

# Surface Mount Chip LEDs

## Technical Data

**HSMx-C650**  
**HSMx-C670**  
**HSMF-C655**

### Features

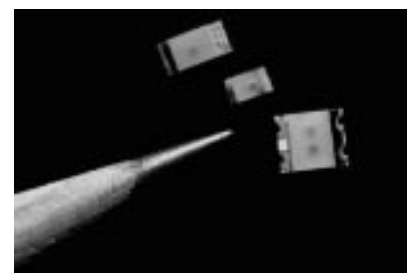
- **Small Size**
- **Industry Standard Footprint**
- **Low Profile**
- **Tinted, Diffused Optics**
- **Compatible with IR Solder Process**
- **Five Colors and Bicolor Available**
- **Available in 8 mm Tape on 7" (178 mm) Diameter Reels**

### Applications

- **Push-Button Backlighting**
- **LCD Backlighting**
- **Symbol Backlighting**
- **Front Panel Indicator**

### Description

These single and bicolor LEDs are designed in an industry standard package for ease of handling and use. Five different LED colors are available in two compact, low profile, single color packages. The 3.2 x 1.6 mm is an excellent all around package, and the small 2.0 x 1.25 mm package is designed for applications where space is limited. The single color LEDs have

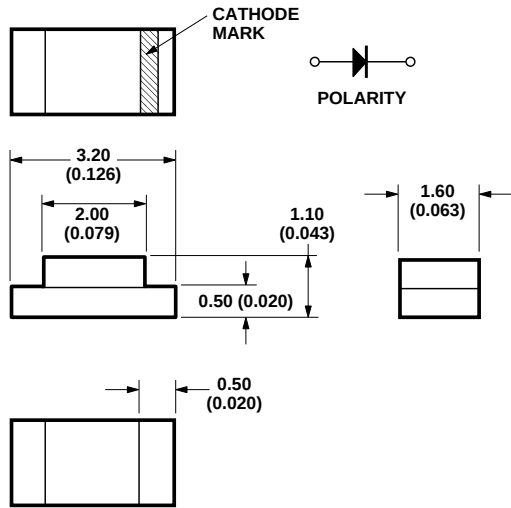


tinted diffused optics. The bicolor package is untinted, diffused.

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.

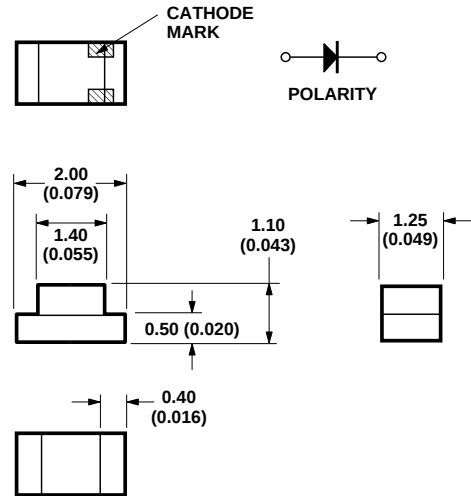
## Device Selection Guide

| Footprint (mm) | DH AlGaAs Red | High Efficiency Red | Orange    | Yellow    | Green     | Bicolor HER-Green |
|----------------|---------------|---------------------|-----------|-----------|-----------|-------------------|
| 3.20 x 1.60    | HSMH-C650     | HSMS-C650           | HSMD-C650 | HSMY-C650 | HSMG-C650 |                   |
| 2.00 x 1.25    | HSMH-C670     | HSMS-C670           | HSMD-C670 | HSMY-C670 | HSMG-C670 |                   |
| 3.20 x 2.70    |               |                     |           |           |           | HSMF-C655         |



