

# HSMF-C118

## TriColor ChipLED



## Data Sheet



### Description

The HSMF-C118 tricolor chip-type LED is designed in an ultra small package for miniaturization. It is the first of its kind to achieve such small packaging for 3 dies. With the freedom to have any combination of colors from mixing of the 3 primary colors, this will yield a wide variety of colors to suit every application and product theme.

The small size, narrow footprint, and low profile make this LED excellent for back-lighting, status indication, and front panel illumination applications.

In order to facilitate pick and place operation, this ChipLED is shipped in tape and reel, with 3000 units per reel. The package is compatible with IR soldering and binned by both color and intensity.

### Features

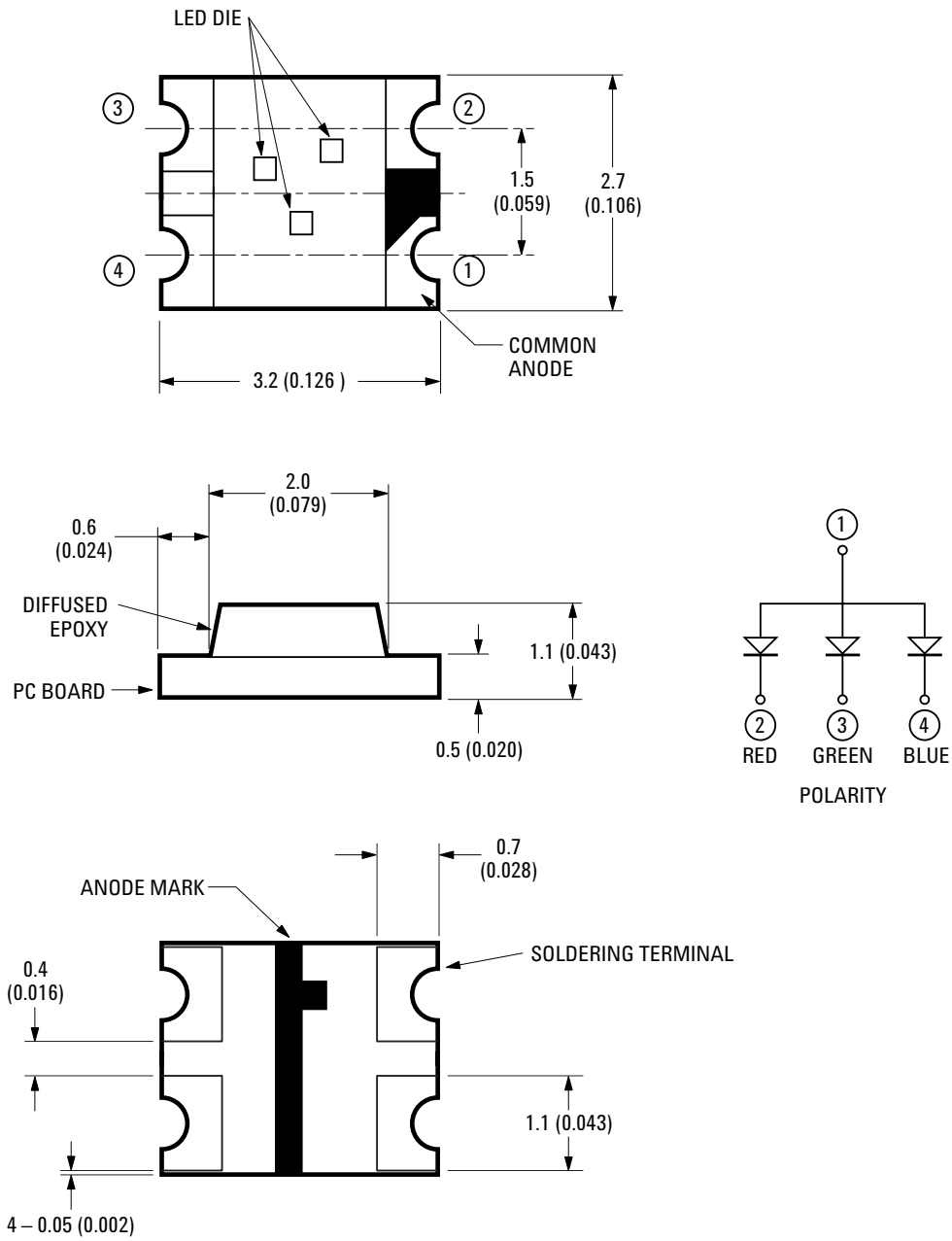
- Common anode
- Small 3.2 x 2.7 x 1.1 mm package
- Diffused optics
- Red/Green/Blue color combination
- Available in 8 mm tape on 7 inch (178 mm) diameter reels
- High brightness using AlInGaP and InGaN die technology
- Compatible with reflow soldering

