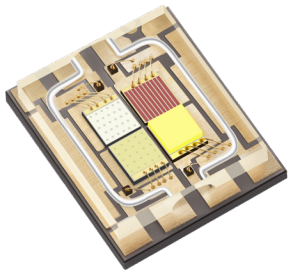
SBM-40-RGBL-HC



Features

- 4 in 1 RGBL LED for high output color mixing applications based on narrow wavelength bins:
  - Red (R): 619-625 nm
  - Green (G): 520-526 nm or 524-530 nm
  - Blue (B): 450-455 nm or 453-458 nm
  - Lime (L): Chromaticity bin centered around CIEx= 0.4165 and CIEy=0.5175
- Lime channel optimizes lumen output while maintaining high CRI (>85) over a large CCT range
- Flat protective window allows efficient light collection and optimizes throw distance
- High thermal conductivity package
- Four chips with minimized inter-chip gap for easy light collection and color mixing
- Drive current up to 3 A per color

RoHS REACH

Table of Contents

Applications

- Entertainment /Stage Lighting
- Architectural Lighting
- Spot Lighting
- Pool and Fountain Lighting
- Medical Lighting
- Fiber-coupled Illumination
- Machine Vision

Binning Structure

All SBM-40-RGBL-HC LEDs are tested at 1 A for luminous flux, radiometric flux and dominant wavelength and placed into one of the following wavelength and flux bins. The binning structure is universally applied across each color of the SBM-40-RGBL-HC product line.

Flux Bins[1,2]

Color	Binning @ 1 A, T_c= 25°C[4]	
	Minimum Flux/Power	Maximum Flux/Power
Red	110 lm	150 lm
Green	220 lm	320 lm
Blue	1100 mW	1600 mW
Lime	360 lm	500 lm

Dominant Wavelength Bins[2]

Color	Wavelength Bin[3]	Binning @ 1 A, T_c= 25°C[4]	
		Minimum Wavelength (nm)	Maximum Wavelength (nm)
Red	R1	619	625
Green	Ga	520	524
	Gb	524	526
	Gc	526	530
Blue	Ba	450	453
	Bb	453	455
	Bc	455	458

Note:

1. Luminus maintains a +/- 6% tolerance on flux measurements.

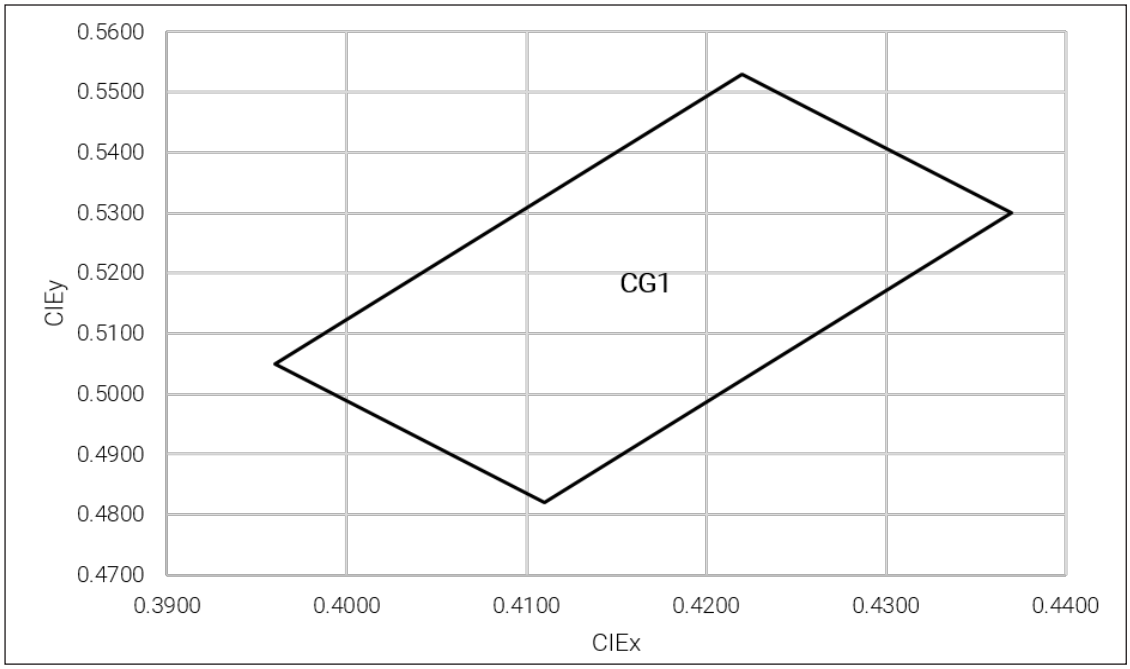
2. Products are production tested then sorted and reeled by bin.

3. Individual bins are not orderable. Please refer to the Product Ordering information page for a list of orderable bin kits.

4. T_c= Case temperature.

Binning Structure

Lime Chromaticity Binning Diagram



Chromaticity Coordinates

Color	Bin Code	CIEx	CIEy
Lime	CG1	0.3960	0.5050
		0.4110	0.4820
		0.4370	0.5300
		0.4220	0.5530

Ordering Information

Part Number Nomenclature

SBM	40	RGBL	HC41	<Bin kit>

Product Family	Chip Area	Color	Package Configuration	Bin Kit[1]
SBM: Multi-Chip Surface mount device, Non-Encapsulated	40: 4 dies R: 0.95 mm^2 G: 0.90 mm^2 B: 0.90 mm^2 L: 0.92 mm^2	R: Red G: Green B: Blue L: Lime	HC41: 5.75 x 4.68 mm - Surface mount, shipped in tape & reel	Refer to ordering part numbers in this document

Note:

1. Individual bins are not orderable. Please refer to the Product Ordering information page for a list of orderable bin kits.

Ordering Information

Ordering Part Numbers

Color	Flux Bin	Wavelength Bin		Bin Kit	Ordering Part Number
RGBL	Full distribution per bin table on page 2	Red	R1	QG100	SBM-40-RGBL-HC41-QG100
		Green	G1, G2		
		Blue	B1, B2		
		Lime	CG1		
RGBL	Full distribution per bin table on page 2	Red	R1	QG110	SBM-40-RGBL-HC41-QG110
		Green	G1		
		Blue	B1		
		Lime	CG1		
RGBL	Full distribution per bin table on page 2	Red	R1	QG120	SBM-40-RGBL-HC41-QG120
		Green	G1		
		Blue	B2		
		Lime	CG1		
RGBL	Full distribution per bin table on page 2	Red	R1	QG210	SBM-40-RGBL-HC41-QG210
		Green	G2		
		Blue	B1		
		Lime	CG1		
RGBL	Full distribution per bin table on page 2	Red	R1	QG220	SBM-40-RGBL-HC41-QG220
		Green	G2		
		Blue	B2		
		Lime	CG1		

Dominant Wavelength Binkits

Color	Wavelength Binkit	Wavelength Bin[1]	Wavelength Range (nm)
Green	G1	Ga, Gb	520-526
	G2	Gb, Gc	524-530
Blue	B1	Ba, Bb	450-455
	B2	Bb, Bc	453-458

Note:

1. Individual bins are not orderable. Please refer to the Product Ordering information page for a list of orderable bin kits.

Absolute Maximum Ratings

	Symbol	Values				Unit
		Red	Green	Blue	Lime	
Forward Current (CW or Pulsed)[1]	$I_{f\ min}$	0.1	0.1	0.1	0.1	A
	$I_{f\ max}$	3.0	3.0	3.0	3.0	
Storage Temperature	$T_{storage\ min}$	-40				°C
	$T_{storage\ max}$	100				
Junction Temperature	$T_{j\ max}$	125	150	150	150	°C

Note:

1. SBM-40-RGBL-HC LED is designed for operation to an absolute maximum current and temperature as specified here. Product lifetime data is specified at recommended forward drive currents.