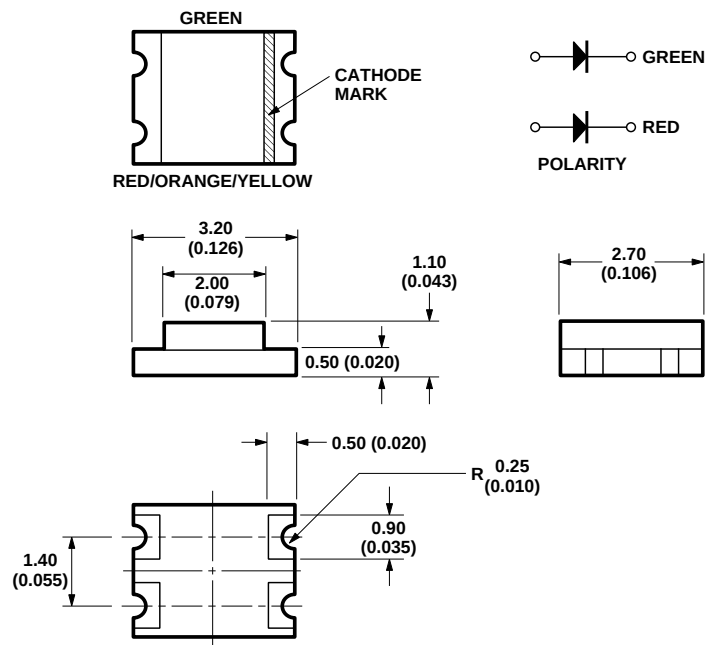
HSMX-C650 Series

[1206]



HSMX-C670 Series

[805]



HSMF-C655

[1210]

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

| Parameter                                    | HSMX-C650<br>HSMF-C655                     | HSMX-C670  | Units            |
|----------------------------------------------|--------------------------------------------|------------|------------------|
| DC Forward Current <sup>[1]</sup>            | 25                                         | 20         | mA               |
| Power Dissipation                            | 65                                         | 50         | mW               |
| Reverse Voltage ( $I_R = 100\ \mu\text{A}$ ) | 5                                          | 5          | V                |
| LED Junction Temperature                     | 95                                         | 95         | $^\circ\text{C}$ |
| Operating Temperature Range                  | -25 to +80                                 | -25 to +80 | $^\circ\text{C}$ |
| Storage Temperature Range                    | -30 to +85                                 | -30 to +85 | $^\circ\text{C}$ |
| Soldering Temperature                        | See SMT reflow soldering profile, Figure 6 |            |                  |

**Notes:**

1. Derate linearly as shown in Figure 4 for temperatures above  $25^\circ\text{C}$ .

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

| Part Number            | Color               | Luminous Intensity<br>$I_V$ (mcd)<br>@ $I_F$ 20 mA <sup>[1]</sup> |      | Peak Wavelength<br>$\lambda_{\text{peak}}$ (nm)<br>Typ. | Color, Dominant Wavelength<br>$\lambda_d$ <sup>[2]</sup> (nm)<br>Typ. | Viewing Angle<br>$2\ \theta_{1/2}$<br>Degrees <sup>[3]</sup><br>Typ. |
|------------------------|---------------------|-------------------------------------------------------------------|------|---------------------------------------------------------|-----------------------------------------------------------------------|----------------------------------------------------------------------|
| HSMH-C650<br>HSMH-C670 | DH AlGaAs Red       | 6.3                                                               | 16.0 | 650                                                     | 639                                                                   | 155                                                                  |
| HSMS-C650<br>HSMS-C670 | High Efficiency Red | 1.6                                                               | 5.0  | 639                                                     | 626                                                                   | 155                                                                  |
| HSMD-C650<br>HSMD-C670 | Orange              | 1.6                                                               | 4.0  | 606                                                     | 604                                                                   | 155                                                                  |
| HSMY-C650<br>HSMY-C670 | Yellow              | 1.6                                                               | 5.0  | 584                                                     | 586                                                                   | 155                                                                  |
| HSMG-C650<br>HSMG-C670 | Green               | 4.0                                                               | 9.0  | 566                                                     | 571                                                                   | 155                                                                  |
| HSMF-C655              | High Efficiency Red | 1.6                                                               | 5.0  | 639                                                     | 626                                                                   | 155                                                                  |
|                        | Green               | 4.0                                                               | 9.0  | 566                                                     | 571                                                                   | 155                                                                  |

**Notes:**

1. The luminous intensity,  $I_V$ , is measured at the peak of the spatial radiation pattern which may not be aligned with the mechanical axis of the lamp package.
2. The dominant wavelength,  $\lambda_d$ , is derived from the CIE Chromaticity Diagram and represents the perceived color of the device.
3.  $\theta_{1/2}$  is the off-axis angle where the luminous intensity is 1/2 the peak intensity.
4. Chip LEDs are supplied in 8 mm embossed tape on 178 mm (7 in.) diameter reels, with 3000 devices per reel. Minimum order quantity and order increments are in quantity of reels only.

