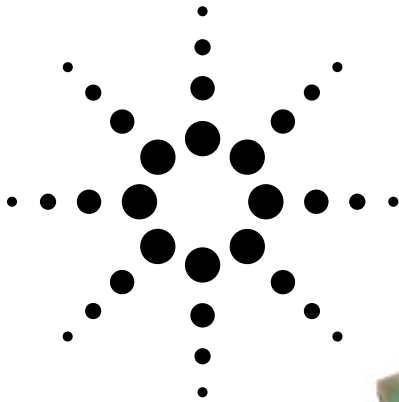


# Agilent HSMF-C16x High Brightness Miniature Bi-Color Surface Mount ChipLEDs

## Data Sheet



### Description

This series of bi-color ChipLEDs is designed with the smallest footprint to achieve high density of components on board. They have the industry standard footprint of 1.6 mm x 0.8 mm and a height of only 0.5 mm. This makes them very suitable for cellular phone and mobile

equipment backlighting and indication. They are available in a wide range of color combinations. In order to facilitate automated pick and place operation, these ChipLEDs are shipped in tape and reel, with 4000 units per reel. These parts are compatible with IR soldering.

### Features

- Small size
- 0603 industry standard footprint
- Diffused optics
- Operating temperature range of  $-30^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- Compatible with reflow soldering
- Available in various color combination
- Available in 8 mm tape on 7" (178 mm) diameter reels

### Applications

- Keypad backlighting
- Symbol indicator
- LCD backlighting
- Pushbutton backlighting
- Front panel indicator

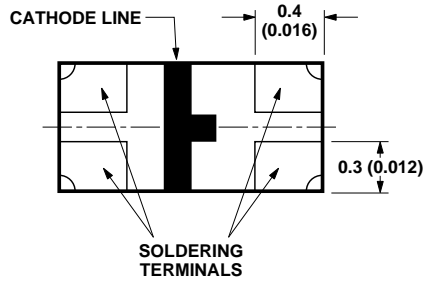
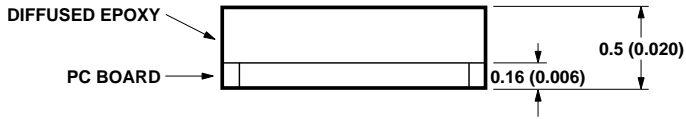
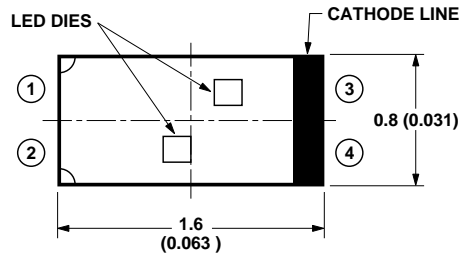
### Device Selection Guide

Part Number	Color	Parts Per Reel
HSMF-C162	AllnGaP Red/AllnGaP Amber	4000
HSMF-C163	AllnGaP Red/InGaN Green	4000
HSMF-C164	AllnGaP Red/InGaN Blue	4000
HSMF-C168	InGaN Green/InGaN Blue	4000
HSMF-C169	AllnGaP Amber/InGaN Blue	4000

**CAUTION:** HSMF-C163, HSMF-C164, HSMF-C168, and HSMF-C169 LEDs are Class 1 ESD sensitive. Please observe appropriate precautions during handling and processing. Refer to Agilent Technologies Application Note AN-1142 for additional details.



# Package Dimensions



POLARITY	HSMF-C162	HSMF-C163	HSMF-C164	HSMF-C168	HSMF-C169
① — >— ③	AMBER	GREEN	BLUE	BLUE	BLUE
② — >— ④	RED	RED	RED	GREEN	AMBER

- NOTES:
1. ALL DIMENSIONS IN MILLIMETERS (INCHES).
  2. TOLERANCE IS  $\pm 0.1$  mm ( $\pm 0.004$  IN.) UNLESS OTHERWISE SPECIFIED.

