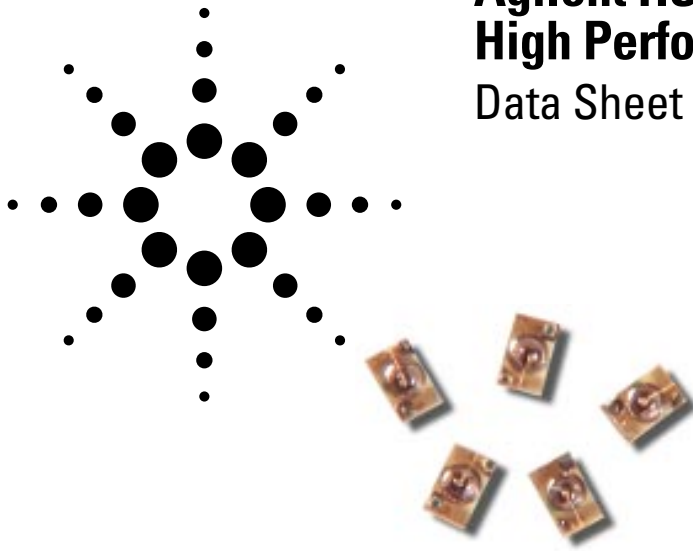


Agilent HSMx-C220

High Performance ChipLEDs

Data Sheet



Description

The HSMx-C220 is the smallest and the most efficient ChipLED package available in the market. The package contains a reflector cup and lens to maximize light extraction. They are available in a wide range of colors. All packages come in 8 mm tape on 7 inch reels which make them suitable for automated pick and place process. The parts are also compatible with IR reflow solder processes.

The small package size makes these LEDs prime choices for all backlighting applications and front panel illumination especially where space is a premium. The directional viewing angle of less than 90 degrees makes the parts suitable for use with light guide/pipe.

Features

- Small size (2 x 1.25 x 1.2 mm)
- High performance (with reflector cup and lens)
- Directional optics
- Industry standard footprint
- Compatible with IR solder
- Operating temperature range of -30°C to $+85^{\circ}\text{C}$
- Available in 8 mm tape on 7 in. (178 mm) diameter reels

Applications

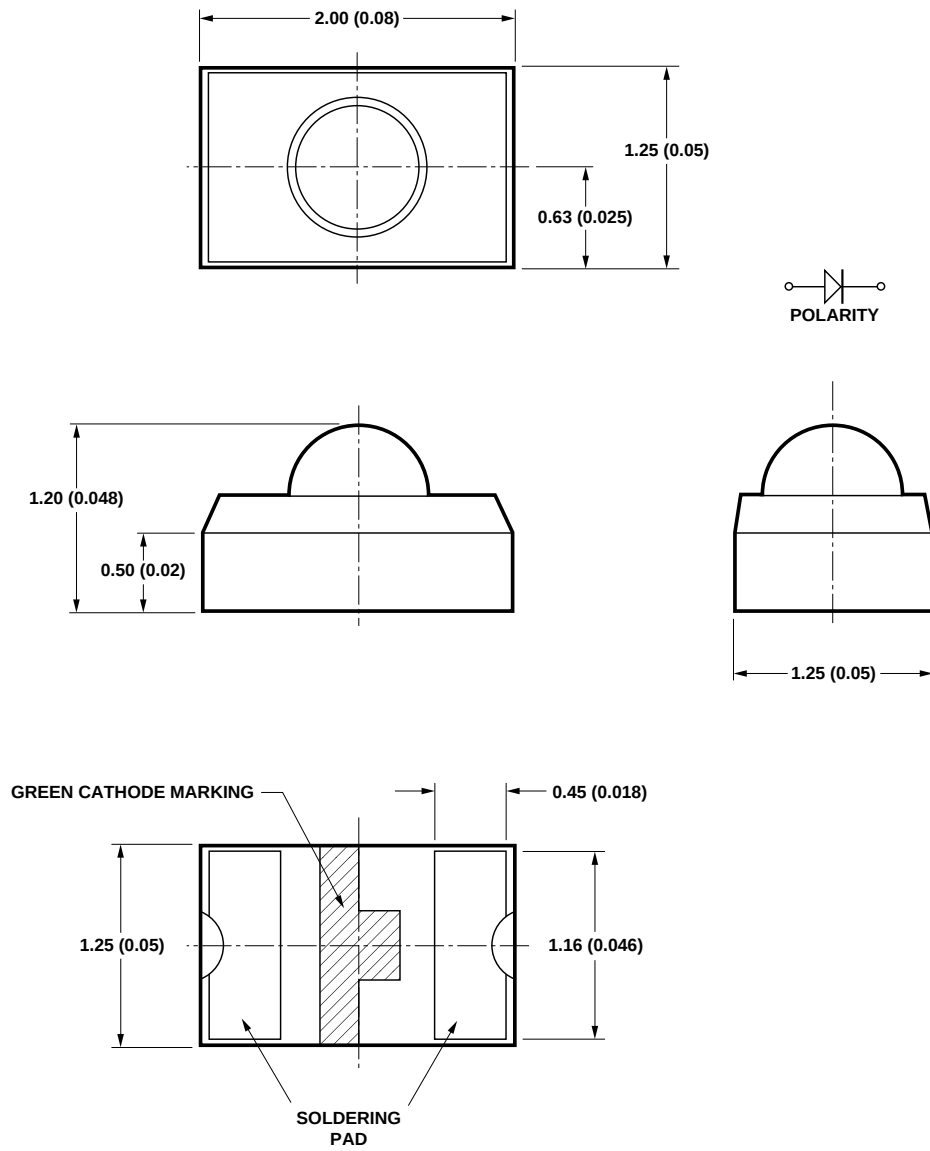
- Keypad backlighting
- Push-button backlighting
- LCD backlighting
- Symbol backlighting
- Front panel indicator