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

| Part Number            | Color                  | Forward Voltage $V_F$ (Volts)<br>@ $I_F = 20\text{ mA}$ |      | Reverse Breakdown $V_R$ (Volts)<br>@ $I_R = 100\text{ }\mu\text{A}$<br>Min. | Capacitance $C$ (pF)<br>$V_F = 0$ ,<br>$f = 1\text{ MHz}$<br>Typ. | Thermal Resistance<br>$R_{\theta_{J-PIN}}$ ( $^\circ\text{C/W}$ ) |
|------------------------|------------------------|---------------------------------------------------------|------|-----------------------------------------------------------------------------|-------------------------------------------------------------------|-------------------------------------------------------------------|
|                        |                        | Typ.                                                    | Max. |                                                                             |                                                                   |                                                                   |
| HSMH-C650<br>HSMH-C670 | DH AlGaAs<br>Red       | 1.8                                                     | 2.2  | 5                                                                           | 46                                                                | 460<br>300                                                        |
| HSMS-C650<br>HSMS-C670 | High Efficiency<br>Red | 1.9                                                     | 2.6  | 5                                                                           | 4.0                                                               | 400<br>250                                                        |
| HSMD-C650<br>HSMD-C670 | Orange                 | 2.1                                                     | 2.6  | 5                                                                           | 4.0                                                               | 400<br>250                                                        |
| HSMY-C650<br>HSMY-C670 | Yellow                 | 2.1                                                     | 2.6  | 5                                                                           | 3.0                                                               | 400<br>250                                                        |
| HSMG-C650<br>HSMG-C670 | Green                  | 2.2                                                     | 2.6  | 5                                                                           | 8.0                                                               | 400<br>250                                                        |
| HSMF-C655              | High Efficiency<br>Red | 1.9                                                     | 2.6  | 5                                                                           | 3.7                                                               | 325                                                               |
|                        | Green                  | 2.2                                                     | 3.0  | 5                                                                           | 6.3                                                               | 325                                                               |

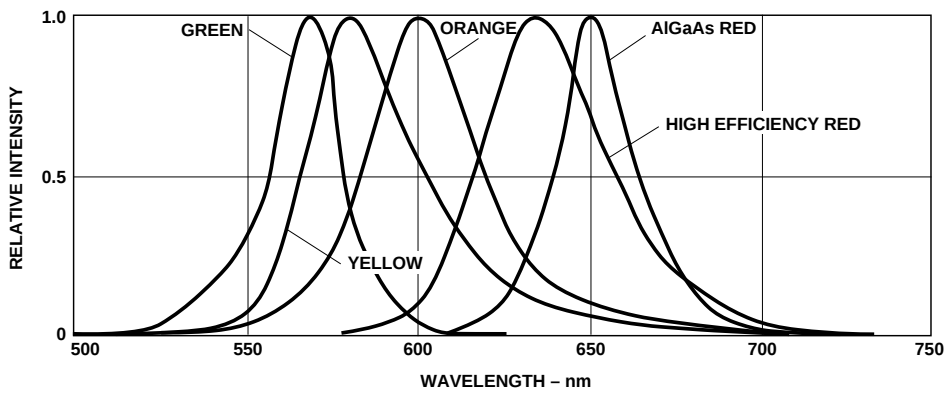


Figure 1. Relative Intensity vs. Wavelength.

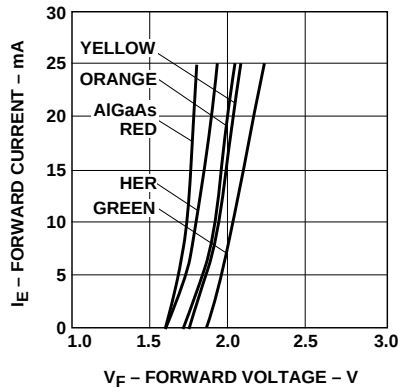


Figure 2. Forward Current vs. Forward Voltage.

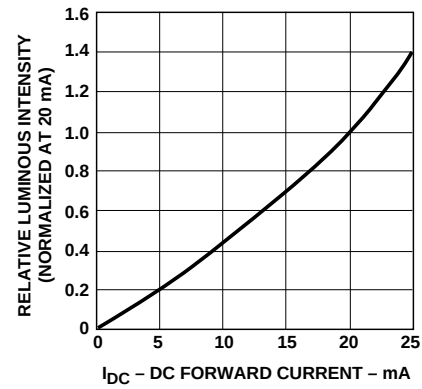


Figure 3. Relative Luminous Intensity vs. DC Forward Current.

