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# Bicolor Surface Mount Chip LEDs

## Technical Data

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

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### Features

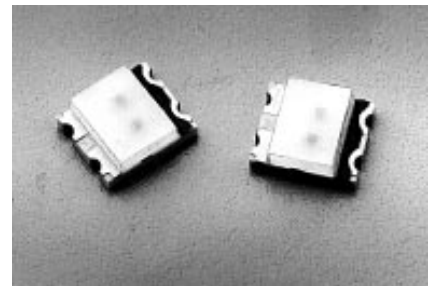
- **Small Size**
- **Diffuse Optics**
- **Compatible with IR Solder Processes**
- **Three Combinations Available: Red/Green, Orange/Green, Yellow/Green**
- **Available in 8 mm Tape on 7" (178 mm) Diameter Reels**

### Applications

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

### Description

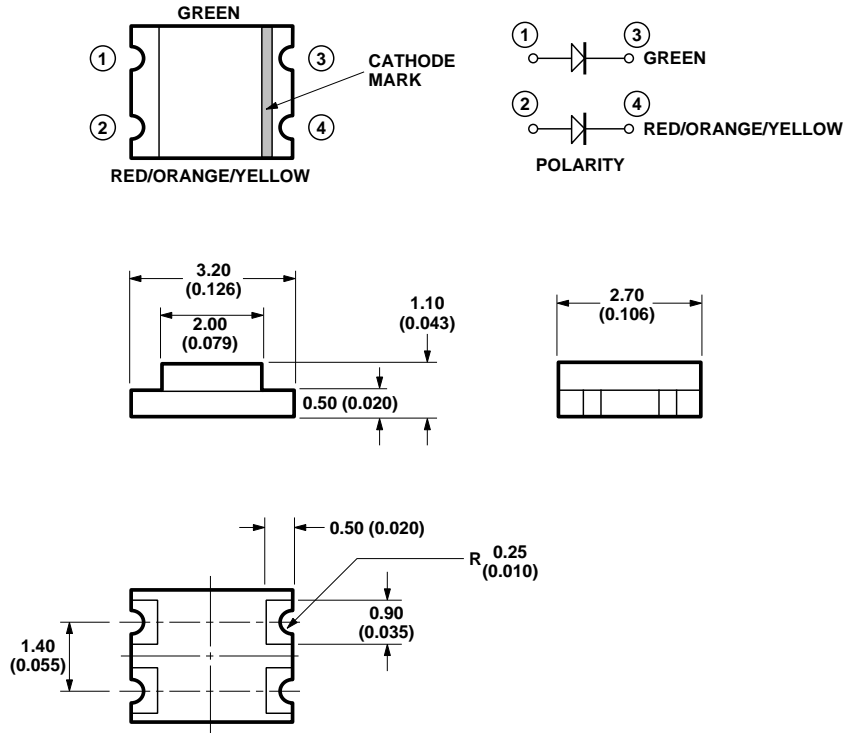
The HSMF-C65x series of bicolor chip-type LEDs are designed in an industry standard package for ease of handling and use. These bicolor LEDs are available as high efficiency red/green, yellow/green, and orange/green.



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/ Green	3000
HSMF-C656	Yellow/ Green	3000
HSMF-C657	Orange/ 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.

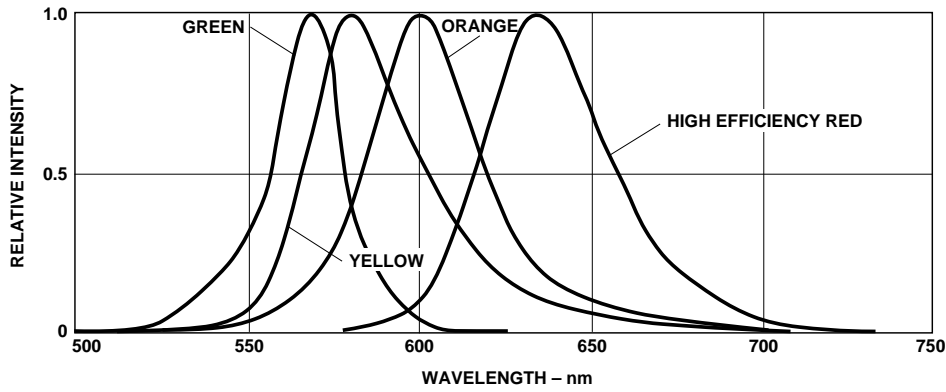


Figure 1. Relative Intensity vs. Wavelength.