Device Selection Guide

Part Number	Color	Package Description
HSMA-C220	AS AlInGaP Amber	Untinted, non-diffused
HSMC-C220	AS AlInGaP Red	Untinted, non-diffused
HSML-C220	AS AlInGaP Orange	Untinted, non-diffused
HSMU-C220	TS AlInGaP Amber	Untinted, non-diffused
HSMM-C220	InGaN Green	Untinted, non-diffused
HSMN-C220	InGaN Blue	Untinted, non-diffused
HSMD-C220	GaP Orange	Untinted, non-diffused
HSMG-C220	GaP Green	Untinted, non-diffused
HSMS-C220	GaP HER	Untinted, non-diffused
HSMY-C220	GaP Yellow	Untinted, non-diffused
HSMH-C220	AS AlGaAs Red	Untinted, non-diffused



Package Dimensions



NOTES:

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

Absolute Maximum Ratings at T_A = 25°C

Parameter	AlInGaP	InGaN	AlGaAs	GaP	Units
DC Forward Current	30	25	25	20	mA
Peak Pulsing Current ^[1]	100	100	100	100	mA
Power Dissipation	78	105	65	52	mW
Reverse Voltage (I _R = 100 µA)	5	5	5	5	V
LED Junction Temperature	95	95	95	95	°C
Operating Temperature Range	-40 to +85				°C
Storage Temperature Range	-40 to +100				°C

Note:

1. Pulse condition of 1/10 duty and 0.1 ms width.

Electrical Characteristics at T_A = 25°C

Color	Forward Voltage V _F (Volts) @ I _F = 20 mA		Reverse Breakdown V _R (Volts) @ I _R = 100 µA Min.	Capacitance C(pF), V _R = 0, f = 1 MHz Typ.	Thermal Resistance R _{θJ-PIN} Typ.
	Typ.	Max.			
AS Amber	1.9	2.6	5	48	485
AS Red	1.9	2.6	5	48	485
AS Orange	1.9	2.6	5	52	485
TS Amber	2.2	2.6	5	40	485
InGaN Green	3.5	4.1	5	53	380
InGaN Blue	3.5	4.1	5	55	380
GaP Orange	2.2	2.6	5	10	450
GaP Green	2.2	2.6	5	7	450
GaP HER	2.1	2.6	5	4	450
GaP Yellow	2.1	2.6	5	3	450
AlGaAs Red	1.8	2.6	5	26	350

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

Color	Luminous Intensity I_v (mcd) @ 20 mA ^[1]		Peak Wavelength λ_{peak} (nm) Typ.	Color, Dominant Wavelength λ_d ^[2] (nm) Typ.	Viewing Angle $2\theta_{1/2}$ Degrees ^[3] Typ.	Luminous Efficacy η_v (lm/w) Typ.
	Min.	Typ.				
AS Amber	63	180	595	592	85	500
AS Red	63	180	637	626	85	155
AS Orange	63	180	609	605	85	385
TS Amber	100	300	595	592	85	490
InGaN Green	63	230	523	525	65	490
InGaN Blue	25	70	468	470	65	70
GaP Orange	6.3	25	605	604	75	350
GaP Green	10	30	570	572	75	540
GaP HER	6.3	20	630	626	75	135
GaP Yellow	6.3	20	589	586	75	480
AlGaAs Red	25	80	660	639	75	75

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, λ_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.

