

---

# Surface Mount Chip LEDs

## Technical Data

---

### HSMF-C155/C156/C157

---

#### Features

- **Small Size**
- **Industry Standard Footprint**
- **Compatible with IR Solder**
- **Diffused Optics**
- **Operating Temperature Range of -30°C to +85°C**
- **Three Color Combinations Available: Red/Green, Yellow/Green, and Orange/Green.**
- **Available in 8 mm Tape on 7 in. (178 mm) Diameter Reels**

#### Applications

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

#### Description

The HSMF-C15x series of bicolor chip-type LEDs is 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 HSMF-C15x has the widely used 3.2 x 2.7 mm footprint and wide viewing angle make this LED exceptional for backlighting applications.

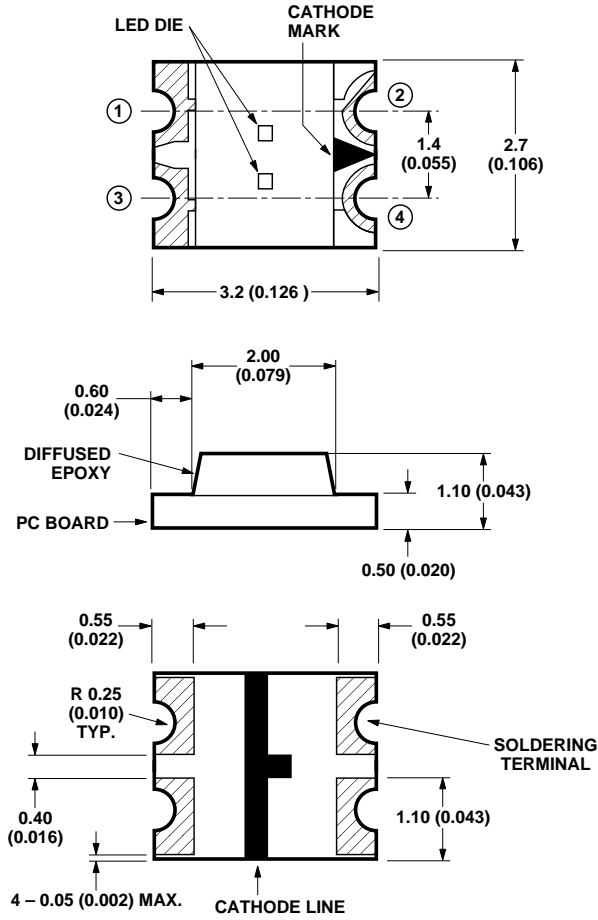
All packages are compatible with IR reflow solder processes. The small size and wide viewing angle make these LEDs prime choices for backlighting applications and front panel indicators especially where space is a premium.



#### Device Selection Guide

Part Number	Color Combinations	Parts Per Reel
HSMF-C155	High Efficiency Red/Green	3000
HSMF-C156	Yellow/Green	3000
HSMF-C157	Orange/Green	3000

### Package Dimensions



POLARITY	PART NUMBER		
	HSMF-C-155	HSMF-C-156	HSMF-C-157
① — >— ②	GREEN	GREEN	GREEN
③ — >— ④	RED	YELLOW	ORANGE

POSITION OF COLOR SOURCE ON DEVICE

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

### HSMF-C155/C156/C157

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

Parameter	HSMF-C155/C156/C157	Units
DC Forward Current <sup>[1]</sup>	25	mA
Peak Pulsing Current <sup>[2]</sup>	100	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	-30 to +85	$^\circ\text{C}$
Storage Temperature Range	-40 to +85	$^\circ\text{C}$
Soldering Temperature	See IR soldering profile (Figure 6)	

**Notes:**

1. Derate linearly as shown in Figure 4 for temperature above  $25^\circ\text{C}$ .
2. Pulse condition of 1/10 duty and 0.1 msec. width.

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

Color	Luminous Intensity <sup>[1]</sup> $I_v(\text{mcd}) @ 20\text{mA}$		Peak Wavelength $\lambda_{\text{peak}}(\text{nm})$	Dominant Wavelength $\lambda_d(\text{nm})$	Viewing Angle $2\theta_{1/2}$ Degrees <sup>[2]</sup>
	Min.	Typ.	Typ.	Typ.	Typ.
HER	2.50	10.0	630	626	170
Orange	2.50	8.0	605	604	170
Yellow	2.50	8.0	589	586	170
Green	4.00	15.0	570	572	170

**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.  $\theta_{1/2}$  is the off-axis angle where the luminous intensity is 1/2 the peak intensity.