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

Parameter	AllnGaP	InGaN	Units
DC Forward Current <sup>[1]</sup>	20	10	mA
Power Dissipation	50	38	mW
Reverse Voltage	5	5	V
LED Junction Temperature	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 (Figure 6)		

**Note:**

1. Derate linearly as shown in Figure 4.

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

Color	Forward Voltage $V_F$ (Volts) @ $I_F$		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.	
	Typ.	Max.				
AllnGaP Red	20 mA	1.9	2.4	5	15	300
AllnGaP Amber	20 mA	1.9	2.4	5	11	300
AllnGaP Red	10 mA	1.8	2.3	5	15	300
AllnGaP Amber	10 mA	1.8	2.3	5	11	300
InGaN Green	10 mA	3.4	3.8	5	35	500
InGaN Blue	10 mA	3.4	3.8	5	35	500

$V_F$  Tolerance:  $\pm 0.1 \text{ V}$ .

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

Color	Luminous Intensity $I_V$ (mcd) @ $I_F$ <sup>[1]</sup>		Peak Wavelength $\lambda_{\text{peak}}$ (nm) Typ.	Color Dominant Wavelength $\lambda_d$ <sup>[2]</sup> (nm) Typ.	Viewing Angle $2 \theta_{1/2}$ Degrees <sup>[3]</sup> Typ.	Luminous Efficacy $\eta_V$ (lm/W) Typ.	
	Min.	Typ.					
AllnGaP Red	20 mA	25	90	637	626	120	155
AllnGaP Amber	20 mA	25	90	595	592	120	480
AllnGaP Red	10 mA	10	35	637	626	120	155
AllnGaP Amber	10 mA	10	35	595	592	120	480
InGaN Green	10 mA	16	45	523	525	120	500
InGaN Blue	10 mA	2.5	10	468	470	120	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.

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

Green Color Bins <sup>[1]</sup>		
Dom. Wavelength (nm)		
Bin ID	Min.	Max.
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: ± 0.5 nm

Blue Color Bins <sup>[1]</sup>		
Dom. Wavelength (nm)		
Bin ID	Min.	Max.
A	460.0	465.0
B	465.0	470.0
C	470.0	475.0
D	475.0	480.0

Tolerance: ± 1 nm

Orange Color Bins <sup>[1]</sup>		
Dom. Wavelength (nm)		
Bin ID	Min.	Max.
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: ± 1 nm

**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.

Yellow/Amber Color Bins <sup>[1]</sup>		
Dom. Wavelength (nm)		
Bin ID	Min.	Max.
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: ± 0.5 nm

InGaN Green Color Bins <sup>[1]</sup>		
Dom. Wavelength (nm)		
Bin ID	Min.	Max.
A	515.0	520.0
B	520.0	525.0
C	525.0	530.0
D	530.0	535.0

Tolerance: ± 1 nm

### Intensity (I<sub>v</sub>) Bin Limits<sup>[1]</sup>

Bin ID	Intensity @ 20 mA (mcd)	
	Min.	Max.
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: ± 15%.

**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.

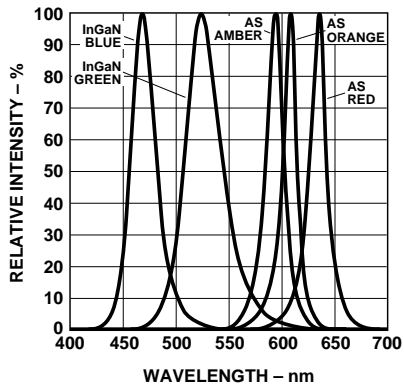


Figure 1. Relative intensity vs. wavelength.