Device Characteristics

Optical and Electrical Characteristics	Symbol	Value				Unit
		Red	Green	Blue	Lime	
Emitting Area	A_E	0.95	0.9	0.9	0.92	mm^2
Emitting Area Dimension		1.0 x 0.95	0.95 x 0.95	0.95 x 0.95	0.96 x 0.96	mm x mm
Test Peak Drive Current[1]	I_f	1.0	1.0	1.0	1.0	A
Forward Voltage[2]	$V_{f\ min}$	1.8	2.6	2.7	2.7	V
	V_f	2.2	3.0	3.0	3.0	
	$V_{f\ max}$	2.8	3.5	3.5	3.5	
Dominant Wavelength[2]	$\lambda_{d\ min}$	619	520	450	-	nm
	$\lambda_{d\ typ}$	622	525	454	-	
	$\lambda_{d\ max}$	625	530	458	-	
FWHM- Spectral bandwidth at 50% of Φ_V	$\Delta\lambda_{1/2}$	15	32	18	108	nm
Chromaticity Coordinates[3]	CIE x	-	-	-	0.4165	
	CIE y	-	-	-	0.5175	
Thermal Characteristics						
Thermal Resistance (junction to case)-Real[4,5]	$R_{th\ j\text{-}c\_real}$	1.2				°C/W
Thermal Resistance (junction to case)[4,5]	$R_{th\ j\text{-}c\_electrical}$	0.9				°C/W

Note:

1. Tested at 1 A drive current.

2. Unless otherwise noted, values listed are typical. All ratings are based on operation with a case temperature of nominally 25°C.

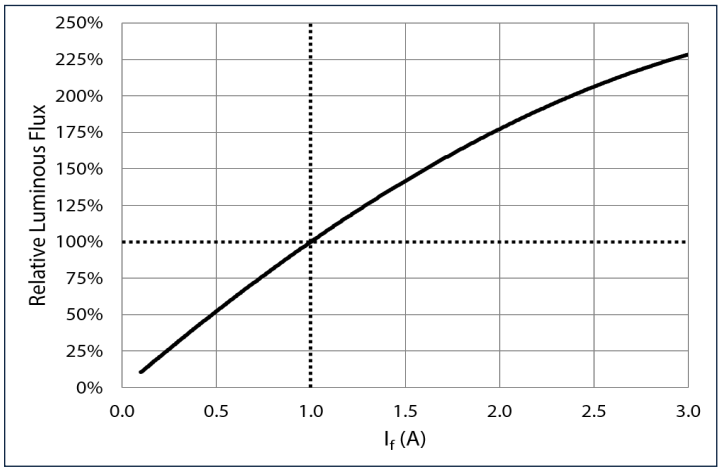
3. In CIE 1931 chromaticity diagram coordinates, normalized to X+Y+Z=1.

4. The thermal resistance values are tested while operating all chips simultaneously.

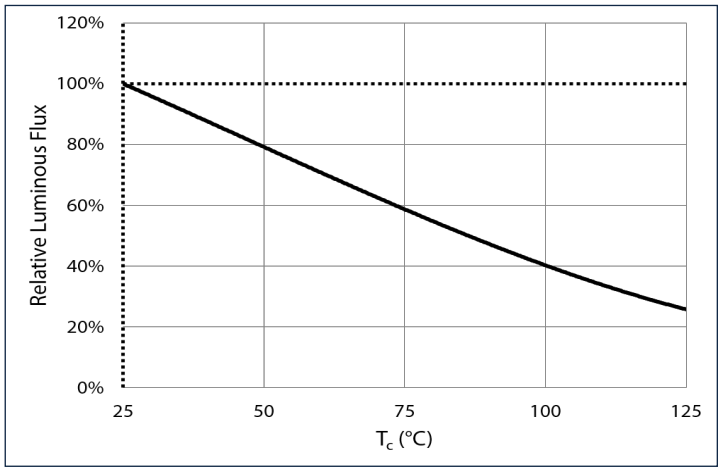
5. Measurements are in accordance with JEDEC 51-14.

Relative Luminous Flux - Red

Forward current: $\varphi_v/\varphi_v(1\ A)$, $T_c = 25°C$

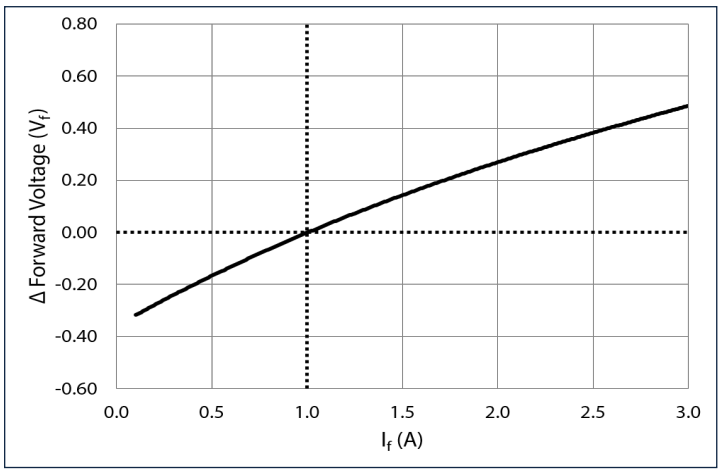


Temperature: $\varphi_v/\varphi_v(25°C)$, $I_f = 1\ A$

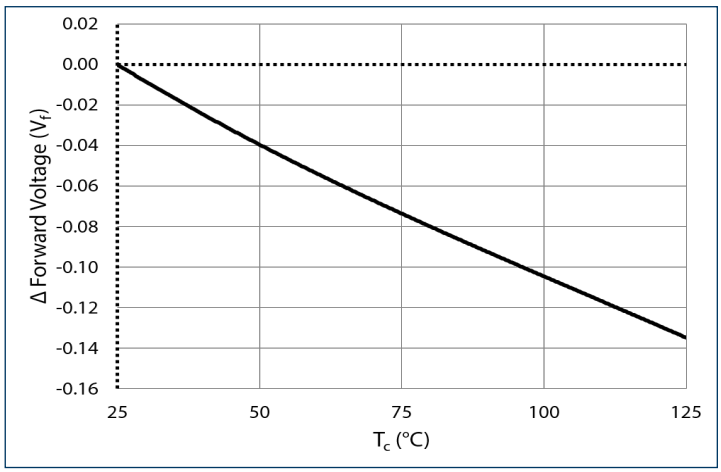


Forward Voltage - Red

Forward current: $V_f = V(I_f)$, $T_c = 25°C$

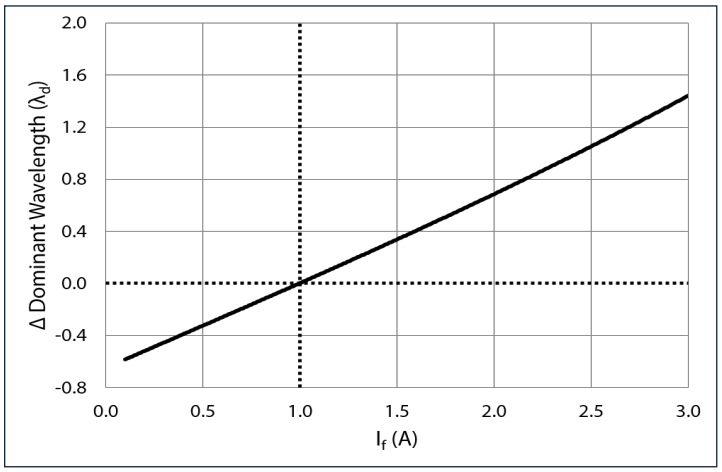


Temperature: $\Delta V_f = V(T_c) - V(25°C)$, $I_f = 1\ A$

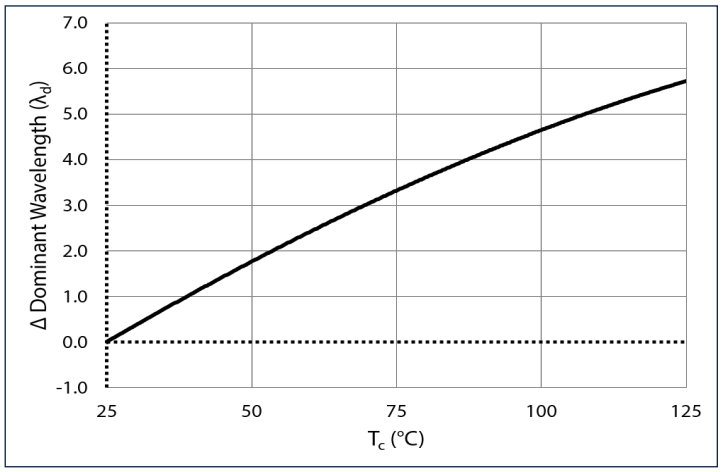


Dominant Wavelength Shift - Red

Forward current: $\Delta\lambda_d = \lambda_d(I_f) - \lambda_d(1\ A)$, $T_c = 25°C$