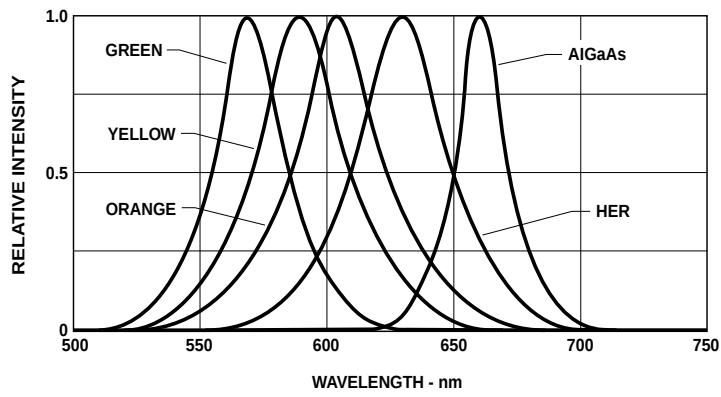


Figure 1a. Relative intensity vs. wavelength for GaP and AlGaAs.

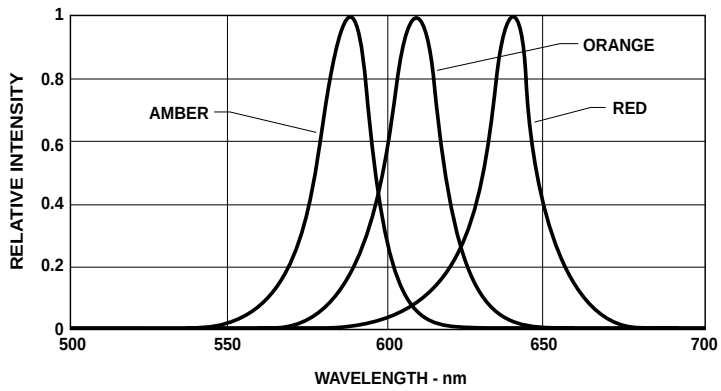


Figure 1b. Relative intensity vs. wavelength for AlInGaP.

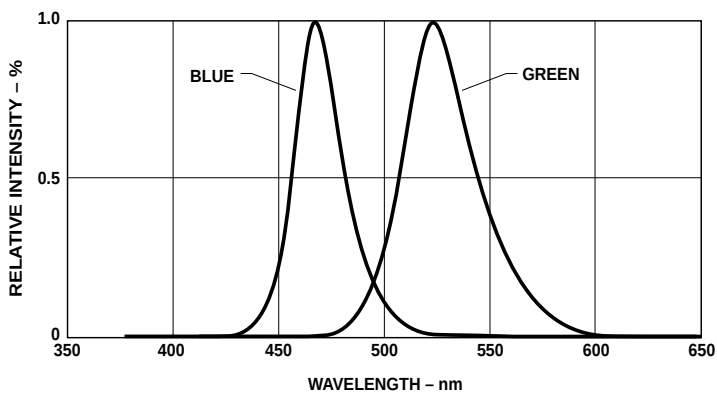


Figure 1c. Relative intensity vs. wavelength for InGaN.

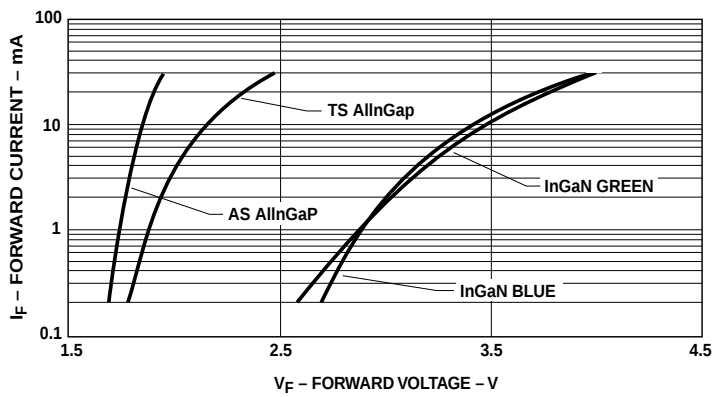
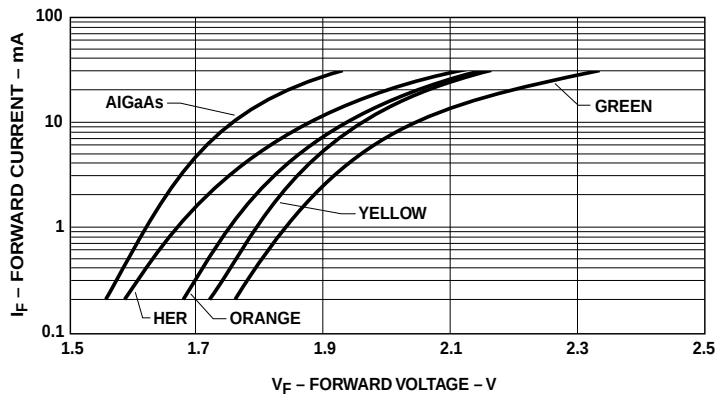


