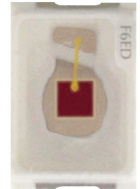


SpicePlus

Like spice, its diminutive size is a stark contrast to its standout performance in terms of brightness, durability and reliability. Despite being the smallest in size yet the SpicePlus packs a powerful performance and is a highly reliable design device.



Features:

- > Super high brightness surface mount LED automotive exterior applications.
- > 120° viewing angle.
- > Compact package outline (LxW) of 2.5 x 2.0mm.
- > Ultra low height profile - 0.7mm.
- > Low thermal resistance.
- > Superior corrosion robustness.
- > Compatible to IR reflow soldering.
- > Compliance to automotive standard; AEC-Q102.
- > Environmental friendly; RoHS compliance.



Applications:

- > Automotive: Exterior application: eg: Turn Signal, Rear Combination Light (RCL), Center High Mounted Stop Light (CHMSL).

Optical Characteristics at Tj=25°C

Part Number	Color	Viewing Angle°	Luminous Flux @ 50mA (lm) <i>Appx. 1.2</i>		
			Min.	Typ.	Max.
SVS-ASS-G3J2-3	Super Red, 635 nm	120	4.20	5.50	7.15
SVS-ASS-H3K2-2	Super Red, 630 nm	120	5.50	7.15	9.35
SVA-ASS-KL3-4	Amber, 625 nm	120	8.20	10.70	13.90
SVA-ASS-K3M2-2	Amber, 617 nm	120	9.35	12.20	15.80
SVY-ASS-K3M2-4	Yellow, 592 nm	120	9.35	12.20	15.80
SVY-ASS-KL3-3	Yellow, 589 nm	120	8.20	10.70	13.90
SVY-ASS-J3L2-2	Yellow, 586 nm	120	7.15	9.35	12.20

Electrical Characteristics at Tj=25°C

Part Number	Vf @ If = 50mA <i>Appx. 3.1</i>			Vr @ Ir = 10uA <i>Appx. 7.1</i>
	Min. (V)	Typ. (V)	Max. (V)	Min. (V)
SVx-ASS (except Yellow)	1.90	2.20	2.65	12
SVY-ASS	1.90	2.35	2.65	12

Absolute Maximum Ratings

	Maximum Value	Unit
DC forward current	70	mA
Peak pulse current; (Ts = 55°C, tp ≤ 100µs, Duty cycle = 0.03)	400	mA
Reverse voltage <i>Appx. 7.1</i>	12	V
ESD threshold (HBM)	2	KV
LED junction temperature	135	°C
Operating temperature	-40 ... +115	°C
Storage temperature	-40 ... +125	°C
Thermal resistance (Rated current = 50mA, Ts = 25 °C)		
- Real Thermal Resistance Junction / solder point, R _{th JS real}		
Super Red & Amber (typ = 25)	45	K/W
Yellow (typ = 27)	50	K/W
- Electrical Thermal Resistance Junction / solder point, R _{th JS el}		
Super Red & Amber (typ = 17)	30	K/W
Yellow (typ = 23)	40	K/W

Wavelength Grouping at Tj= 25°C

Color	Group	Wavelength distribution (nm) <i>Appx. 2.2</i>
SVx; Super Red	Full	627 - 637
	W	627 - 630
	X	630 - 633
	Y	633 - 637
SVx; Amber	Full	612 - 627
	W	612 - 616
	X	616 - 620
	Y	620 - 624
	Z	624 - 627
SVx; Yellow	Full	583 - 595
	W	583 - 586
	X	586 - 589
	Y	589 - 592
	Z	592 - 595

Luminous Flux Group at Tj=25°C

Brightness Group	Luminous Flux <i>Appx. 1.2</i> (lm)
G3	4.20 ... 4.90
H2	4.90 ... 5.50
H3	5.50 ... 6.30
J2	6.30 ... 7.15
J3	7.15 ... 8.20
K2	8.20 ... 9.35
K3	9.35 ... 10.70
L2	10.70 ... 12.20
L3	12.20 ... 13.90
M2	13.90 ... 15.80

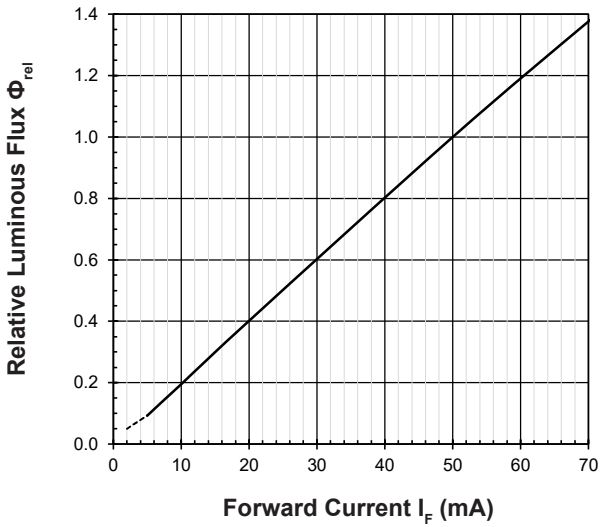
Vf Bining (Optional)

Vf Bin @ 50 mA	Forward Voltage (V) <i>Appx. 4.1</i>
V43	1.90 ... 2.05
V44	2.05 ... 2.20
V45	2.20 ... 2.35
V46	2.35 ... 2.50
V47	2.50 ... 2.65

Please consult sales and marketing for special part number to incorporate Vf binning.