### Applications

- Backlighting
- Status indicator
- Front panel indicator
- Office automation, home appliances, industrial equipment

*CAUTION: HSMF-C118 is Class 1A ESD sensitive per JESD22-A114C.01. Please observe appropriate precautions during handling and processing. Refer to Application Note AN-1142 for additional details.*

## Package Dimensions



### NOTES:

1. DIMENSIONS IN MILLIMETERS (INCHES).
2. TOLERANCE  $\pm 0.1$  mm UNLESS OTHERWISE NOTED.

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

| Parameter                                   | AllInGaP Red                                 | InGaN Green | InGaN Blue | Units            |
|---|--|-------------|------------|------------------|
| DC Forward Current <sup>[1, 3, 4]</sup>     | 20   | 20          | 20         | mA               |
| Power Dissipation <sup>[1]</sup>            | 48   | 78          | 78         | mW               |
| DC Forward Current <sup>[2]</sup>           | 15   | 15          | 15         | mA               |
| Power Dissipation <sup>[2]</sup>            | 36   | 59          | 59         | mW               |
| Reverse Voltage ( $I_R = 100 \mu\text{A}$ ) | 5  | 5           | 5          | V                |
| LED Junction Temperature                    | 95   | 95          | 95         | $^\circ\text{C}$ |
| Operating Temperature Range                 |  | -30 to +85  |            | $^\circ\text{C}$ |
| Storage Temperature Range                   |  | -40 to +85  |            | $^\circ\text{C}$ |
| Soldering Temperature                       | See reflow soldering profile (Figures 6 & 7) |             |            |                  |

### Notes:

1. Applies when single LED is lit up.
2. Applies when all 3 LEDs are lit up simultaneously.
3. Derate linearly as shown in Figure 4.
4. Drive currents above 5 mA are recommended for best long term performance.

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

| Color        | Forward Voltage<br>$V_F$ (Volts) @ $I_F = 20 \text{ mA}$ |      | Reverse<br>Breakdown<br>$V_R$ (Volts)<br>@ $I_R = 100 \mu\text{A}$ | Capacitance<br>$C$ (pF), @ $V_F = 0$ ,<br>$f = 1 \text{ MHz}$ | Thermal<br>Resistance<br>$R\theta_{J-PIN}$ ( $^\circ\text{C}/\text{W}$ ) |
|--------------|--|------|--|---|--|
|              | Typ.   | Max. | Min.   | Typ.  | Typ.   |
| AllInGaP Red | 1.9  | 2.4  | 5  | 17  | 400  |
| InGaN Green  | 3.5  | 3.9  | 5  | 110   | 450  |
| InGaN Blue   | 3.5  | 3.9  | 5  | 110   | 450  |

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

| Color        | Luminous Intensity<br>$I_v$ (mcd) @ $I_F = 20 \text{ mA}$ <sup>[1]</sup> |      | Peak<br>Wavelength<br>$\lambda_{\text{peak}}$ (nm) | Color,<br>Dominant<br>Wavelength<br>$\lambda_d$ <sup>[2]</sup> (nm) | Viewing Angle<br>$2 \theta_{1/2}$ Degrees <sup>[3]</sup> | Luminous<br>Efficacy<br>$\eta_v$ (lm/W) |
|--------------|--|------|--|---|--|---|
|              | Min.   | Typ. | Typ.   | Typ.  | Typ.   | Typ.                                    |
| AllInGaP Red | 28.5   | 90   | 637  | 626   | 135  | 155                                     |
| InGaN Green  | 45.0   | 120  | 523  | 525   | 130  | 490                                     |
| InGaN Blue   | 11.2   | 40   | 468  | 470   | 125  | 80                                      |