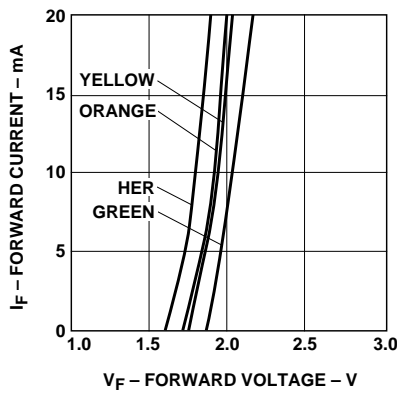


Figure 2. Forward Current vs. Forward Voltage.

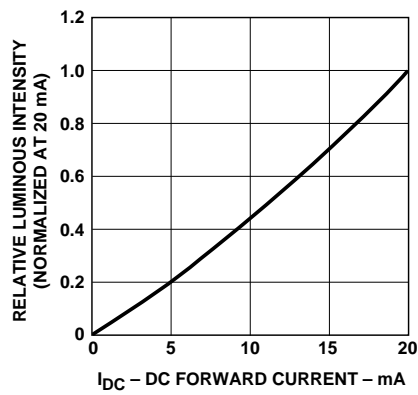


Figure 3. Relative Luminous Intensity vs. DC Forward Current.

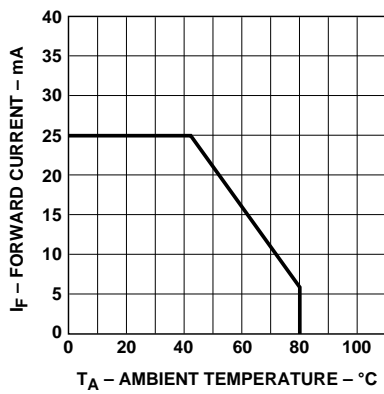


Figure 4. Maximum DC Current vs. Ambient Temperature.

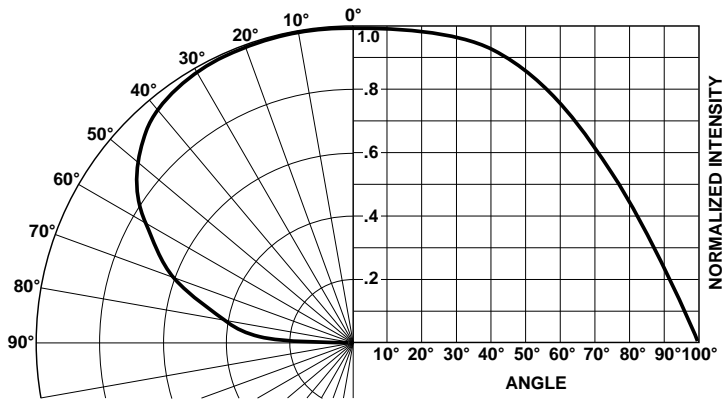


Figure 5. Intensity vs. Angle.

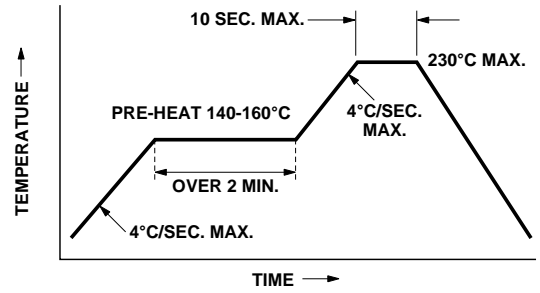


Figure 6. Recommended Reflow Soldering Profile.

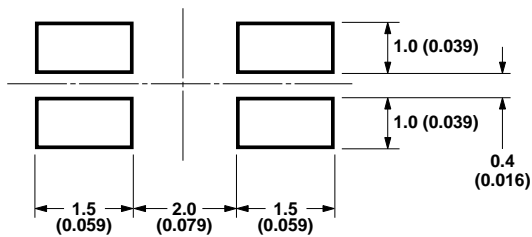


Figure 7. Recommended Solder Pattern.