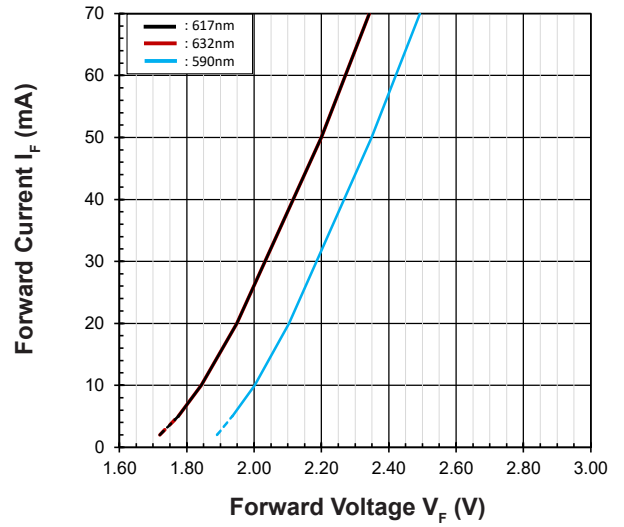
Relative Luminous Flux Vs Forward Current

$\Phi_v/\Phi_v(50\text{mA}) = f(I_F); T_j = 25^\circ\text{C}$



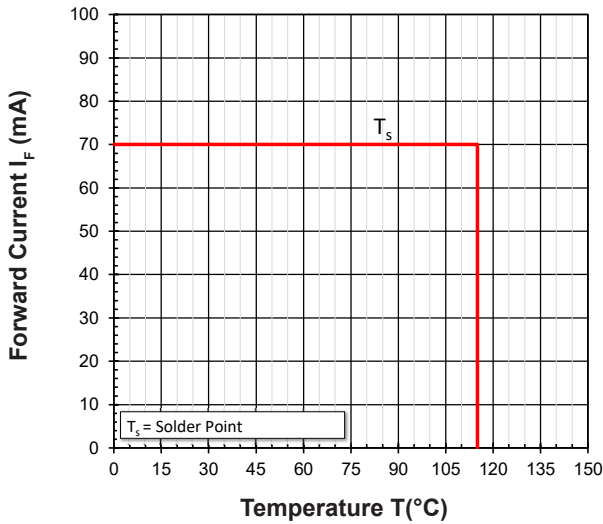
Forward Current Vs Forward Voltage

$I_F = f(V_F); T_j = 25^\circ\text{C}$



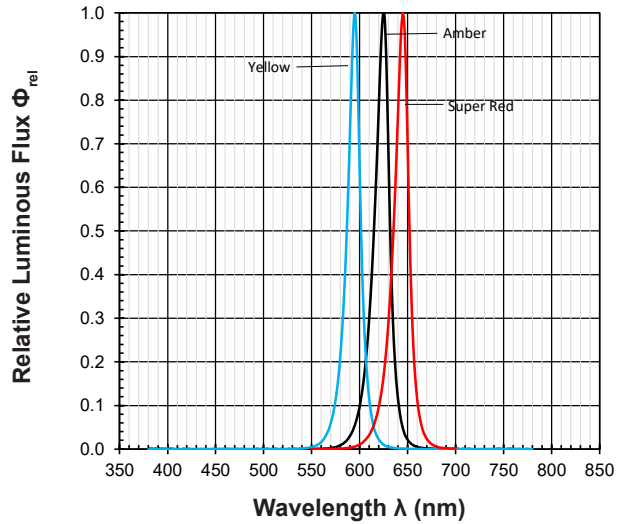
Maximum Current Vs Temperature

$I_F = f(T)$



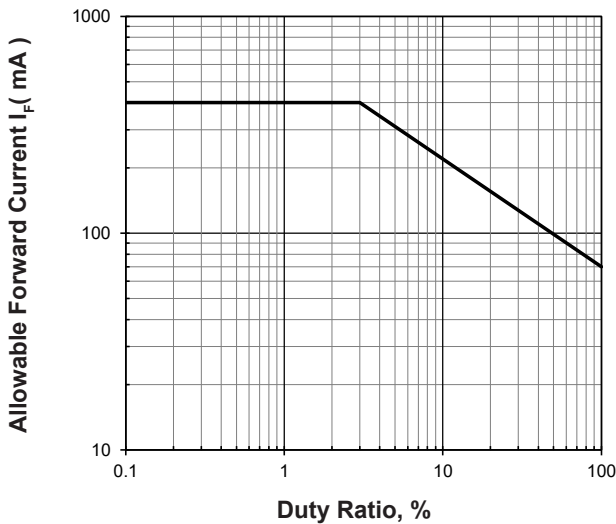
Relative Spectral Emission

$\Phi_{rel} = f(\lambda); T_j = 25^\circ\text{C}; I_F = 50\text{mA}$