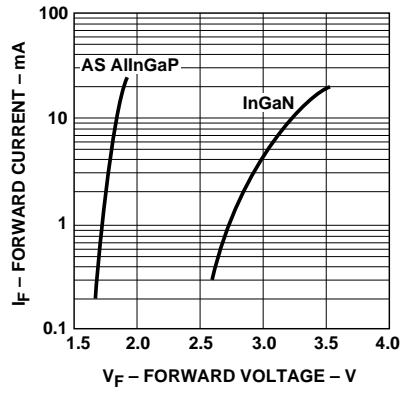


Figure 2. Forward current vs. forward voltage.

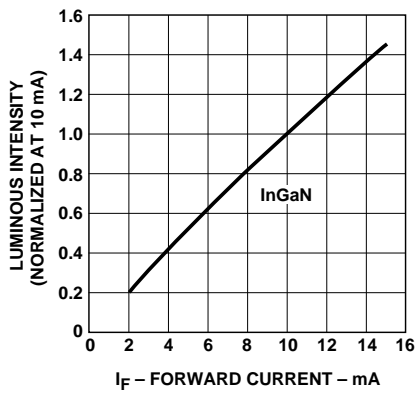
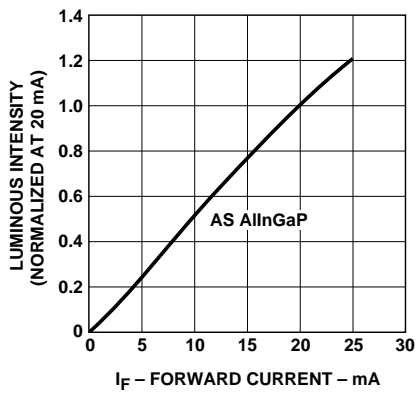


Figure 3. Luminous intensity vs. forward current.

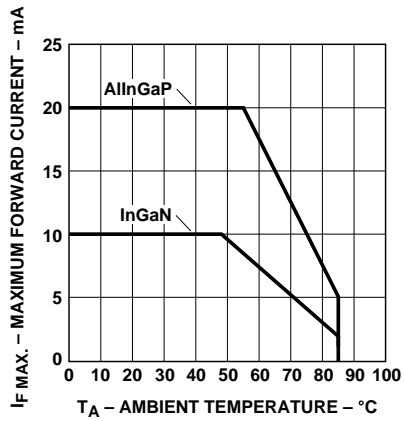


Figure 4. Maximum forward current vs. ambient temperature.

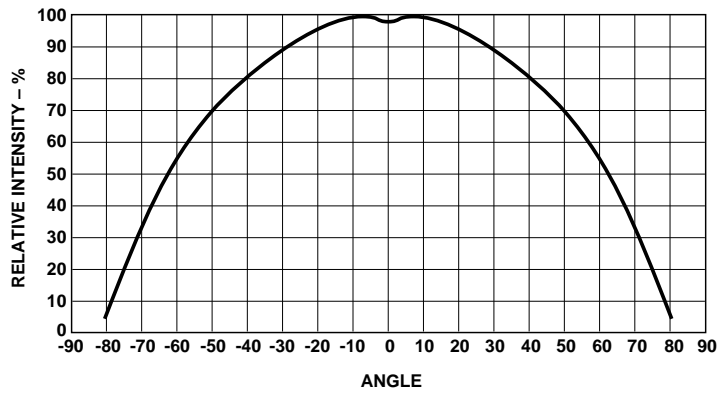


Figure 5. Relative intensity vs. angle.

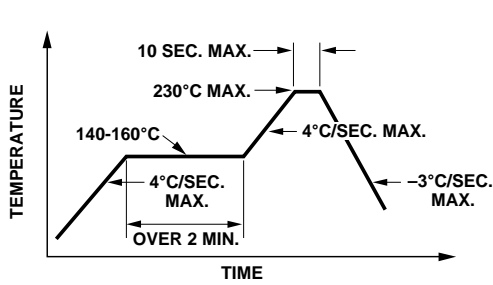


Figure 6. Recommended reflow soldering profile.