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

Color	Forward Voltage $V_F(\text{V})$ @ $I_F = 20 \text{ mA}$		Reverse Breakdown $V_R(\text{V})$ @ $I_R = 100 \mu\text{A}$	Capacitance $C(\text{pF})$ @ $V_F = 0, f = 1\text{Mhz}$	Thermal Resistance $R\theta_{J-P} (\text{C}/\text{W})$
	Typ.	Max.	Min.	Typ.	Typ.
HER	2.1	2.6	5	5	325
Orange	2.2	2.6	5	7	325
Yellow	2.1	2.6	5	6	325
Green	2.2	2.6	5	9	325

**Note:**

The bicolor package contains two individual light sources of different color. The specifications above refer to each color of a particular package.

## Color Bin Limits

### Green Color Bins<sup>[1]</sup>

Bin ID	Dom. Wavelength (nm)	
	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:  $\pm 0.5$  nm

### Orange Color Bins<sup>[1]</sup>

Bin ID	Dom. Wavelength (nm)	
	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:  $\pm 1$  nm

### Yellow/Amber Color Bins<sup>[1]</sup>

Bin ID	Dom. Wavelength (nm)	
	Min.	Max.
A	582.0	584.5
B	584.5	587.0
C	587.0	589.5
D	589.5	592.0
H	592.0	594.5
J	594.5	597.0

Tolerance:  $\pm 0.5$  nm

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

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

Tolerance:  $\pm 15\%$

#### 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.

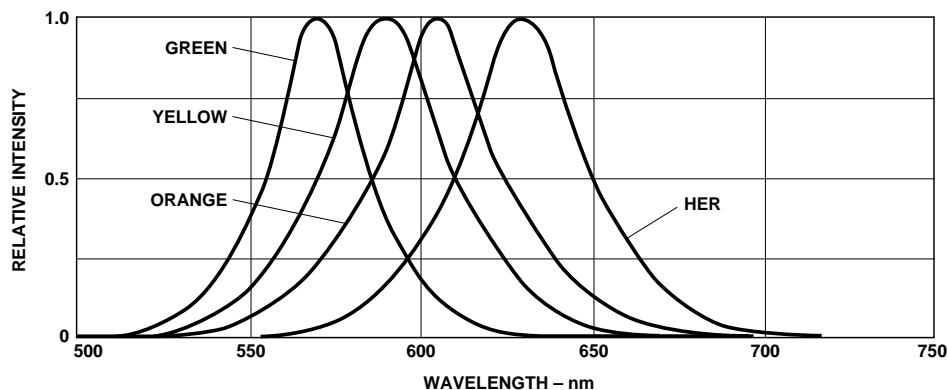


Figure 1. Relative Intensity vs. Wavelength.

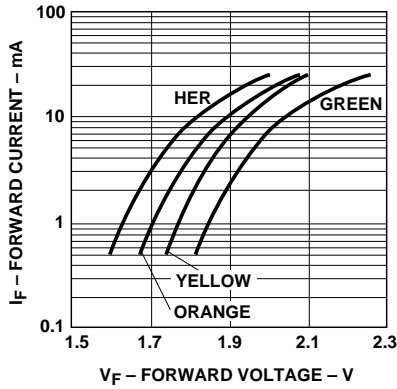


Figure 2. Forward Current vs. Forward Voltage.

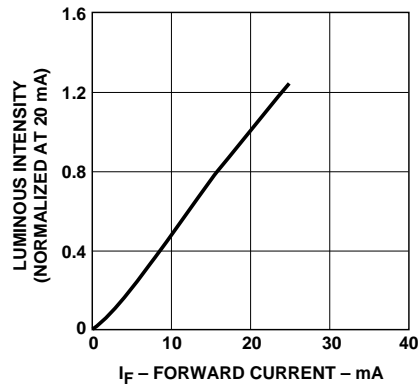


Figure 3. Luminous Intensity vs. Forward Current (All Colors).

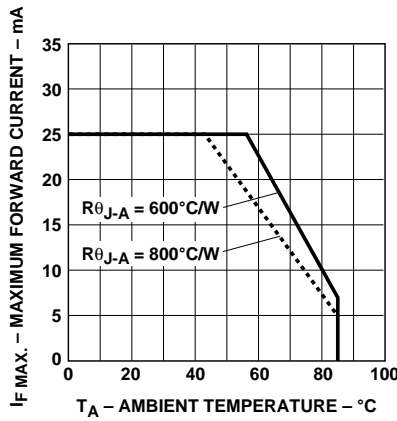


Figure 4. Maximum Forward Current vs. Ambient Temperature.