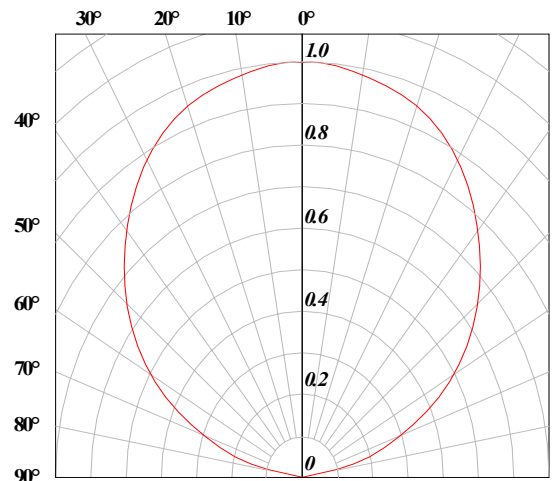


Allowable Forward Current Vs Duty Ratio

$(T_s = 55^\circ\text{C}; t_p \leq 100\mu\text{s})$

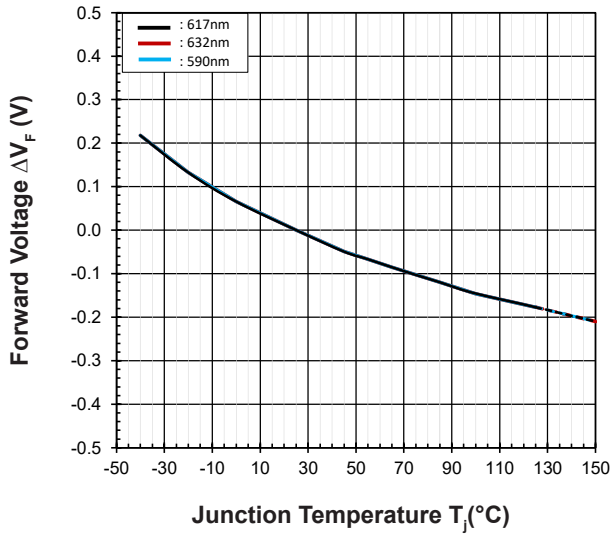


Radiation Pattern



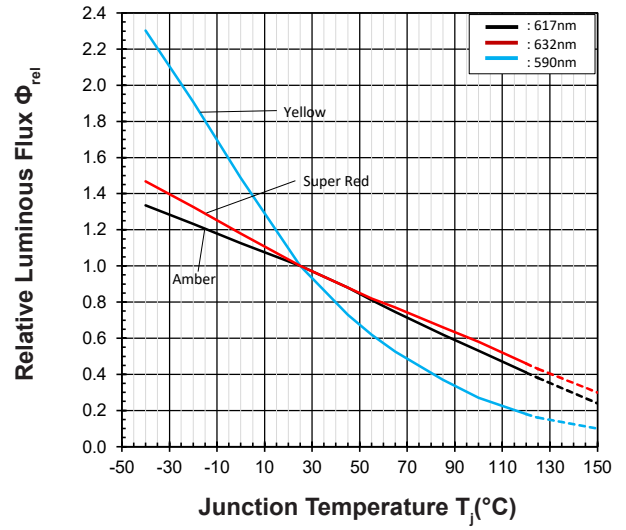
Forward Voltage Vs Junction Temperature

$$\Delta V_F = V_F - V_F(25^\circ\text{C}) = f(T_j); I_F = 50\text{mA}$$



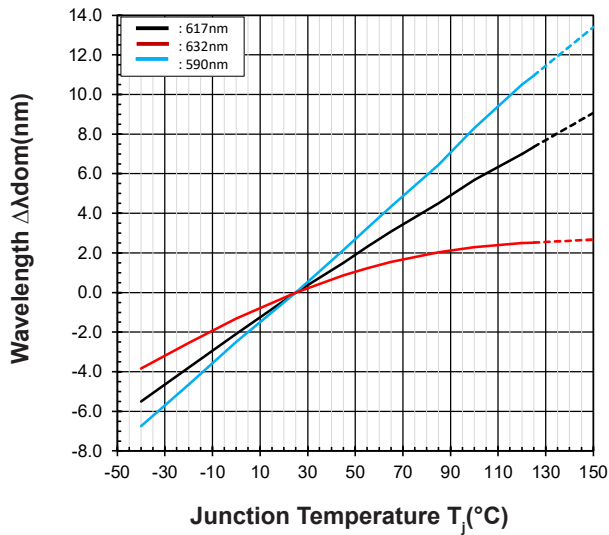
Relative Luminous Flux Vs Junction Temperature