Figure 2. Forward current vs. forward voltage.

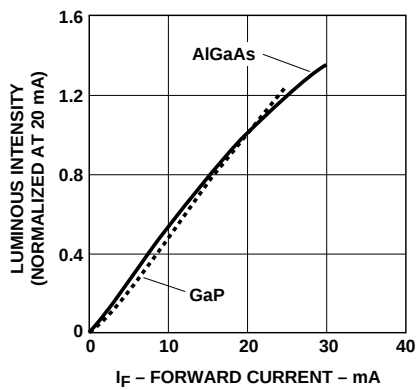


Figure 3a. Luminous intensity vs. forward current – GaP and AlGaAs.

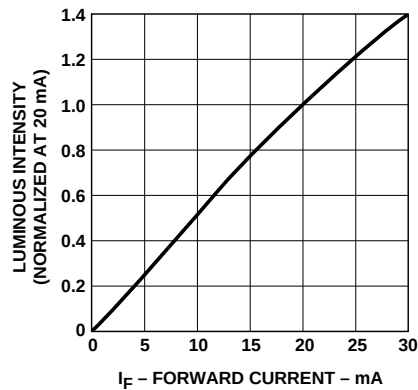


Figure 3b. Luminous intensity vs. forward current – AlInGaP.

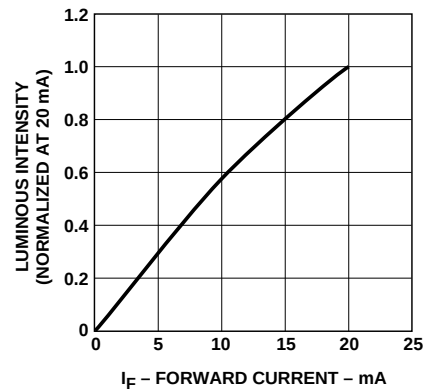


Figure 3c. Luminous intensity vs. forward current – InGaN.

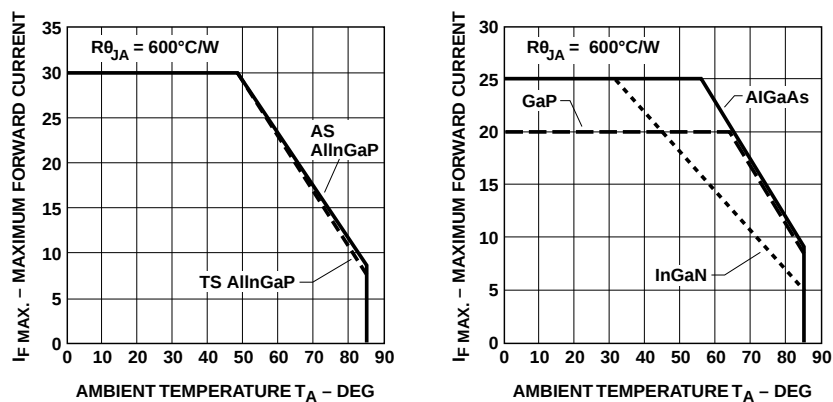


Figure 4. Maximum forward current vs. ambient temperature.