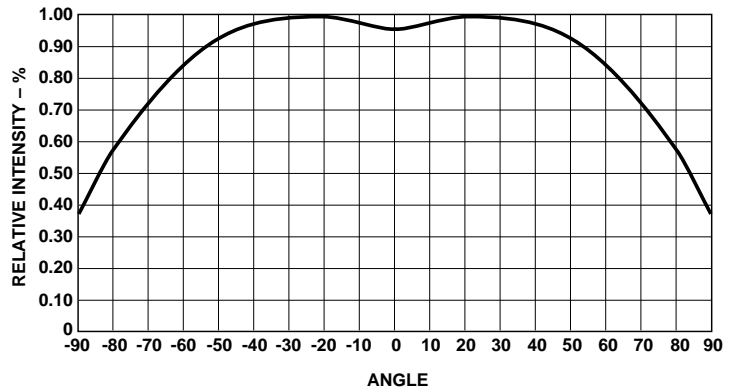
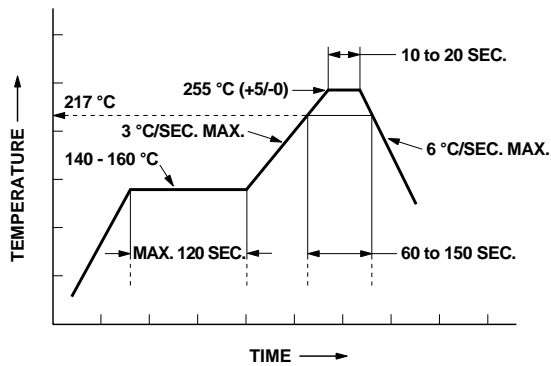
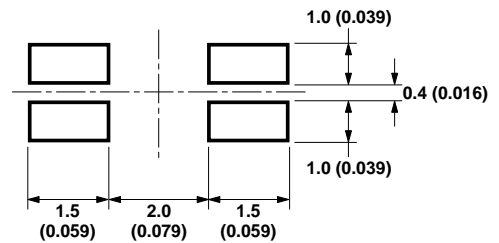


Figure 5. Relative Intensity vs. Angle for HSMx-C155, C156 and C157.



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

Figure 6. Recommended Pb Free Reflow Soldering Profile.



Note: 1. All dimensions in millimeters (inches).

Figure 7. Recommended Solder Pad Pattern.

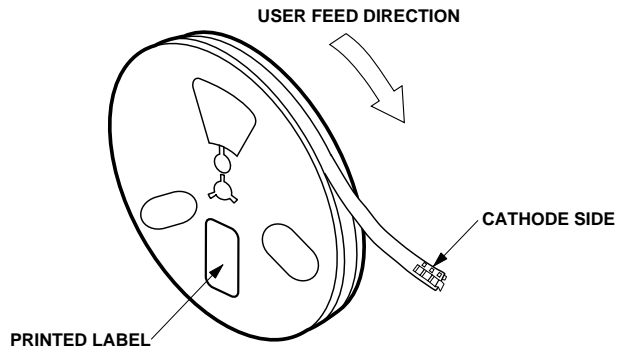
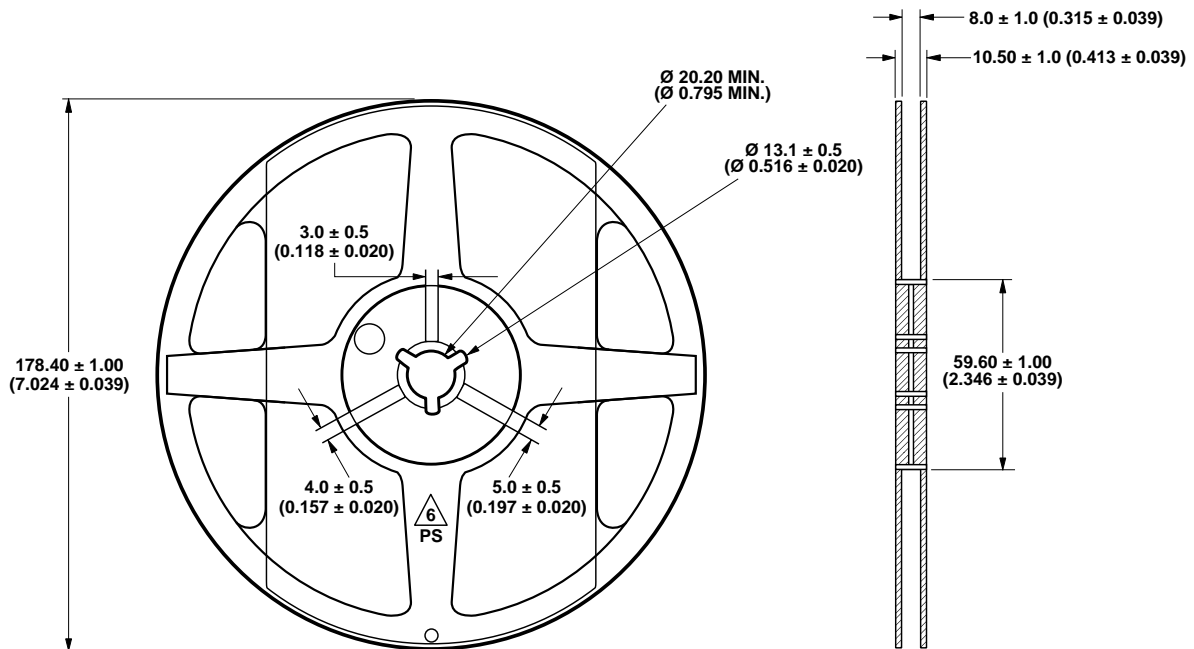