$$\Phi_V/\Phi_V(25^\circ\text{C}) = f(T_j); I_F = 50\text{mA}$$

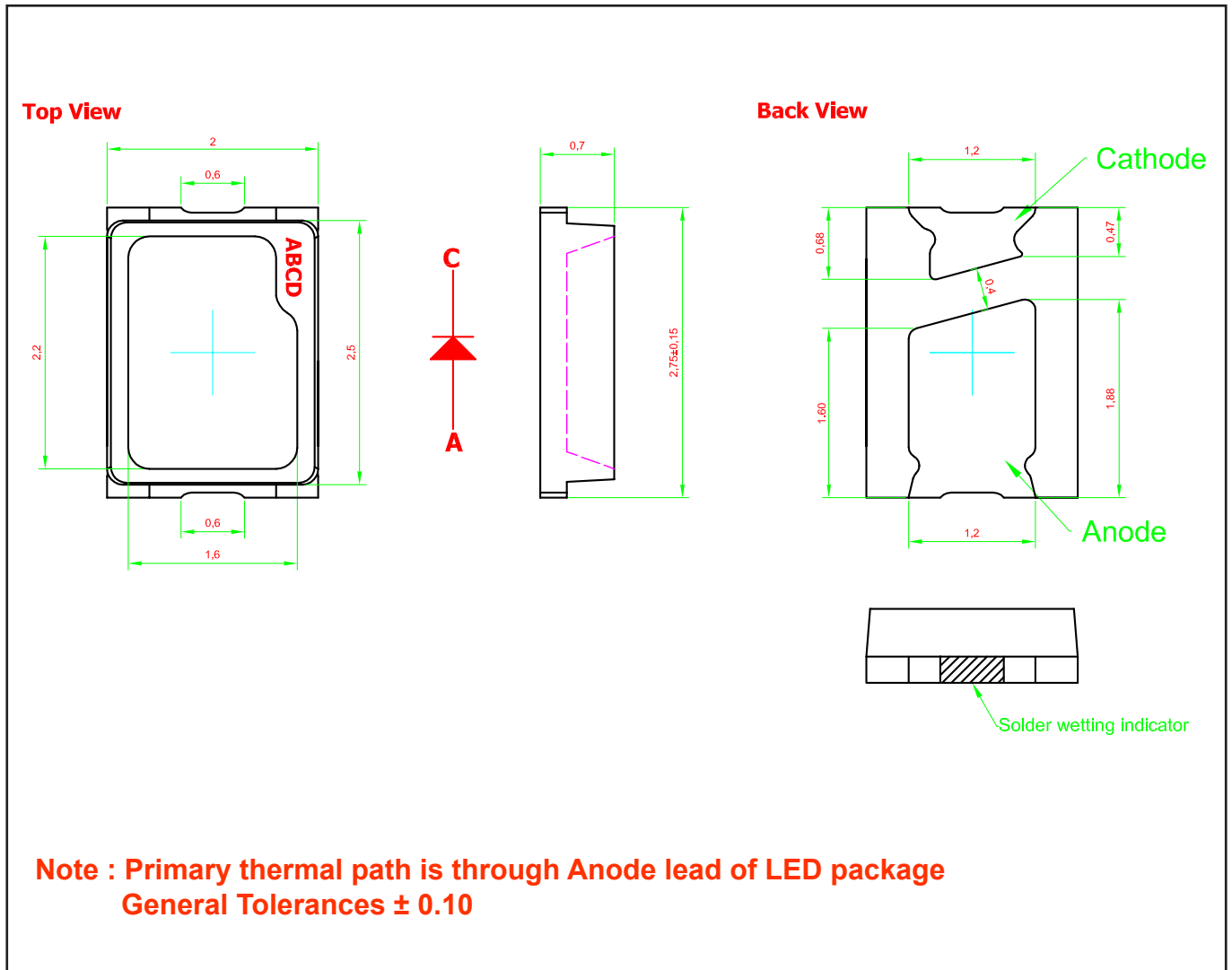


Wavelength Vs Junction Temperature

$$\Delta \lambda_{\text{dom}} = \lambda_{\text{dom}} - \lambda_{\text{dom}}(25^\circ\text{C}) = f(T_j); I_F = 50\text{mA}$$



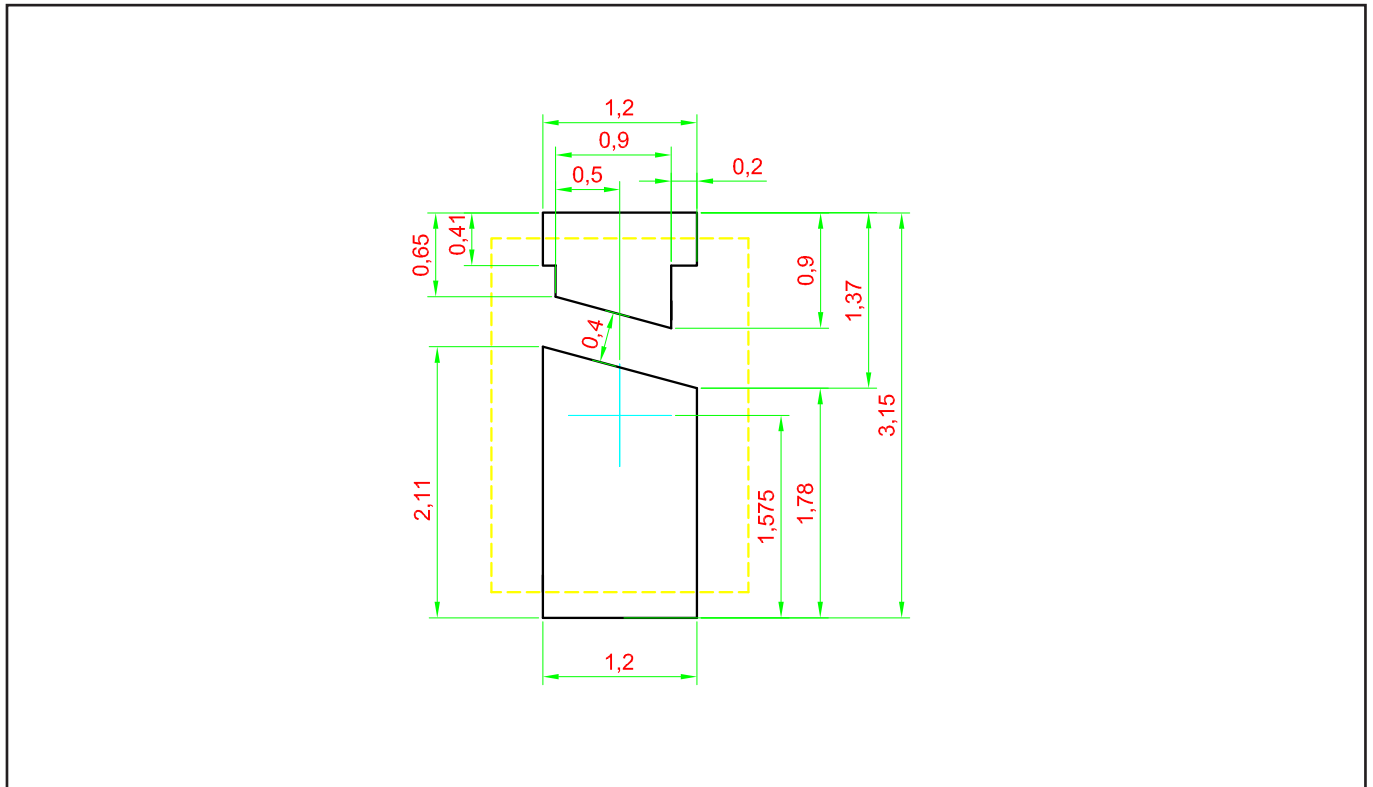
SpicePlus 2520 AllnGaP: SVx-ASS Package Outlines