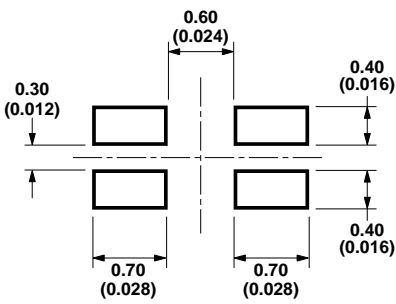


Figure 7. Recommended soldering pad pattern.

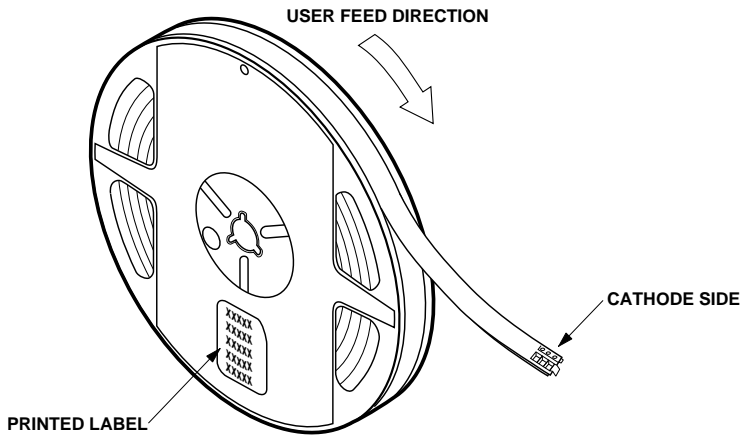
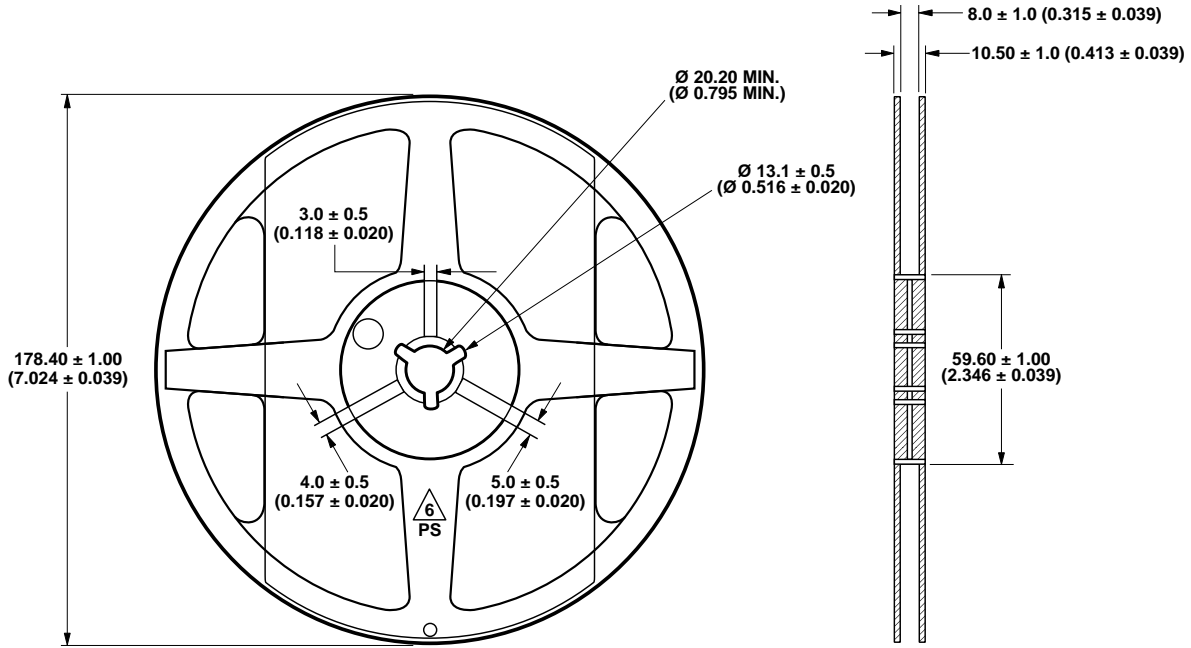


Figure 8. Reeling orientation.