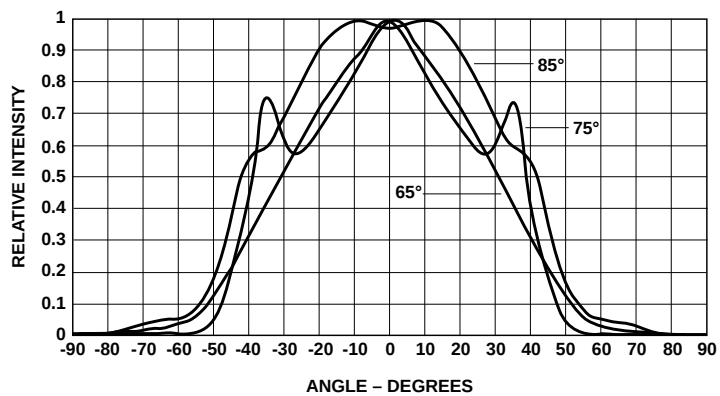


Figure 5. Radiation pattern.

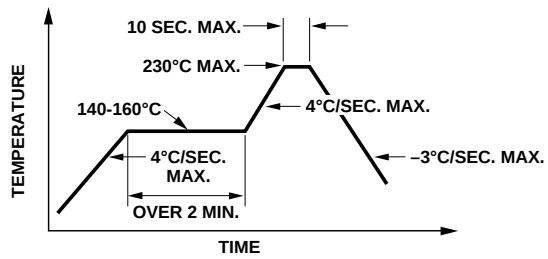


Figure 6. Recommended reflow soldering profile.

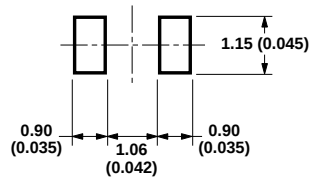


Figure 7. Recommended soldering pattern.

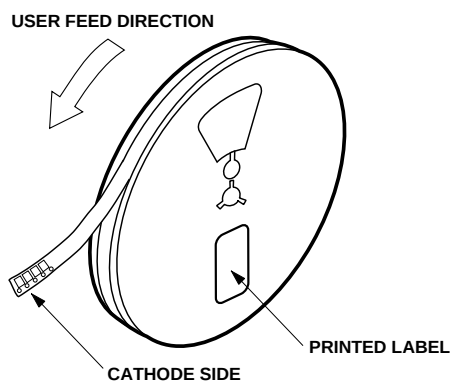


Figure 8. Reeling orientation.

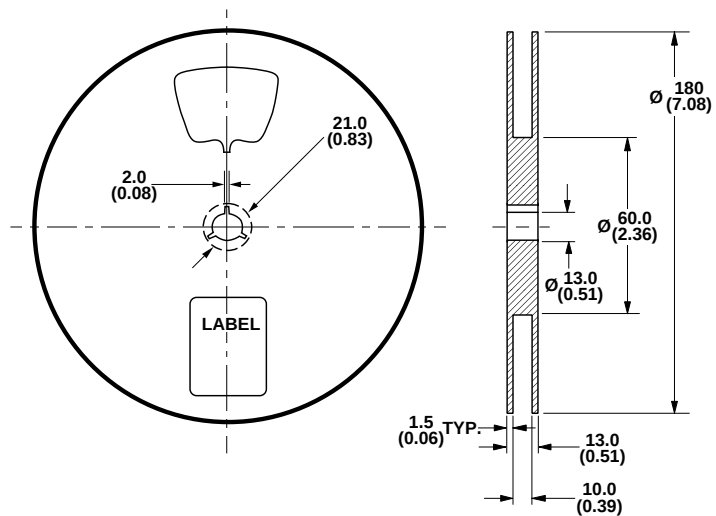


Figure 9. Reel dimensions.

Notes:

1. All dimensions in millimeters (inches).
2. Tolerance is ± 0.1 mm (± 0.004 in.) unless otherwise specified.

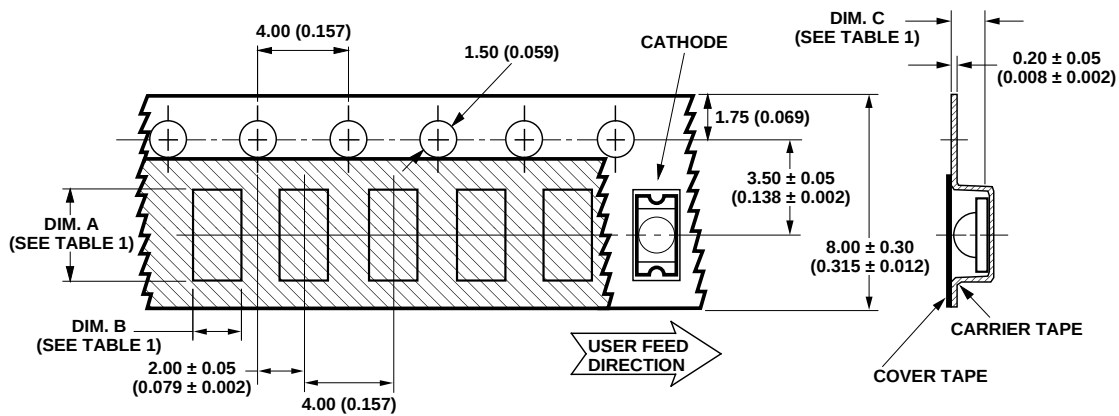


TABLE 1
DIMENSIONS IN MILLIMETERS (INCHES)

PART NUMBER	DIM. A ± 0.10 (0.004)	DIM. B ± 0.10 (0.004)	DIM. C ± 0.10 (0.004)
HSMx-C220 SERIES	2.44 (0.096)	1.68 (0.066)	1.30 (0.051)

Figure 10. Tape dimensions.

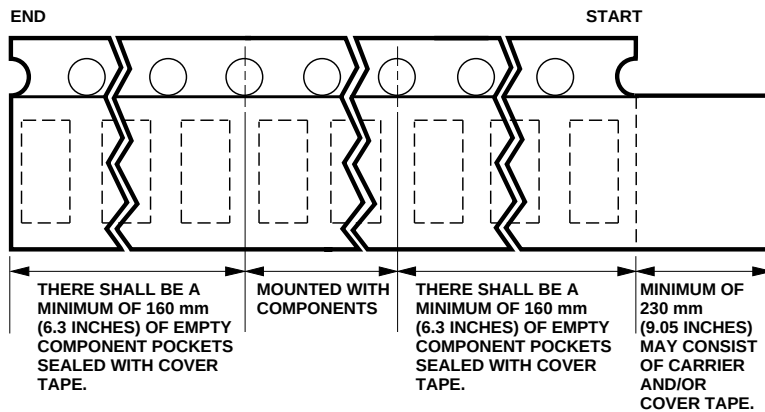


Figure 11. Tape leader and trailer dimensions.

Notes:

1. All dimensions in millimeters (inches).
2. Tolerance is ± 0.1 mm (± 0.004 in.) unless otherwise specified.

Intensity Bin Limits

Bin ID	Intensity Range (mcd)	
	Min.	Max.
A	0.10	0.20
B	0.16	0.32
C	0.25	0.50
D	0.40	0.80
E	0.63	1.25
F	1.00	2.00
G	1.60	3.20
H	2.50	5.00
J	4.00	8.00
K	6.30	12.50
L	10.00	20.00
M	16.00	32.00
N	25.00	50.00
P	40.00	80.00
Q	63.00	125.00
R	100.00	200.00
S	160.00	320.00
T	250.00	500.00
U	400.00	800.00
V	630.00	1250.00
W	1000.00	2000.00
X	1600.00	3200.00
Y	2500.00	5000.00

HSMN-C220

Bin ID	Dom. Wavelength (nm)	
	Min.	Max.
A	459.0	465.0
B	463.0	469.0
C	467.0	473.0
D	471.0	477.0
E	475.0	481.0

HSMN-C220

Bin ID	Dom. Wavelength (nm)	
	Min.	Max.
A	514.0	521.0
B	519.0	526.0
C	524.0	531.0
D	529.0	536.0
E	534.0	541.0

HSMG-C220

Bin ID	Dom. Wavelength (nm)	
	Min.	Max.
A	561.0	565.0
B	564.0	568.0
C	567.0	571.0
D	570.0	574.0
E	573.0	577.0

HSMA-C220

Bin ID	Dom. Wavelength (nm)	
	Min.	Max.
A	581.5	585.0
B	584.0	587.5
C	586.5	590.0
D	589.5	592.5
H	591.5	595.0
J	594.0	597.5

HSMD-C220

Bin ID	Dom. Wavelength (nm)	
	Min.	Max.
A	596.0	601.0
B	599.0	604.0
C	602.0	607.0
D	605.0	610.0
E	608.0	613.0
F	611.0	616.0

Convective IR Reflow Soldering

For more information on IR reflow soldering, refer to Application Note 1060, *Surface Mounting SMT LED Indicators Components* and Application Note 1217 *Pick and Place and Soldering of the Agilent HSMX-C540, HSMx-C220 Surface Mount LEDs* respectively.

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

Baking is required under the condition:

- a) the blue silica gel indicators 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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