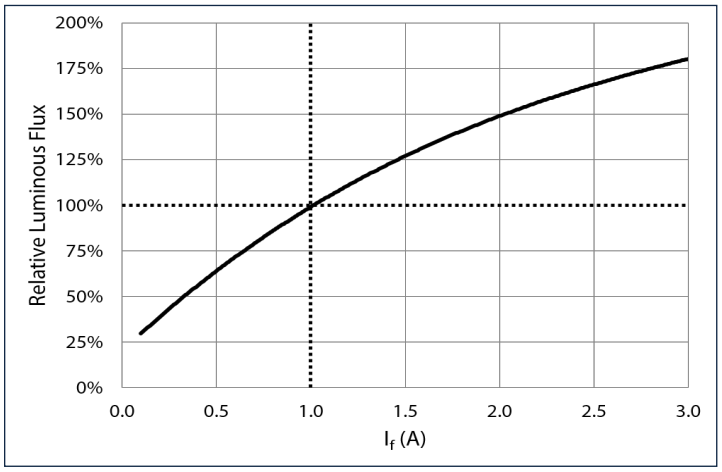


Temperature: $\Delta\lambda_d = \lambda_d(T_c) - \lambda_d(25°C)$, $I_f = 1\ A$

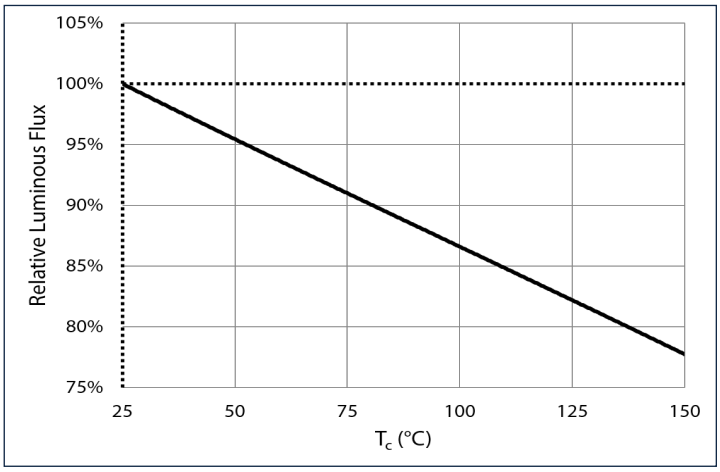


Relative Luminous Flux - Green

Forward current: $\varphi_v/\varphi_v(1\ A)$, $T_c = 25°C$

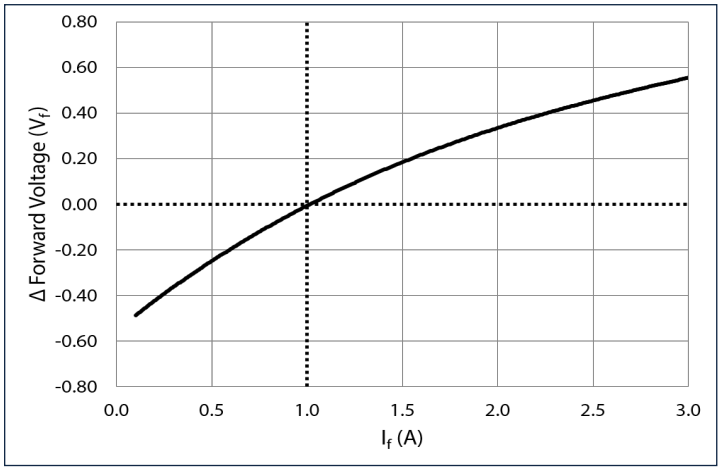


Temperature: $\varphi_v/\varphi_v(25°C)$, $I_f = 1\ A$

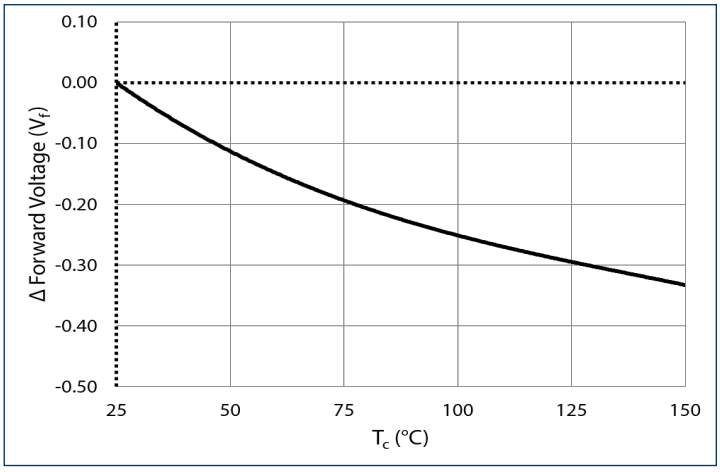


Forward Voltage - Green

Forward current: $V_f = V(I_f)$, $T_c = 25°C$

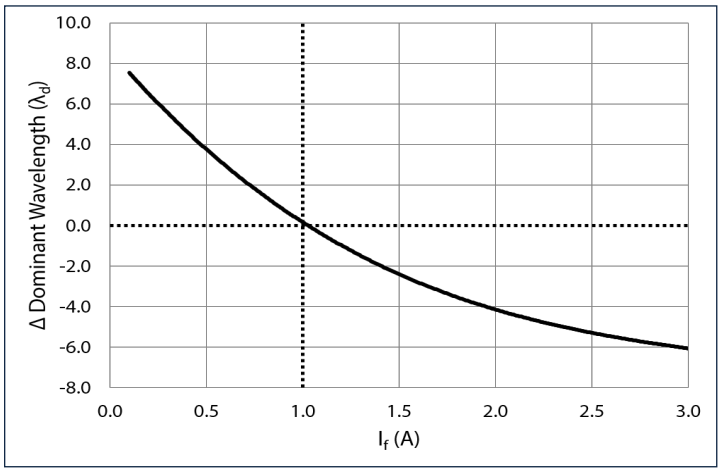


Temperature: $\Delta V_f = V(T_c) - V(25°C)$, $I_f = 1\ A$

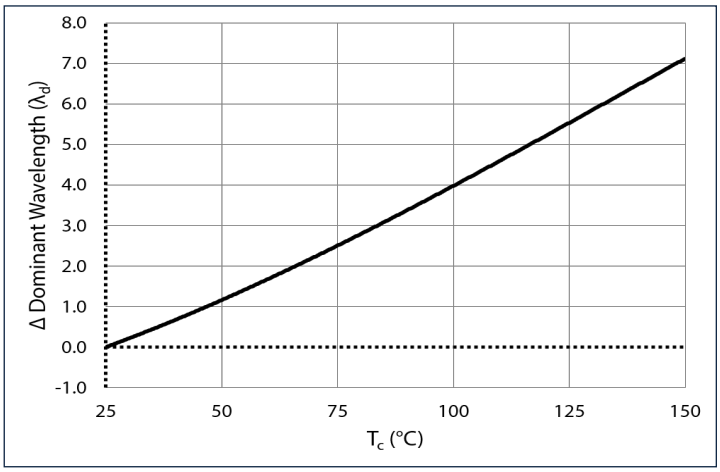


Dominant Wavelength Shift - Green

Forward current: $\Delta\lambda_d = \lambda_d(I_f) - \lambda_d(1\ A)$, $T_c = 25°C$