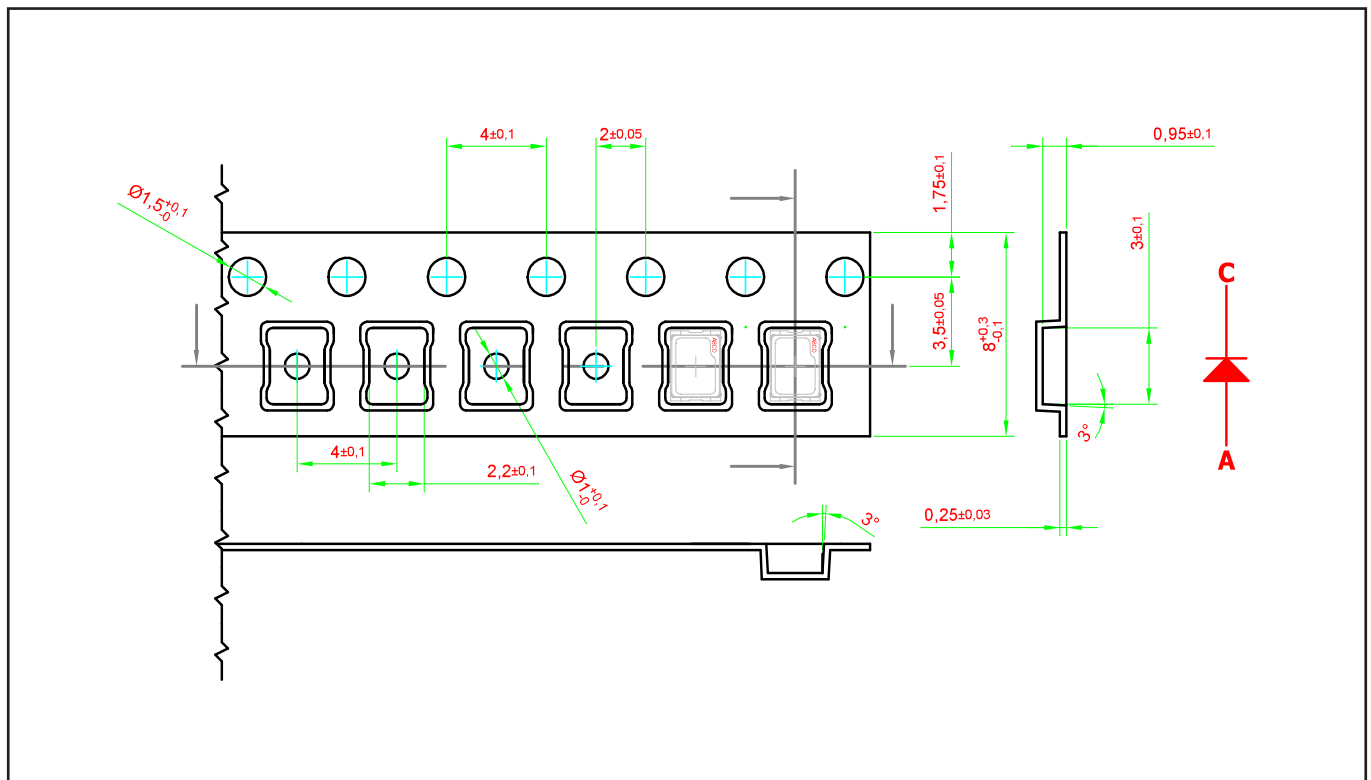
Material

Material	
Lead-frame	Cu Alloy With Ag Plating
Package	High Temperature Resistant Plastic
Encapsulant	Epoxy Resin
Soldering Leads	Sn Plating