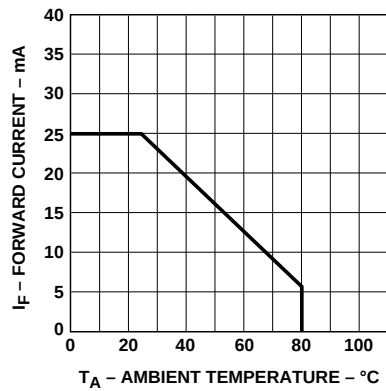


Figure 4. Maximum DC Current vs. Ambient Temperature.

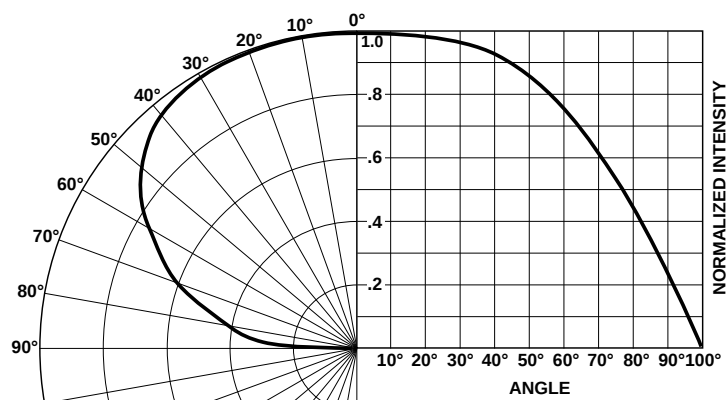
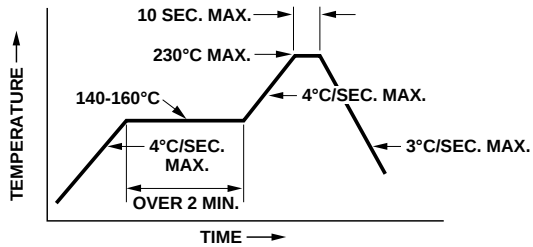
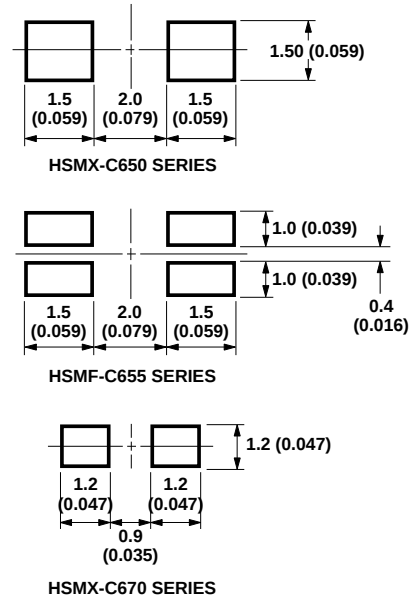


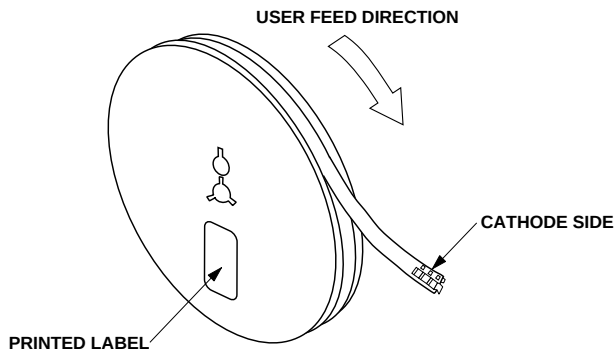
Figure 5. Intensity vs. Angle.