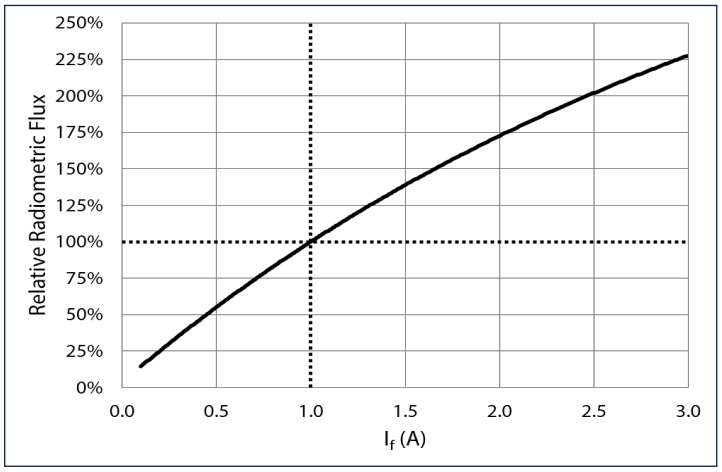


Temperature: $\Delta\lambda_d = \lambda_d(T_c) - \lambda_d(25°C)$, $I_f = 1\ A$

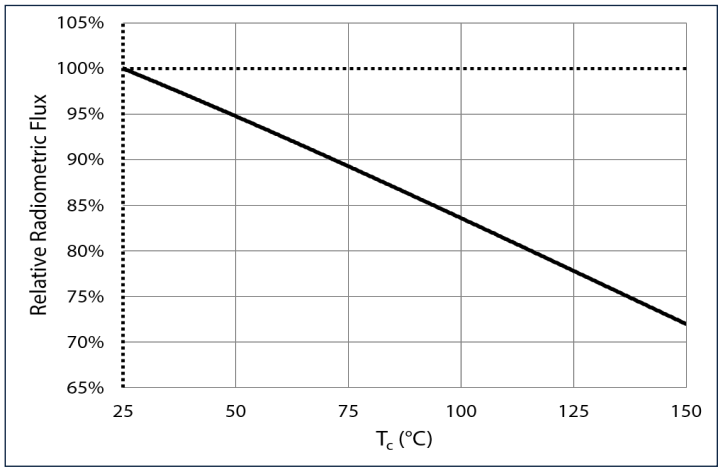


Relative Radiometric Flux - Blue

Forward current: $\varphi_v/\varphi_v(1\ A)$, $T_c = 25°C$

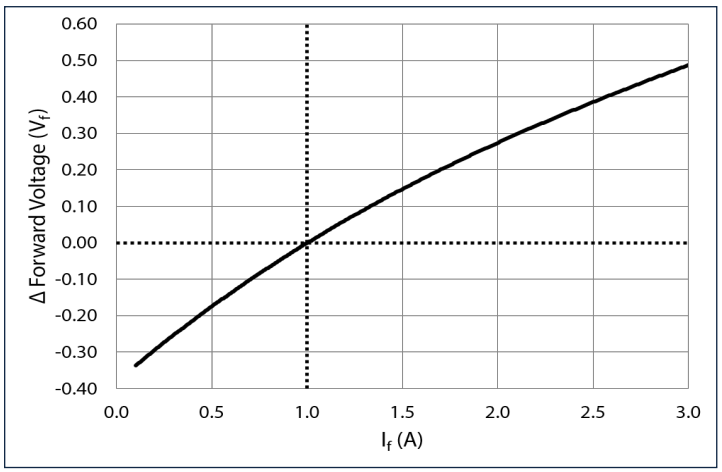


Temperature: $\varphi_v/\varphi_v(25°C)$, $I_f = 1\ A$

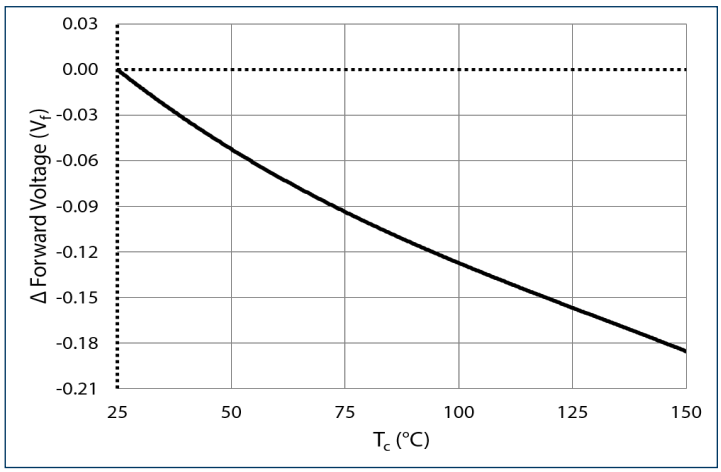


Forward Voltage - Blue

Forward current: $V_f = V(I_f)$, $T_c = 25°C$

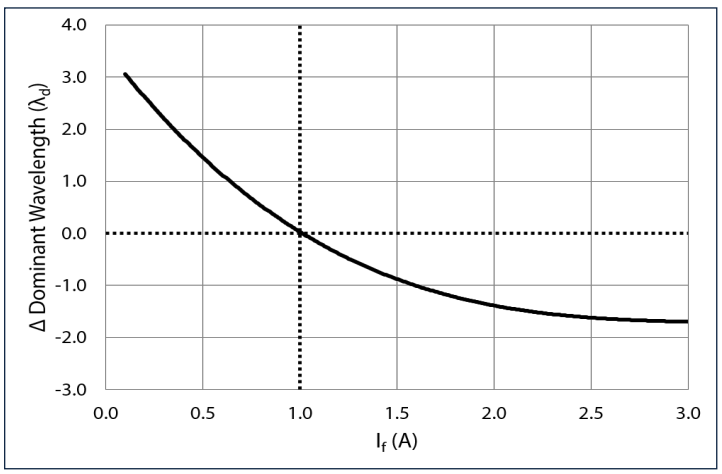


Temperature: $\Delta V_f = V(T_c) - V(25°C)$, $I_f = 1\ A$

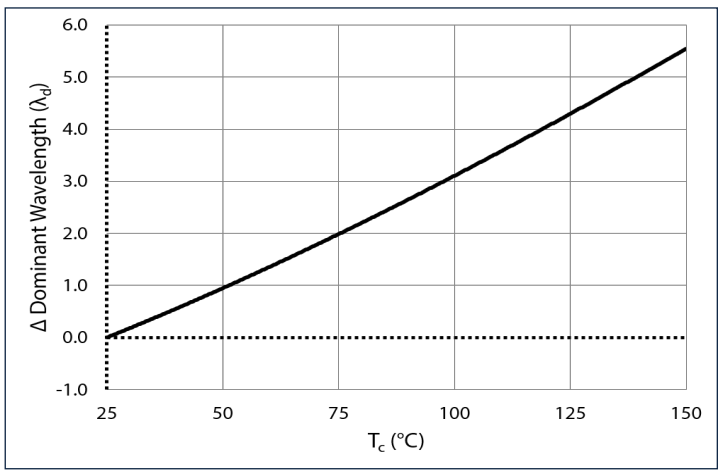


Dominant Wavelength Shift - Blue

Forward current: $\Delta\lambda_d = \lambda_d(I_f) - \lambda_d(1\ A)$, $T_c = 25°C$