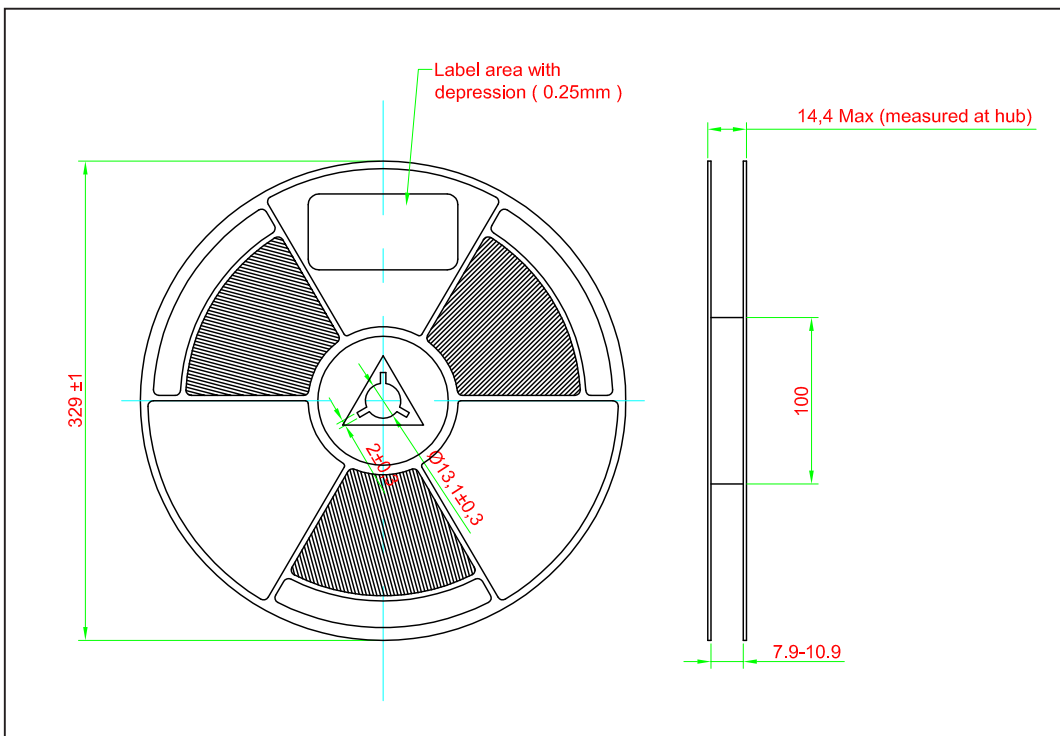
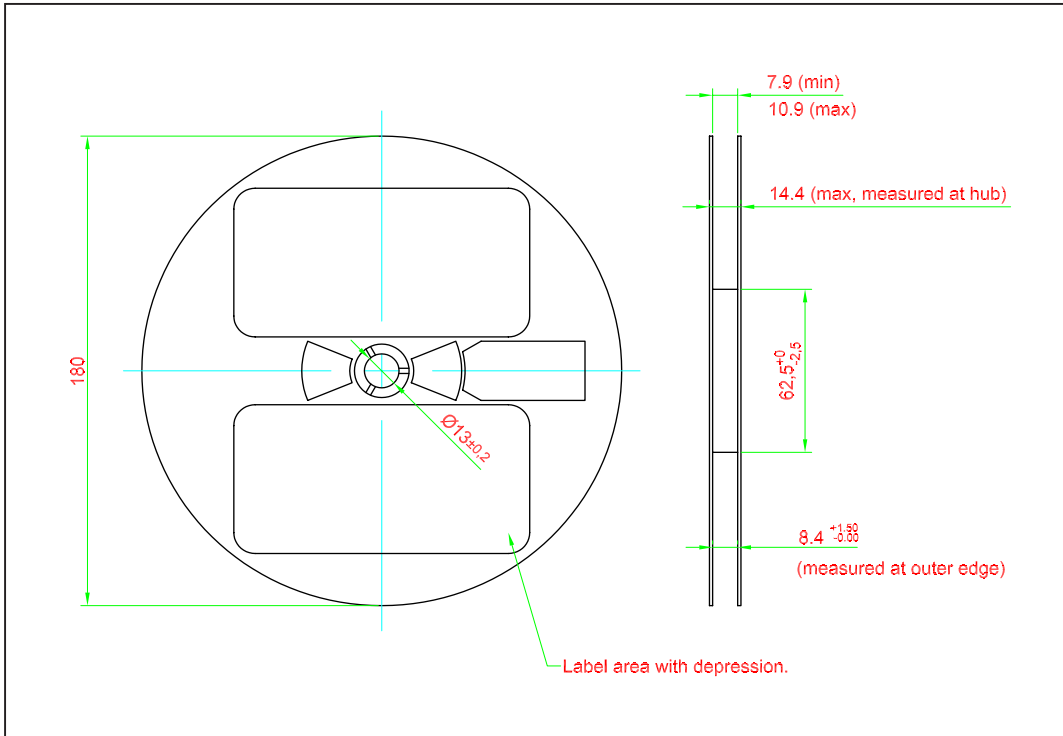
Recommended Solder Pad