### 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.

### Intensity ( $I_v$ ) Bin Limits<sup>[1]</sup>

| Bin ID | Intensity (mcd) |        |
|--------|-----------------|--------|
|        | Min.            | Max.   |
| 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 |

Tolerance:  $\pm 15\%$ .

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

#### Blue Color Bins

| Bin ID | Dom. Wavelength (nm) |       |
|--------|----------------------|-------|
|        | Min.                 | Max.  |
| A      | 460.0                | 465.0 |
| B      | 465.0                | 470.0 |
| C      | 470.0                | 475.0 |
| D      | 475.0                | 480.0 |

Tolerance:  $\pm 1$  nm

#### Red Color Bins

| Bin ID | Dom. Wavelength (nm) |       |
|--------|----------------------|-------|
|        | Min.                 | Max.  |
| —      | 620.0                | 635.0 |

Tolerance:  $\pm 1$  nm

#### Green Color Bins

| Bin ID | Dom. Wavelength (nm) |       |
|--------|----------------------|-------|
|        | Min.                 | Max.  |
| A      | 515.0                | 520.0 |
| B      | 520.0                | 525.0 |
| C      | 525.0                | 530.0 |
| D      | 530.0                | 535.0 |

Tolerance:  $\pm 1$  nm

#### Note:

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

#### CAUTION:

1. The above optical performance specifications are valid in the case when single LED is lit up.
2. The above product specifications DO NOT provide any guarantee on color mixing, color consistency over time, or uniformity in luminous intensity when more than 1 LED is lit.
3. Please refer to *Application Brief ABD-007* for additional details/explanation on driving the part in parallel circuit.

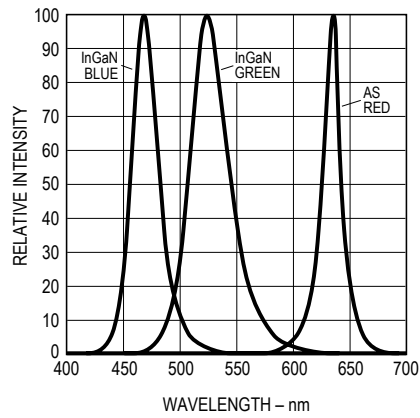


Figure 1. Relative intensity vs. wavelength.

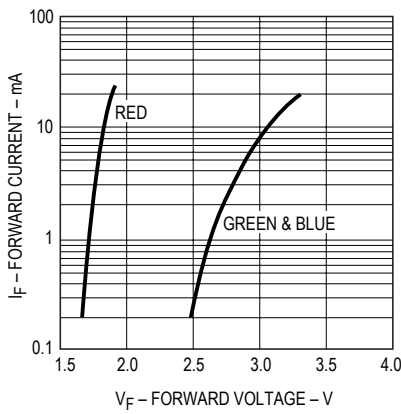


Figure 2. Forward current vs. forward voltage.

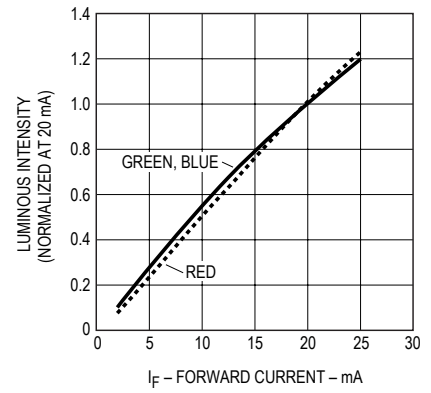


Figure 3. Luminous intensity vs. forward current.