Figure 8. Reeling Orientation.



**Note:**  
All dimensions in millimeters (inches).

Figure 9. Reel Dimensions.

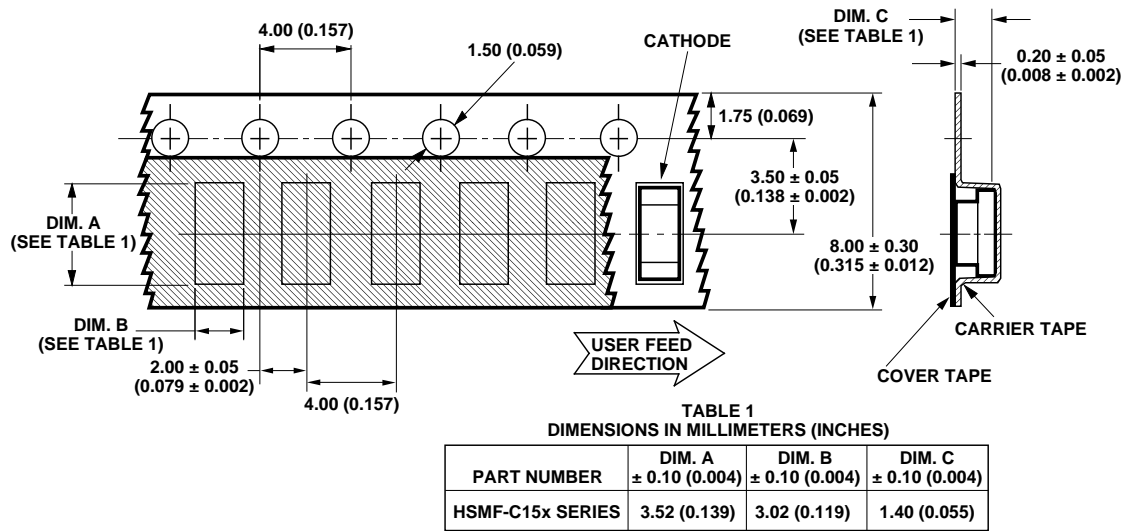


Figure 10. Tape Dimensions.

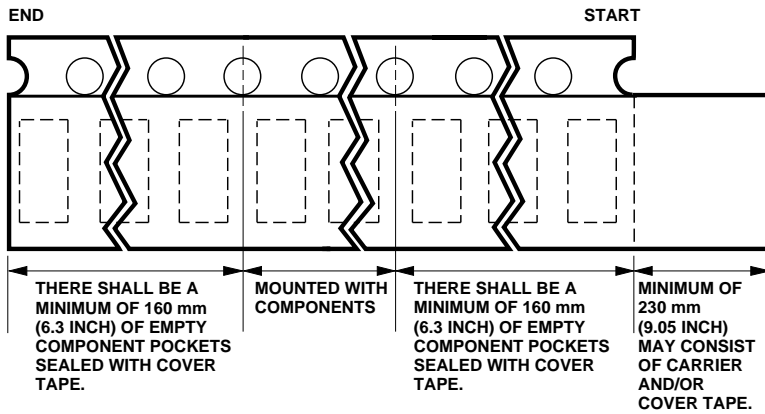


Figure 11. Tape Leader and Trailer Dimensions.

**Notes:**

- All dimensions in millimeters (inches).
- Tolerance is  $\pm 0.1$  mm ( $\pm 0.004$  in.) unless otherwise specified.

### Convective IR Reflow Soldering

For more information on IR 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:

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

Baking recommended condition: 60  $\pm$  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  
(916) 788-6763

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 © 2003 Agilent Technologies, Inc.

Obsoletes 5988-6268EN

October 28, 2003

5988-7414EN