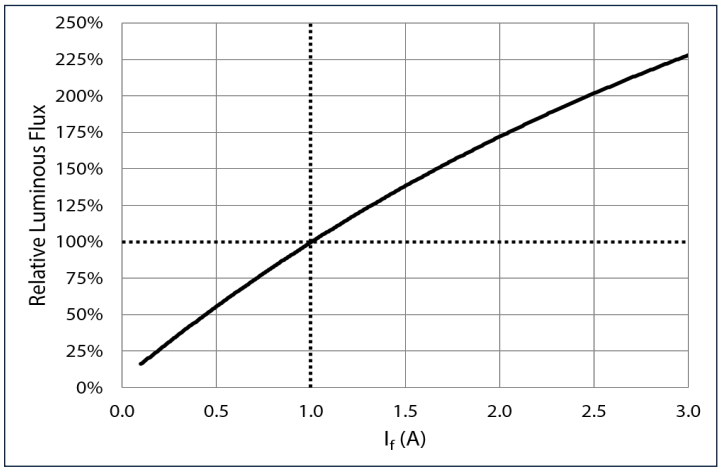


Temperature: $\Delta\lambda_d = \lambda_d(T_c) - \lambda_d(25°C)$, $I_f = 1\ A$

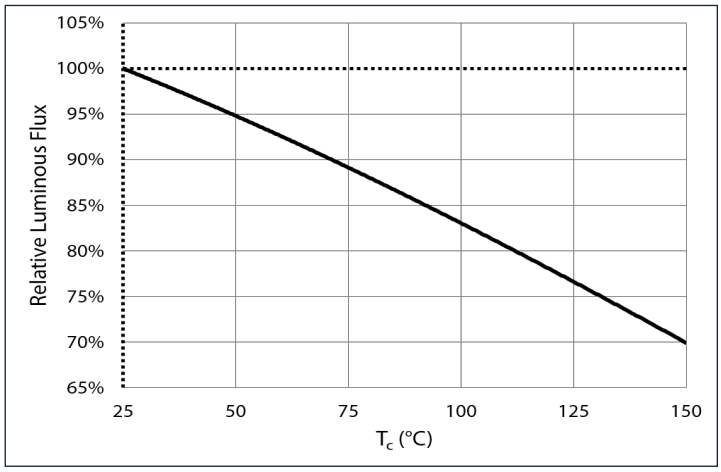


Relative Luminous Flux - Lime

Forward current: $\varphi_v/\varphi_v(1\ A)$, $T_c = 25°C$

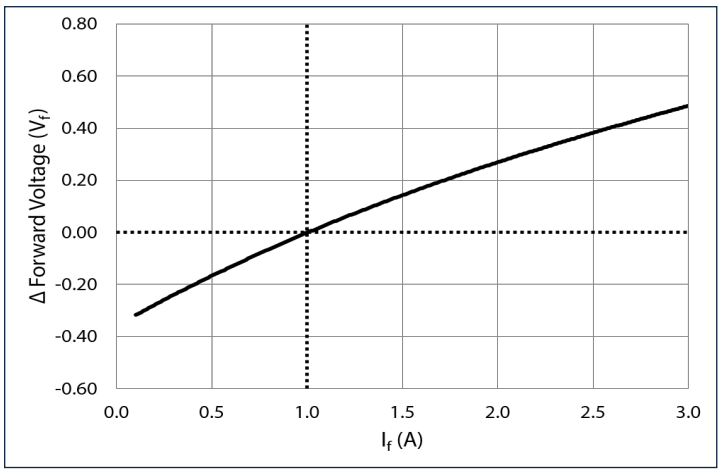


Temperature: $\varphi_v/\varphi_v(25°C)$, $I_f = 1\ A$

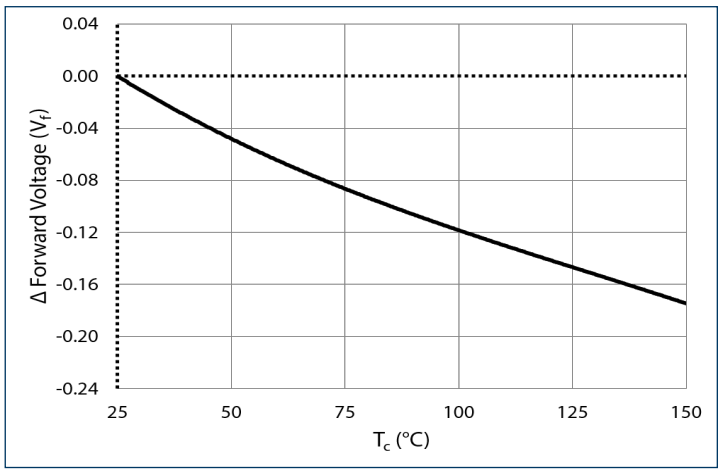


Forward Voltage - Lime

Forward current: $V_f = V(I_f)$, $T_c = 25°C$

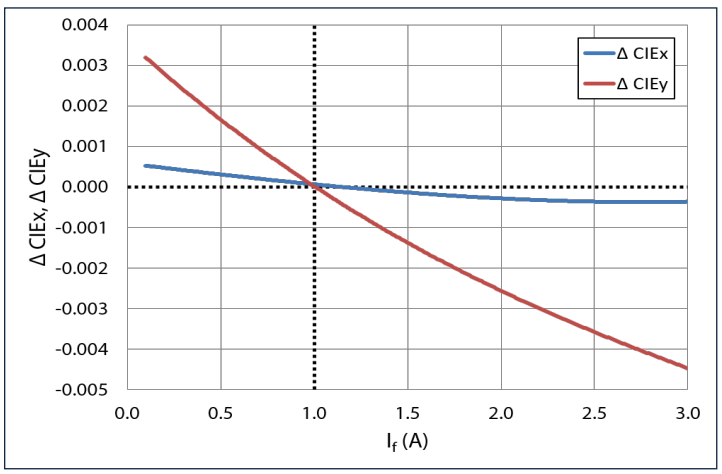


Temperature: $\Delta V_f = V(T_c) - V(25°C)$, $I_f = 1\ A$

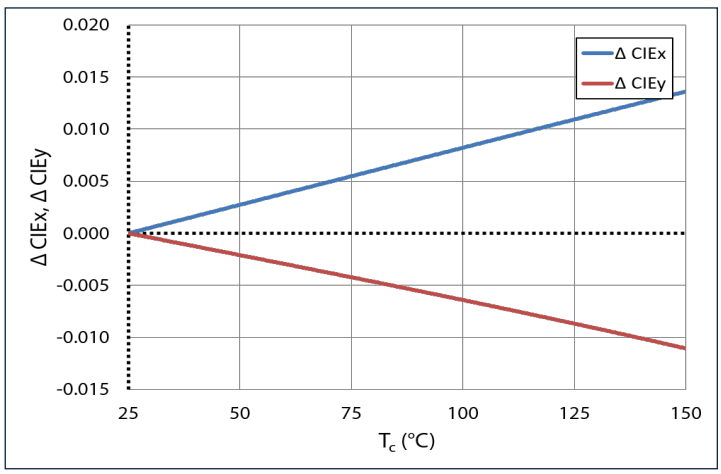


Relative Chromaticity

Forward current: $\Delta CIEx,y = CIEx,y(I_f) - CIEx,y(1\ A)$, $T_c = 25°C$



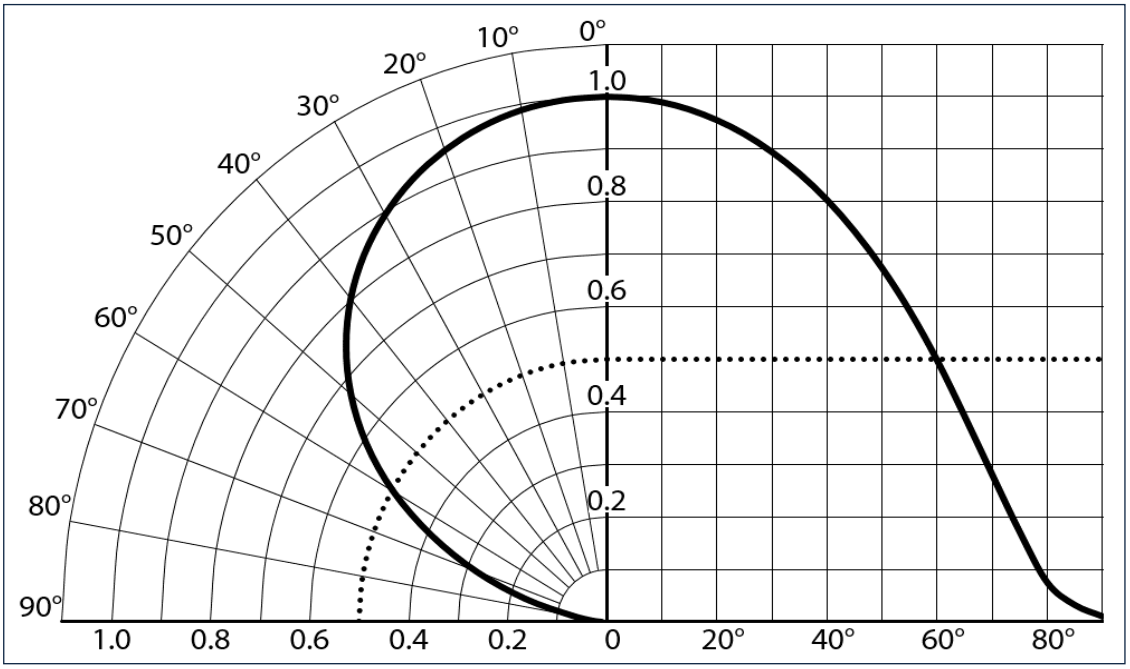
Temperature: $\Delta CIEx,y = CIEx,y(T_c) - CIEx,y(25°C)$, $I_f = 1\ A$