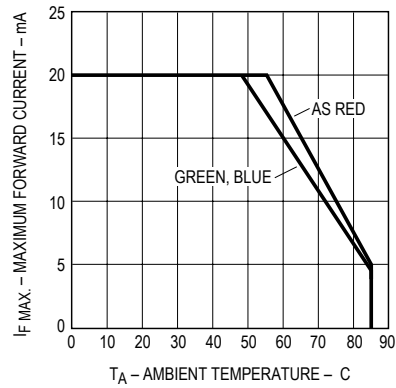


Figure 4. Maximum forward current vs. ambient temperature (1 chip lit up).

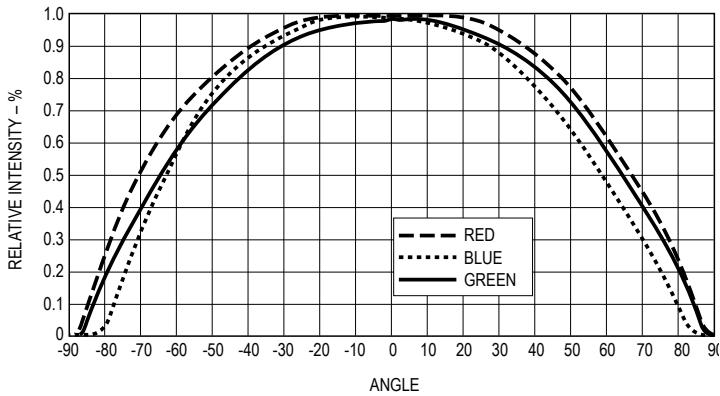


Figure 5. Relative intensity vs. angle.

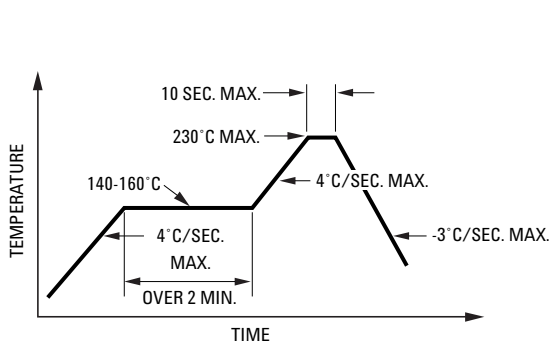


Figure 6. Recommended Pb-Free reflow soldering profile.

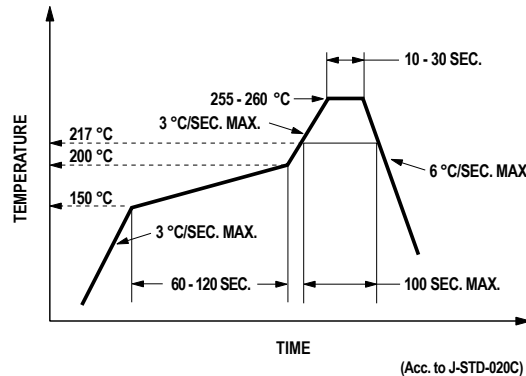


Figure 7. Recommended Pb-Free reflow soldering profile. (Acc. to J-STD-020C)

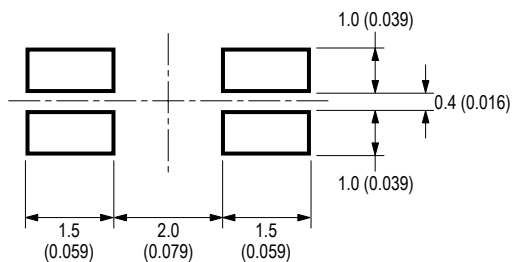


Figure 8. Recommended soldering pattern.

