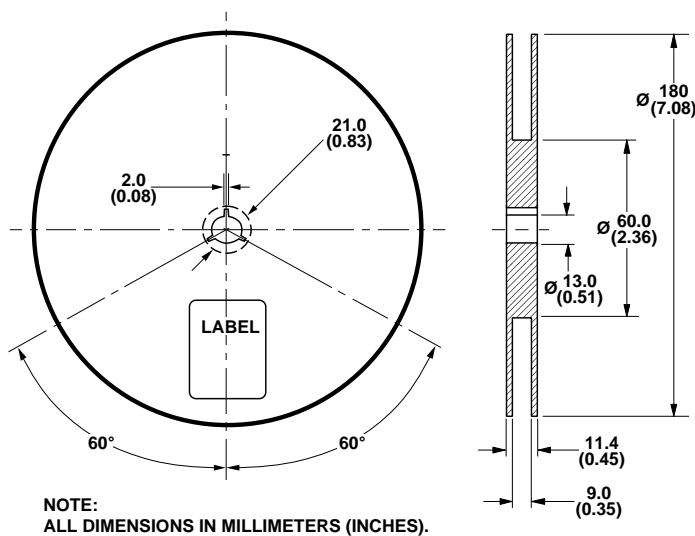
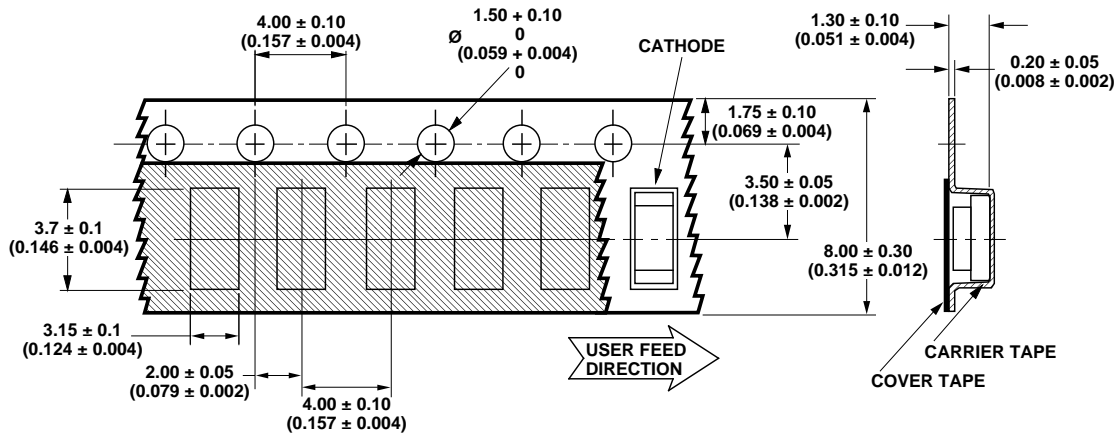
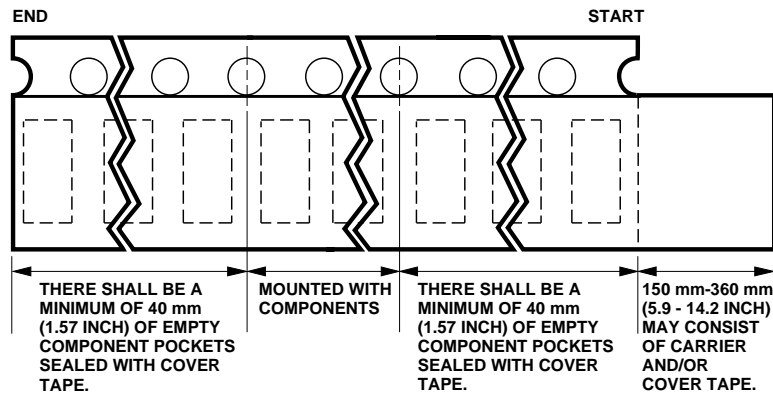


Figure 9. Reel Dimensions.



**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:

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

Baking recommended condition: 60 ± 5° C for 20 hours.

[www.agilent.com/semiconductors](http://www.agilent.com/semiconductors)

For product information and a complete list of distributors, please go to our web site.

For technical assistance call:

Americas/Canada: +1 (800) 235-0312 or (408) 654-8675

Europe: +49 (0) 6441 92460

China: 10800 650 0017

Hong Kong: (+65) 6271 2451

India, Australia, New Zealand: (+65) 6271 2394

Japan: (+81 3) 3335-8152(Domestic/International), or 0120-61-1280(Domestic Only)

Korea: (+65) 6271 2194

Malaysia, Singapore: (+65) 6271 2054

Taiwan: (+65) 6271 2654

Data subject to change.

Copyright © 2002 Agilent Technologies, Inc.

Obsoletes 5988-4447EN

July 31, 2002

5988-7313EN