Angular Distribution

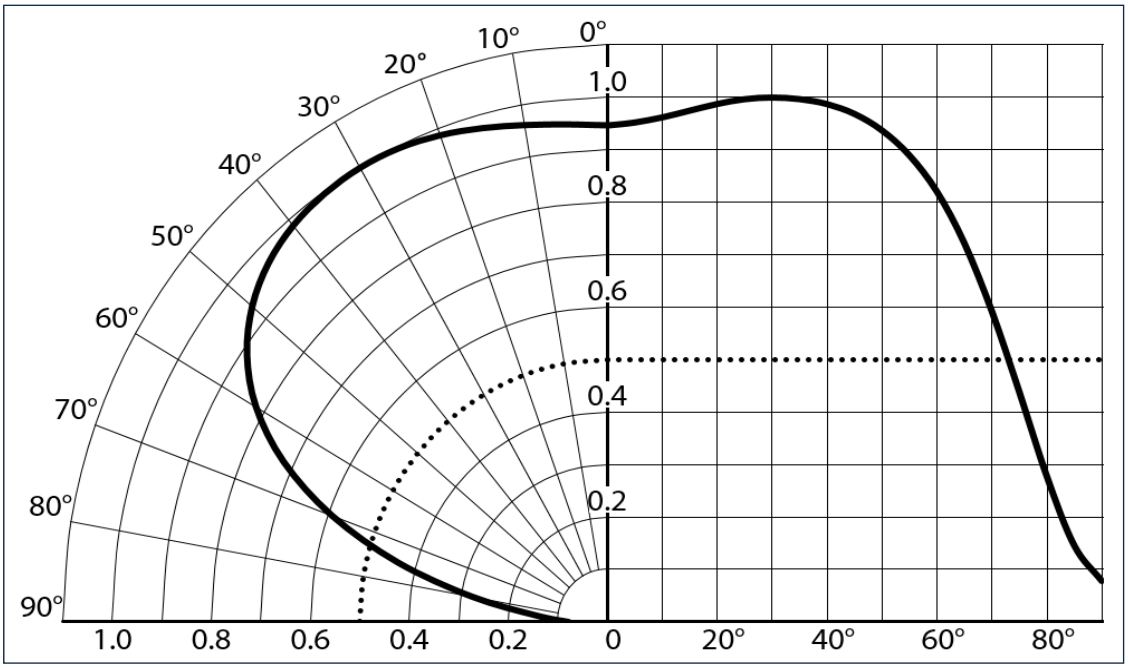
Angular Distribution - RGB

$I_{ref} = f(\Phi)$; $T_c = 25°C$



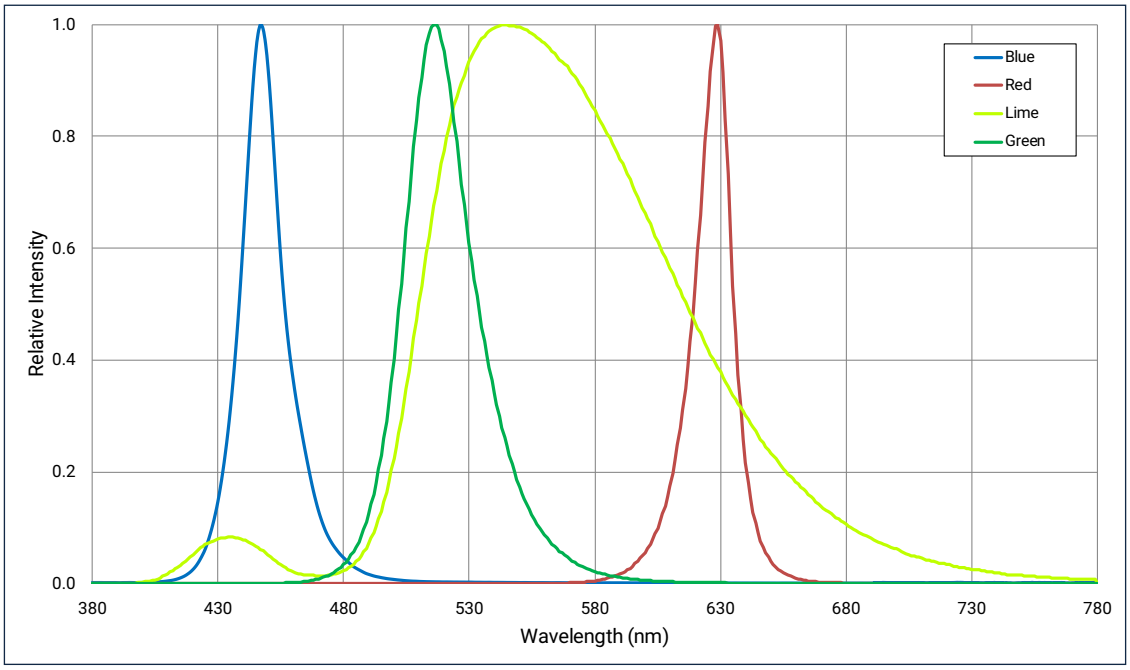
Angular Distribution - L

$I_{ref} = f(\Phi)$; $T_c = 25°C$

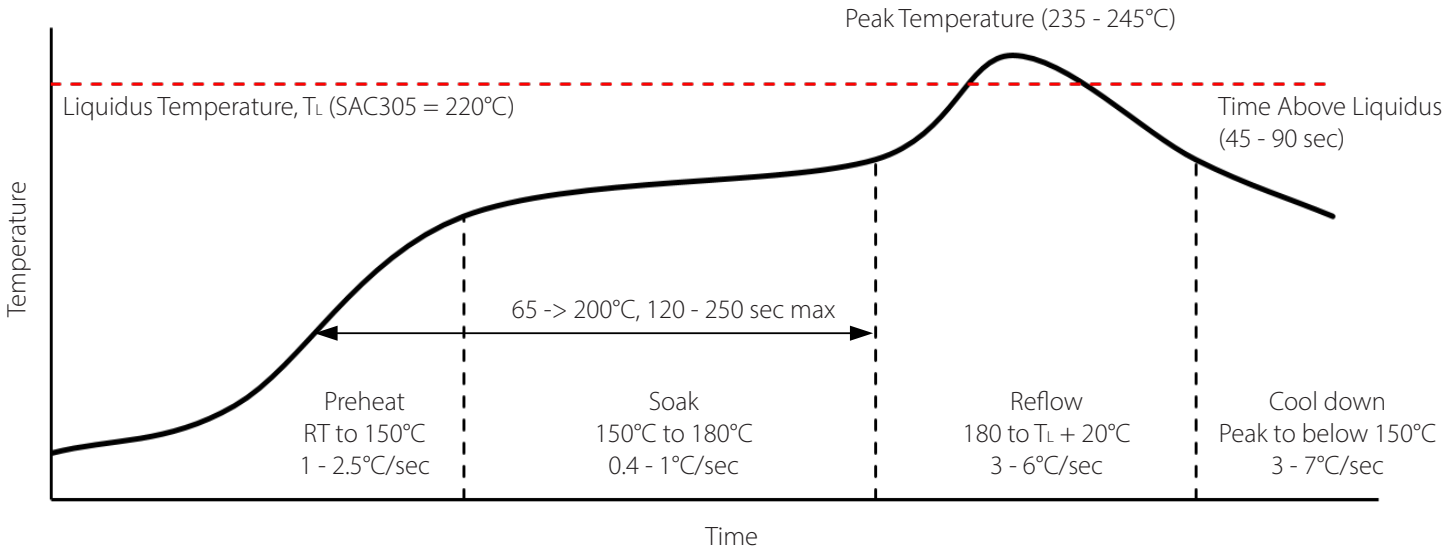


Typical Spectrum

$\Phi_{ref} = f(\lambda)$; $I_f = 1$ A; $T_c = 25°C$



Soldering Profile



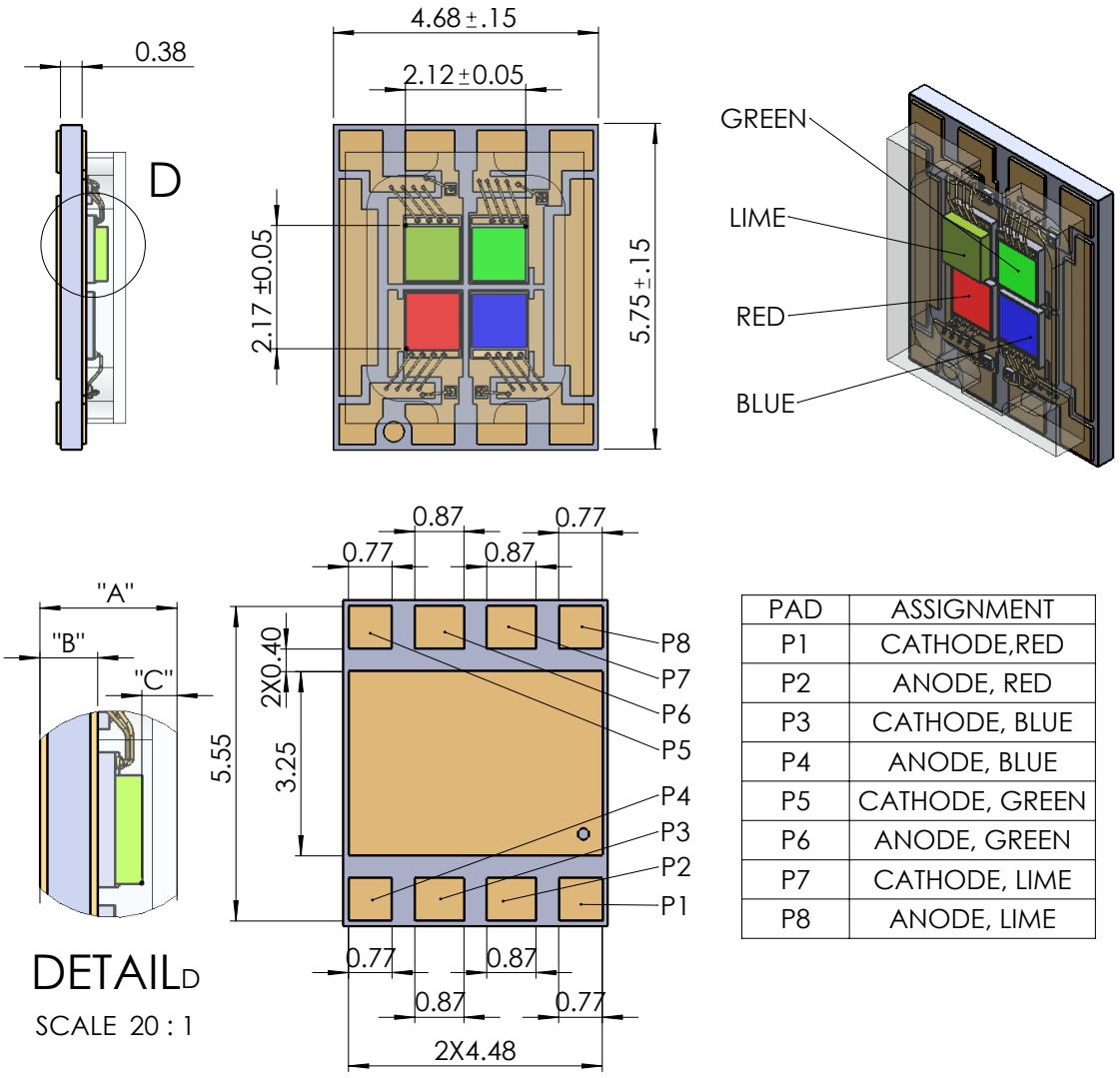
SMT Rework Guideline	Manual Hotplate Reflow	Hot Air Gun Reflow
Heating Time	< 60 sec	
Hotplate Temperature	< 245°C	< 150°C

Note:

1. Product complies to Moisture Sensitivity Level 1 (MSL 1).
2. The numbers in the table are specific to SAC305. Luminus recommends using an SAC305 solder paste with a no-clean flux for RoHS compliant products.
3. During the pick and place process, axial forces on the dome (or window) should not exceed 0.5 Newtons (N).
4. Use of a multi-zone IR reflow oven with a nitrogen blanket is recommended.
5. Time-temperature profile of the reflow process showing the four functional profile zones are defined in IPC-7801. Temperature is referenced to the center of the PCB.
6. Luminus recommends to use the solder paste data sheet information as a starting point in time-temperature process development.
7. These are general guidelines. Consult the solder paste manufacturer's datasheet for guidelines specific to the alloy and flux combination used in your application. For more information, please refer to:

   https://luminusdevices.zendesk.com/hc/en-us/articles/360060306692-How-do-I-Reflow-Solder-Luminus-SMD-Components-
8. For any technical questions about soldering process, please contact Luminus at techsupport@luminus.com.