NOTE:  
1. ALL DIMENSIONS IN MILLIMETERS (INCHES).

Figure 9. Reel dimensions.

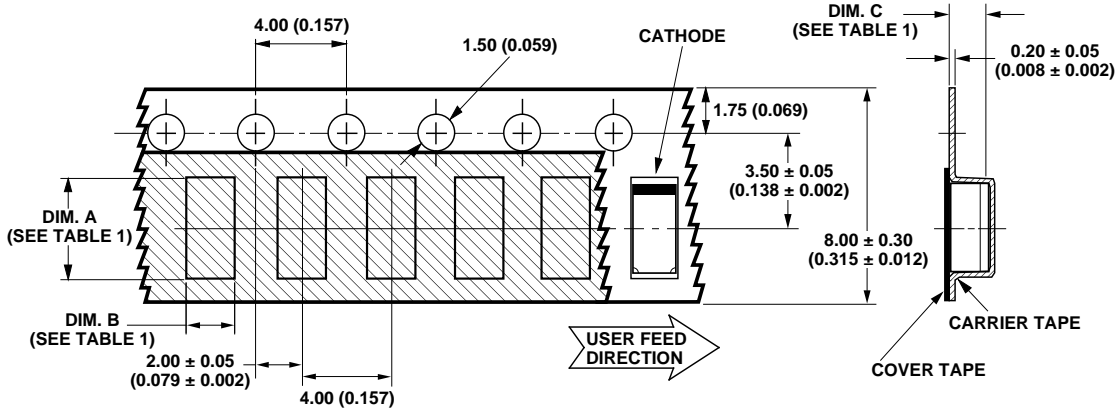


TABLE 1  
DIMENSIONS IN MILLIMETERS (INCHES)

PART NUMBER	DIM. A ± 0.10 (± 0.004)	DIM. B ± 0.10 (± 0.004)	DIM. C ± 0.10 (± 0.004)
HSMF-C16x SERIES	1.80 (0.071)	0.95 (0.037)	0.60 (0.024)

Figure 10. Tape dimensions.

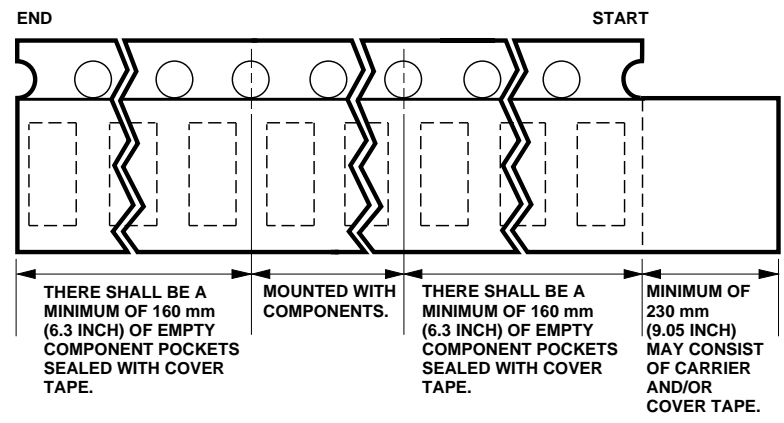


Figure 11. Tape leader and trailer dimensions.

- NOTES:
1. ALL DIMENSIONS IN MILLIMETERS (INCHES).
  2. TOLERANCE IS ± 0.1 mm (± 0.004 IN.) UNLESS OTHERWISE SPECIFIED.



**Reflow Soldering**

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

**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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