Taping and orientation



Packaging Specification

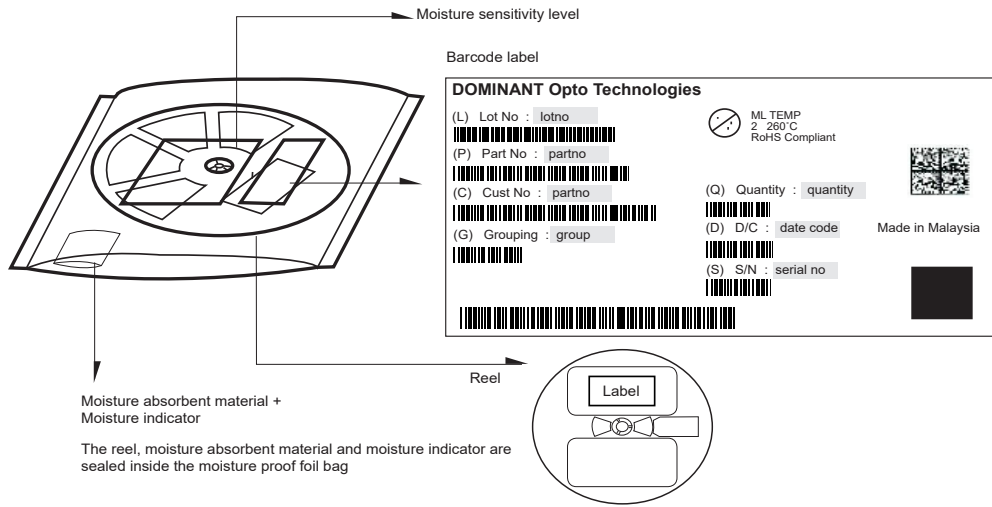


	Reel Diameter (mm)	Quantity (pcs)	*Ordering Number
Standard Packing	180	4000	SVx-ASS-xxx-x
Optional Packing	329	15000	SVx-ASS-xxx-x-L

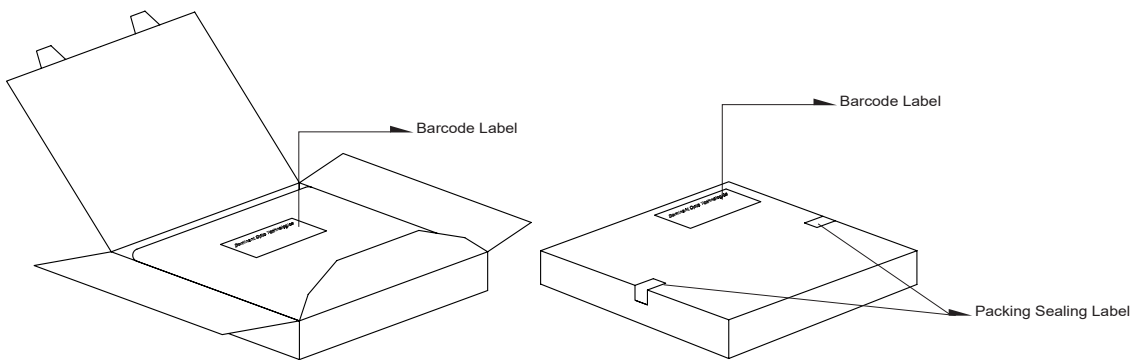
Notes:

* For ordering purpose only. Please consult sales and marketing for details.

Packaging Specification



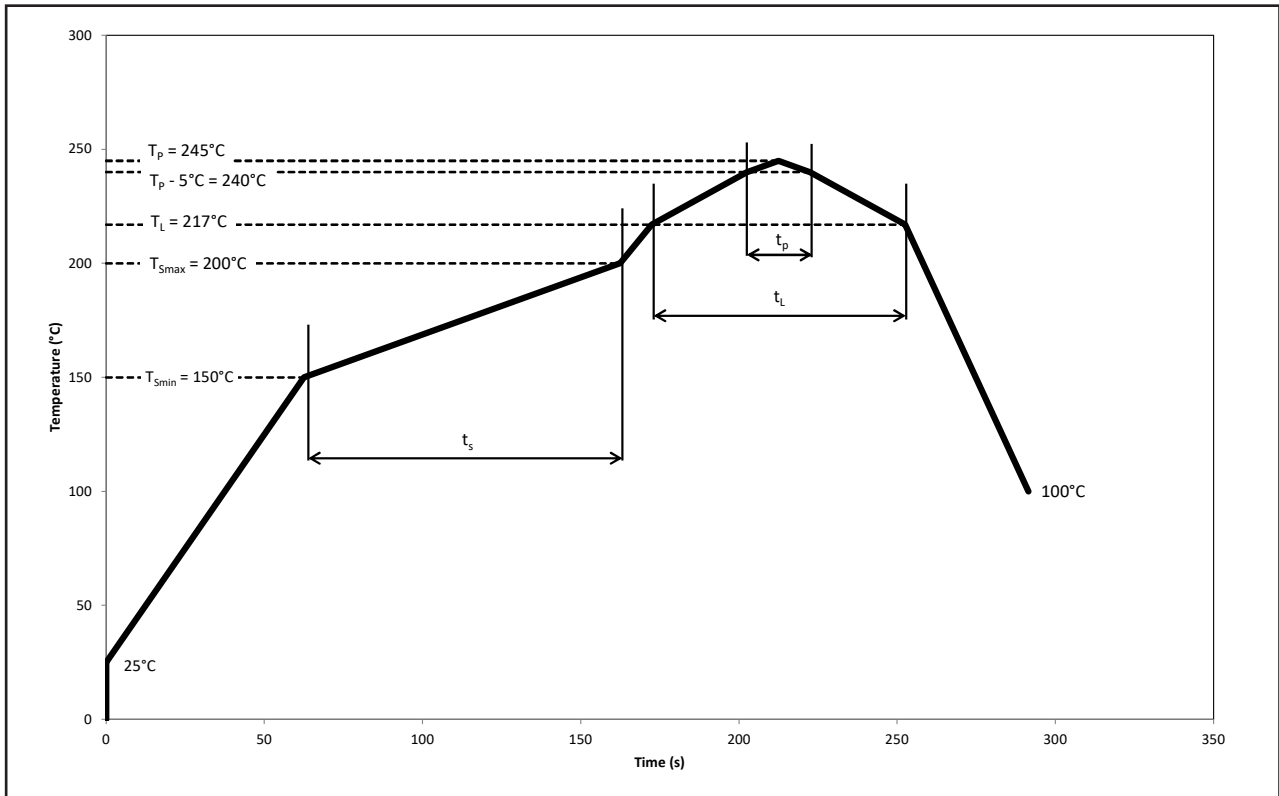
Quantity per bag (pcs)	Average 1pc SpicePlus 2520	1 completed bag (gram)
4000	0.0089	150 ± 10
15000	0.0089	600 ± 10