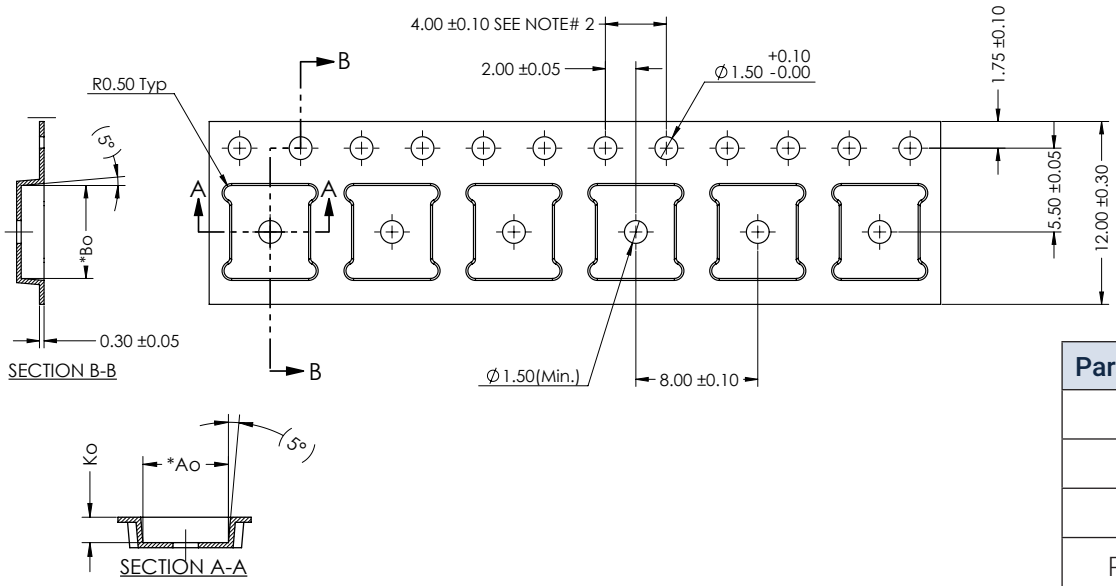
Mechanical Dimensions



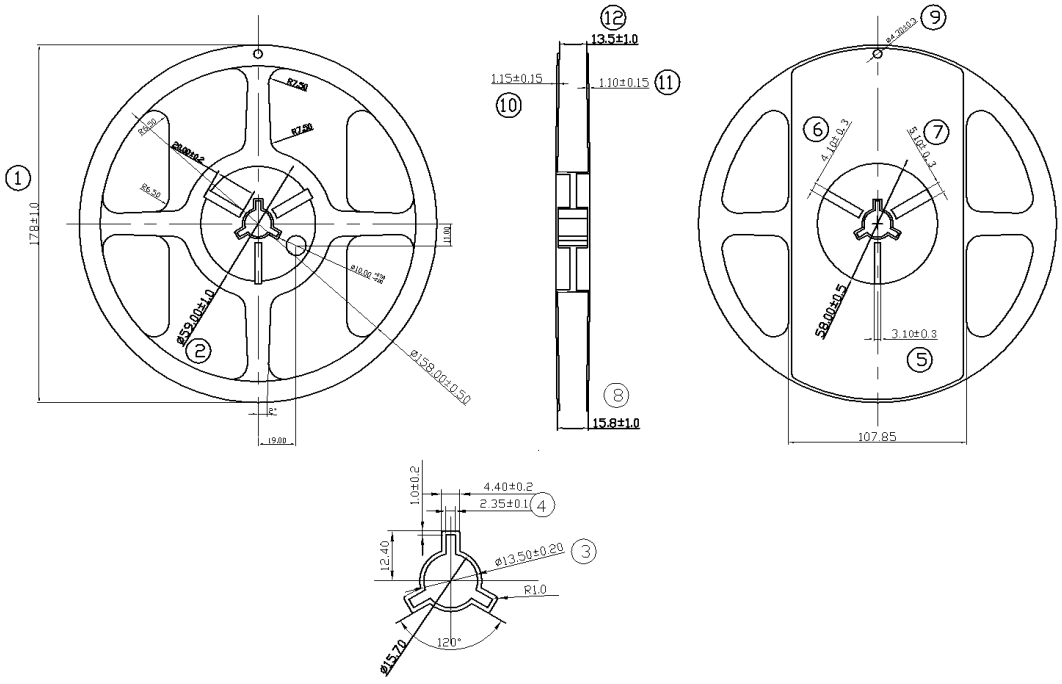
PAD	ASSIGNMENT
P1	CATHODE,RED
P2	ANODE, RED
P3	CATHODE, BLUE
P4	ANODE, BLUE
P5	CATHODE, GREEN
P6	ANODE, GREEN
P7	CATHODE, LIME
P8	ANODE, LIME

DIMENSION NAME	DESCRIPTION	NOMINAL DIMENSION	TOLERANCE
"A"	BOTTOM OF SUBSTRATE TO TOP OF WINDOW	1.21	±.09
"B"	BOTTOM OF SUBSTRATE TO TOP OF COPPER TRACE	0.51	±.05
"C"	TOP OF DIE EMITTING AREA TO TOP OF WINDOW	0.31	±.07

Tape and Reel Outline



Parameter	Dimension (mm)
A0	5.05±0.1
B0	6.10±0.1
K0	1.50±0.1
Pitch	8.00±0.1
Width	12.0±0.30

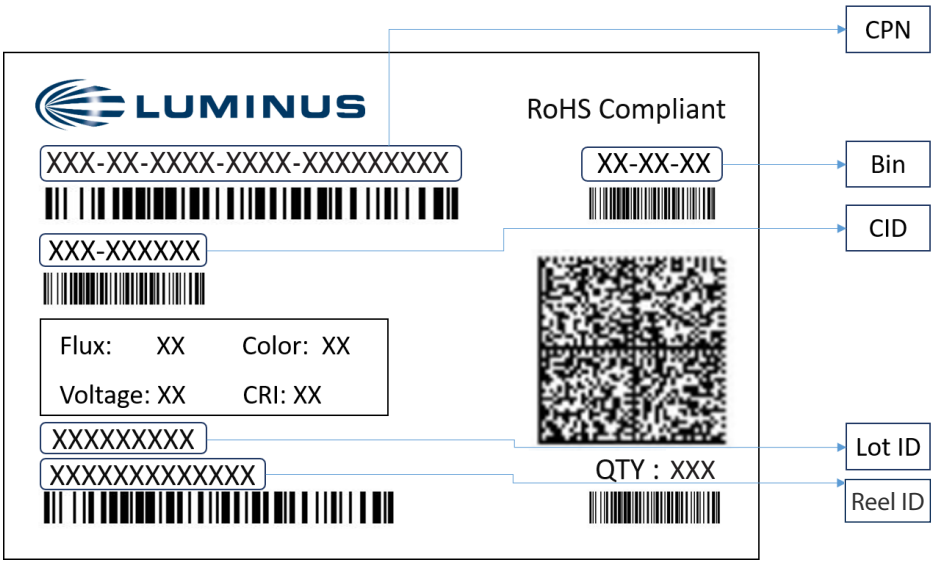


Parameter	Dimension (mm)
1	178.0±1.0
2	59.0±1.0
3	13.5±0.2
4	2.35±0.1
5	3.10±0.3
6	4.10±0.3
7	5.10±0.3
8	15.8±1.0
9	4.30±0.3
10	1.15±0.15
11	1.10±0.15
12	13.5±1.0

Note:

1. 10 pitched cumulative tolerance 0.2 mm.

Shipping Label



Label Fields:

- CPN: Luminus ordering part number
- CID: Customer part number
- QTY: Quantity of pcs in pack
- Flux: Bin as defined on page 2
- Voltage: NA
- Color: Bin as defined on pages 3
- CRI: NA

Packing Configuration:

- 500 pcs per reel
- Partial reel may be shipped
- Each pack is enclosed in anti-static bag
- Shipping label is placed on top of each pack

Notes

Static Electricity

This product is sensitive to static electricity, and care should be taken when handling them. Static electricity or surge voltage will damage the LEDs. It is recommended to wear an anti-electrostatic wristband or anti-electrostatic gloves when handling the LEDs. All devices, equipment and machinery must be properly grounded. It is recommended that measures be taken to isolate LED processing equipment from potential sources of voltage surges.

Reference: APN-002815 Electrical Stress Damage to LEDs and How to Prevent It

Revision History

Rev	Date	Description of Change
01	04/16/2024	Initial release