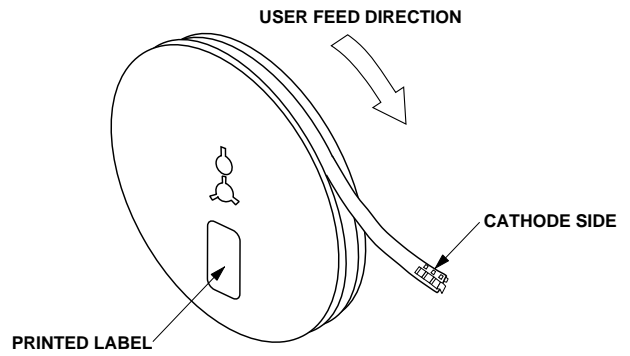


Figure 8. Reeling Orientation.

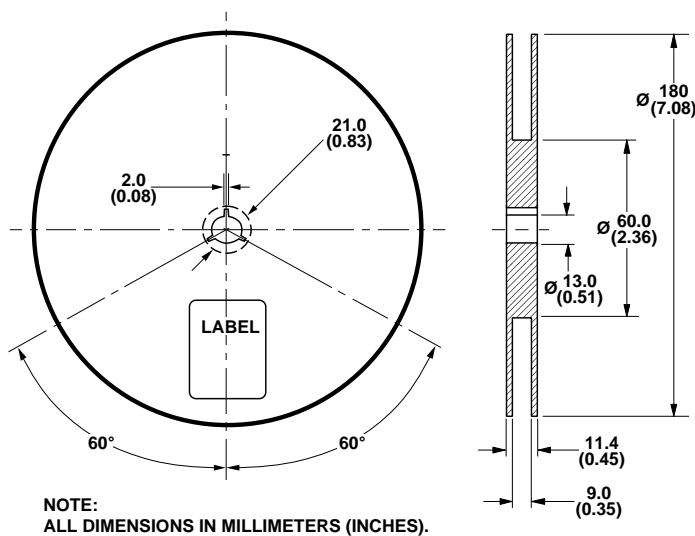
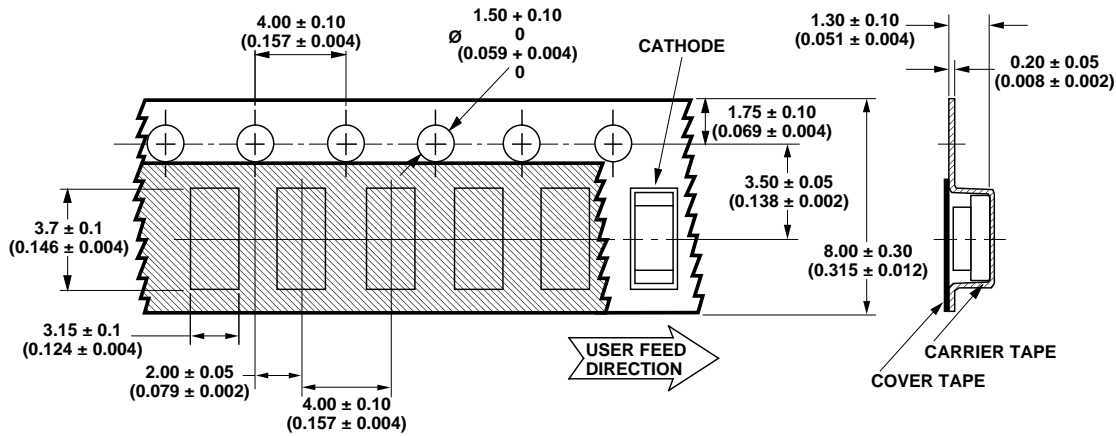
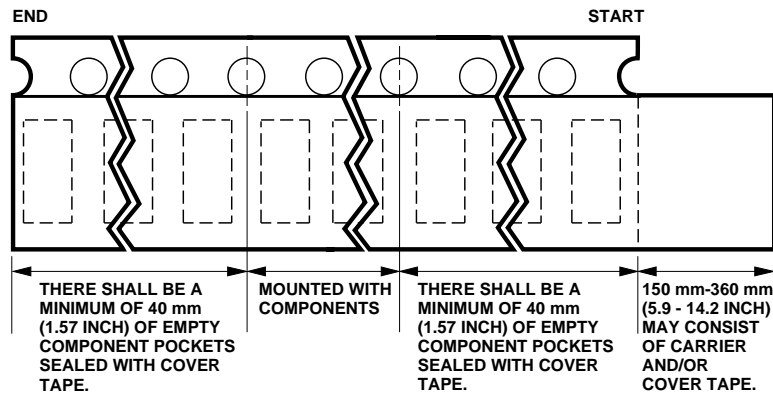


Figure 9. Reel Dimensions.



**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:

- 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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