Reel Diameter (mm)	Packing Box Dimensions (mm)
180	210 x 210 x 16
329	345 x 345 x 16

Recommended Pb-free Soldering Profile

Product complies to MSL Level 2 acc. to JEDEC J-STD-020E



Profile Feature	Symbol	Pb-Free Assembly			Unit
		Min.	Recommended	Max.	
Ramp-up rate to preheat 25°C to T_{smin}	-	-	2	3	°C/s
Time t_s T_{smin} to T_{smax}	t_s	60	100	120	s
Ramp-up rate to peak T_L to T_p	-	-	2	3	°C/s
Liquidous temperature	T_L	-	217	-	°C
Time above liquidous temperature	t_L	60	80	150	s
Peak temperature	T_p	-	245	260	°C
Time within 5°C of the specified peak temperature $T_p - 5^\circ\text{C}$	t_p	10	20	30	s
Ramp-down rate T_p to 100°C	-	-	3	6	°C/s
Time 25°C to T_p	-	-	-	480	s

Appendix

1) **Brightness:**

- 1.1 Luminous intensity is measured at current pulse 25 ms(typ) with an internal reproducibility of $\pm 8\%$ and an expanded uncertainty of $\pm 11\%$ (according to GUM with a coverage factor of $k=3$).
- 1.2 Luminous flux is measured at current pulse 25 ms(typ) with an internal reproducibility of $\pm 8\%$ and an expanded uncertainty of $\pm 11\%$ (according to GUM with a coverage factor of $k=3$).
- 1.3 Radiant intensity is measured at current pulse 25 ms(typ) with an internal reproducibility of $\pm 8\%$ and an expanded uncertainty of $\pm 11\%$ (according to GUM with a coverage factor of $k=3$).
- 1.4 Radiant flux is measured at current pulse 25 ms(typ) with an internal reproducibility of $\pm 8\%$ and an expanded uncertainty of $\pm 11\%$ (according to GUM with a coverage factor of $k=3$).

2) **Color:**

- 2.1 Chromaticity coordinate groups are measured at current pulse 25 ms(typ) with an internal reproducibility of ± 0.005 and an expanded uncertainty of ± 0.01 (accordingly to GUM with a coverage factor of $k=3$).
- 2.2 Dominant wavelength is measured at current pulse 25 ms(typ) with an internal reproducibility of $\pm 0.5\text{nm}$ and an expanded uncertainty of $\pm 1\text{nm}$ (accordingly to GUM with a coverage factor of $k=3$).

3) **Voltage:**

- 3.1 Forward Voltage, V_f is measured when a current pulse of 8 ms(typ) with an internal reproducibility of $\pm 0.05\text{V}$ and an expanded uncertainty of $\pm 0.1\text{V}$ (accordingly to GUM with a coverage factor of $k=3$).

4) **Typical Values:**

- 4.1 At special conditions of LED manufacturing processes, typical data or calculated correlations of technical parameters only reflect the statistical figures. But not necessarily correspond to the actual parameters of each single product, which could differ from the typical data or calculated correlations or the typical characteristic line. These typical data may change whenever technical improvements happen.

5) **Tolerance of Measure**

- 5.1 Unless otherwise noted in drawing, tolerances are specified with ± 0.1 and dimension are specific in mm.

6) **Corrosion Robustness:**

- 6.1 Test conditions: $40\text{ }^\circ\text{C} / 90\% \text{ rh} / 15 \text{ ppm H}_2\text{S} / 336 \text{ h}$.
= Stricter than IEC 60068-2-43 (H_2S) [$25\text{ }^\circ\text{C} / 75\% \text{ rh} / 10 \text{ ppm H}_2\text{S} / 21 \text{ days}$].

7) **Reverse Voltage:**

- 7.1 Not designed for reverse operation. Continuous reverse voltage can cause migration and LED damage.

8)

- 8.1 Package edge may have plastic burr or protrusion no bigger than 0.05mm .

Revision History

Page	Subjects	Date of Modification
-	Initial Release	23 Jun 2021
2	Update Rth Max	02 Mar 2022
8	Add Polarity in Package Outline	11 Aug 2022
2, 6, 7	Update Electrical Characteristics Update Graph: Relative Luminous Flux Vs Forward Current Update Graph: Forward Current Vs Forward Voltage Update Graph: Forward Voltage Vs Junction Temperature	16 Feb 2023

NOTE

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