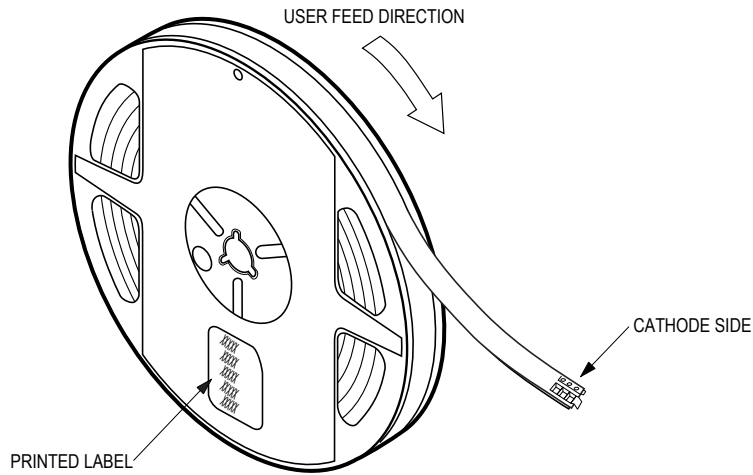


Figure 9. Reeling orientation.

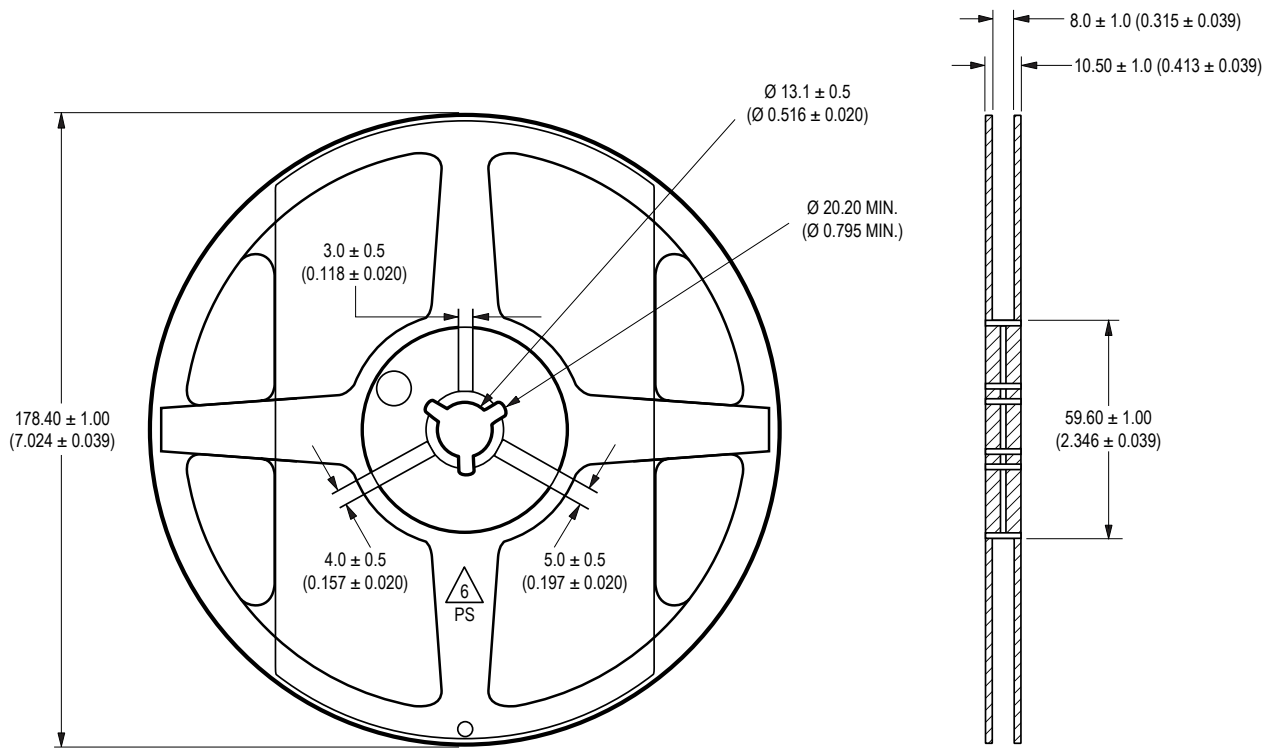


Figure 10. Reel dimensions.