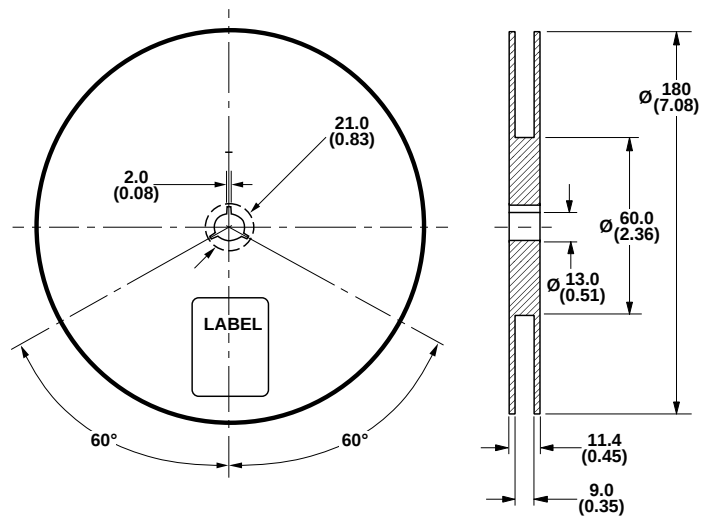
**Figure 6. Recommended SMT Reflow Soldering Profile.**



**Figure 7. Recommended Solder Patterns.**



**Figure 8. Reeling Orientation.**



**Figure 9. Reel Dimensions.**

NOTE:  
ALL DIMENSIONS IN MILLIMETERS (INCHES).

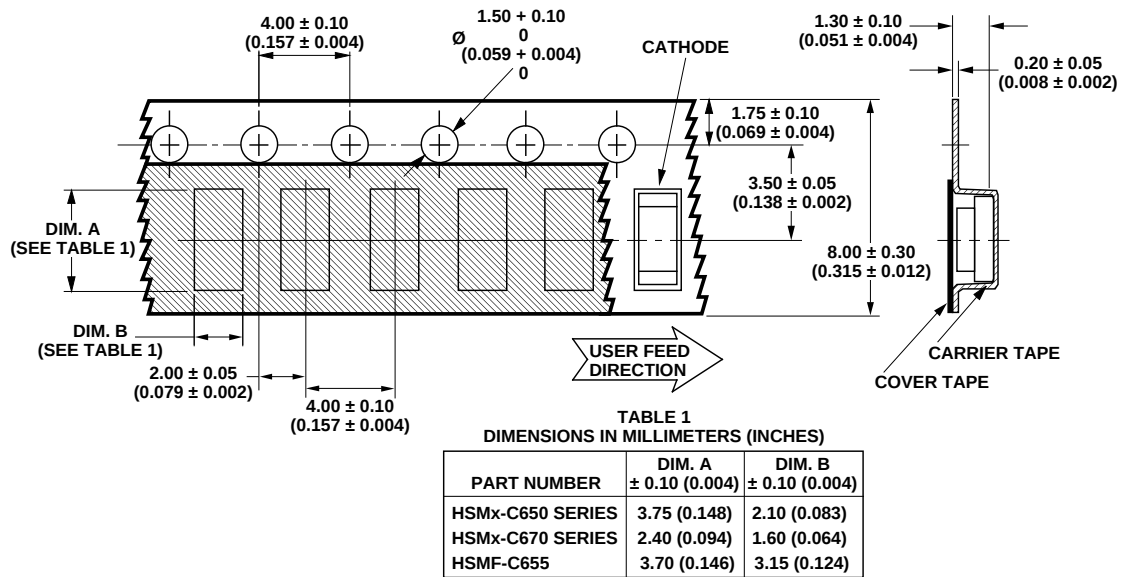


Figure 10. Tape Dimensions.

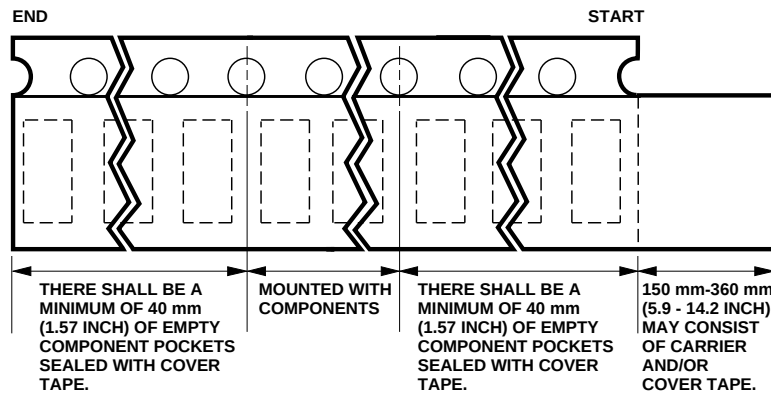


Figure 11. Tape Leader and Trailer Dimensions.



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