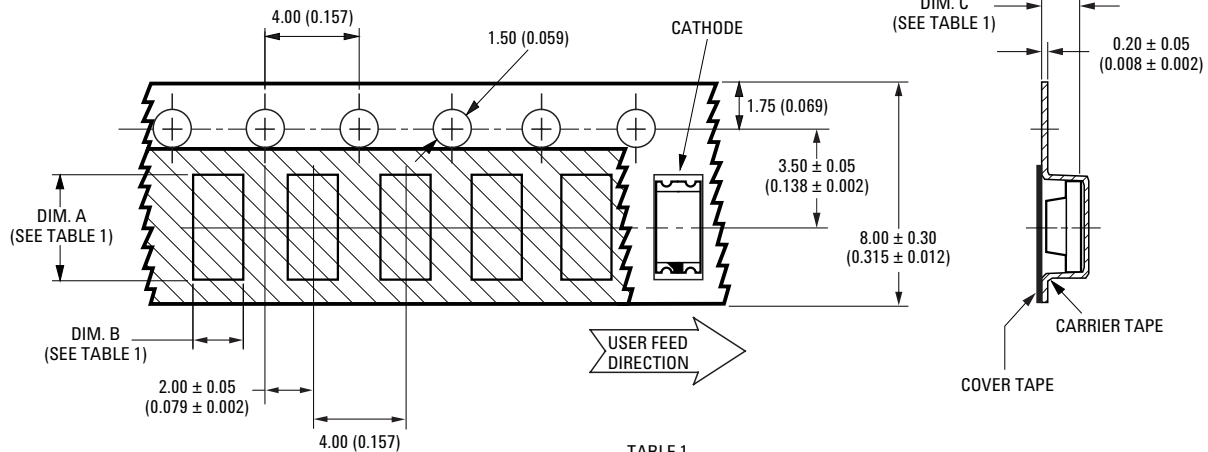


TABLE 1  
DIMENSIONS IN MILLIMETERS (INCHES)

| PART NUMBER | DIM. A<br>± 0.10 (± 0.004) | DIM. B<br>± 0.10 (± 0.004) | DIM. C<br>± 0.10 (± 0.004) |
|-------------|----------------------------|----------------------------|----------------------------|
| HSMF-C118   | 3.52 (0.139)               | 3.02 (0.119)               | 1.40 (0.055)               |

Figure 11. Tape dimensions.

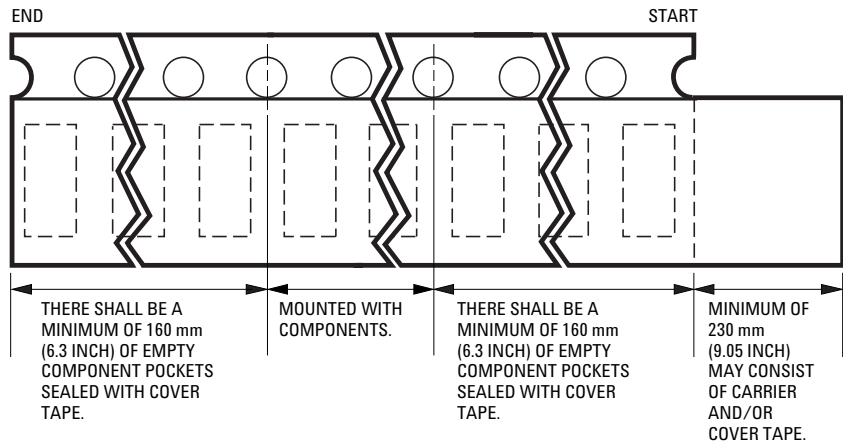


Figure 12. Tape leader and trailer dimensions.

**Reflow Soldering:**

For more information on reflow soldering, refer to Application Note AN-1060, Surface Mounting SMT LED Indicator Components.

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

Baking is required before mounting, if:

1. Humidity Indicator Card is > 10% when read at  $23 \pm 5^\circ\text{C}$ .
2. Device expose to factory conditions <30°C/60%RH more than 672 hours.

Recommended baking condition:  $60 \pm 5^\circ\text{C}$  for 20 hours.

For product information and a complete list of distributors, please go to our web site: [www.avagotech.com](http://www.avagotech.com)

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