

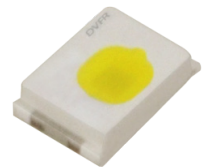
SpicePlus

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 2.45 x 2.0mm.
- > Ultra low height profile - 0.6mm.
- > Small Light Emitting Surface, Excellent Near Field Color over Angle coupling with light guide.
- > 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: DRL, Reverse Lamp.

Optical Characteristics at Tj=25°C

Part Ordering Number	Color	Viewing Angle°	Luminous Flux @ 150mA (lm) <i>Appx. 1.2</i>		
			Min.	Typ.	Max.
STW-EZHG-R3S-L2P2	White	120	45.2	54.0	67.2
STW-EZHG-R9S-L2P2	White	120	48.5	55.4	72.0

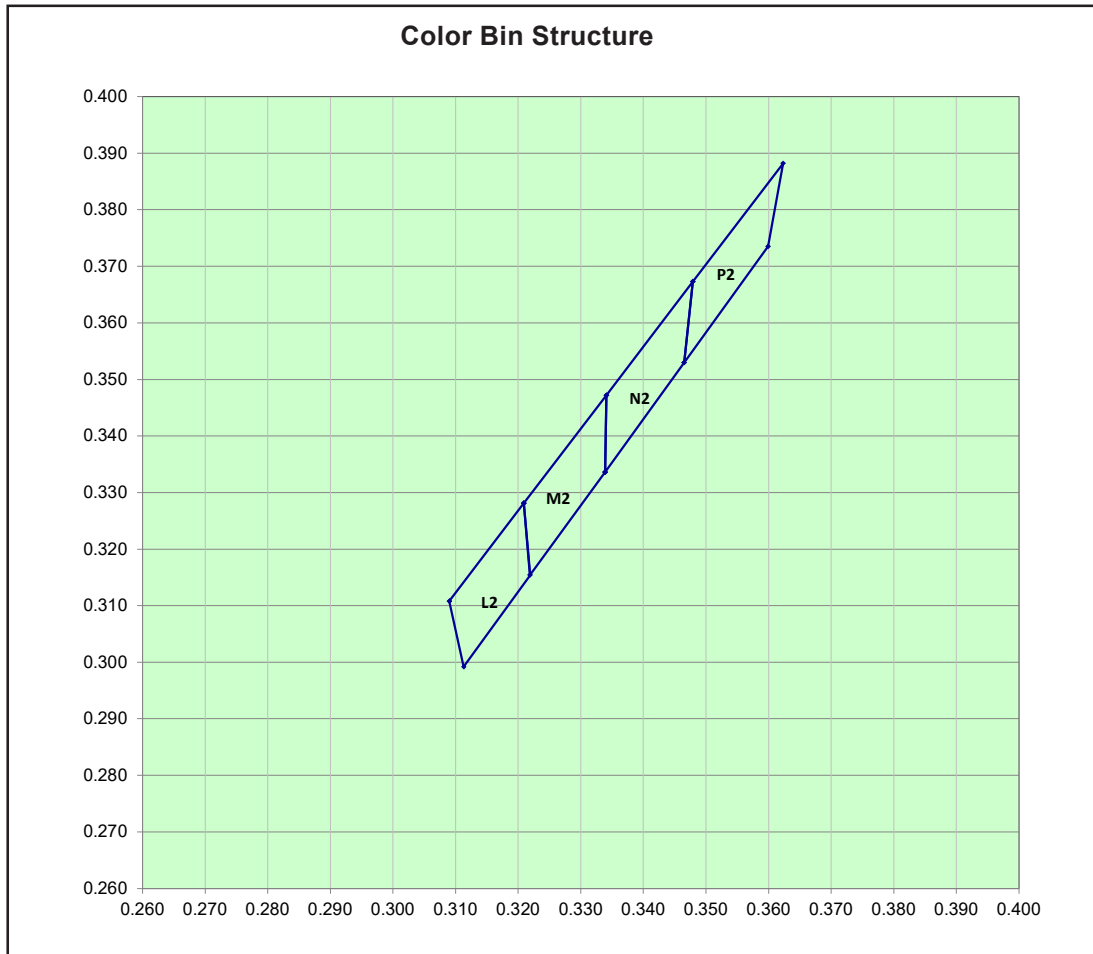
Electrical Characteristics at Tj=25°C

Part Number	Vf @ If = 150mA <i>Appx. 3.1</i>		
	Min. (V)	Typ. (V)	Max. (V)
STW-EZHG	2.80	3.10	3.40

Absolute Maximum Ratings

	Maximum Value	Unit
DC forward current	250	mA
Peak pulse current; (Ts = 55°C, tp ≤ 100µs, Duty cycle = 0.03)	500	mA
Reverse voltage	Not designed for reverse bias	V
ESD threshold (HBM)	8	KV
LED junction temperature	150	°C
Operating temperature	-40 ... +125	°C
Storage temperature	-40 ... +125	°C
Thermal resistance (Rated current = 150mA, Ts = 25 °C)		
- Real Thermal Resistance		
Junction / solder point, R _{th JS real} (typ = 18)	26	K/W
- Electrical Thermal Resistance		
Junction / solder point, R _{th JS el} (typ = 12)	18	K/W

STW, Color Grouping *Appx. 2.1*



Bin		1	2	3	4
L2	Cx	0.3090	0.3113	0.3219	0.3209
	Cy	0.3108	0.2992	0.3154	0.3281
M2	Cx	0.3209	0.3219	0.3339	0.3341
	Cy	0.3281	0.3154	0.3336	0.3472
N2	Cx	0.3339	0.3341	0.3479	0.3465
	Cy	0.3336	0.3472	0.3673	0.3530
P2	Cx	0.3465	0.3479	0.3623	0.3599
	Cy	0.3530	0.3673	0.3882	0.3735

InGaN wavelength is very sensitive to drive current. Operating at lower current is not recommended and may yield unpredictable performance. Current pulsing should be used for dimming purposes.

Luminous Flux Group at Tj=25°C

Brightness Group	Luminous Flux ^{Appx. 1.2} (lm)
R3	45.2 ... 51.7
S2	51.7 ... 59.0
S3	59.0 ... 67.2
R9	48.5 ... 55.4
S8	55.4 ... 63.0
S9	63.0 ... 72.0

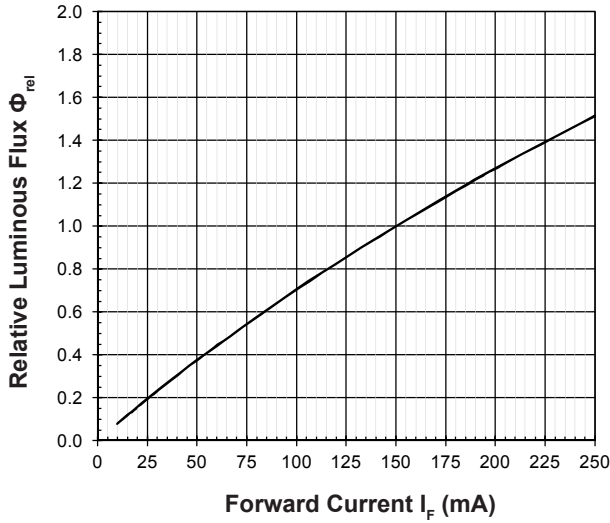
Vf Bining (Optional)

Vf Bin @ 150 mA	Forward Voltage (V) ^{Appx. 4.1}
VR7	2.80 ... 3.10
VR8	3.10 ... 3.40

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

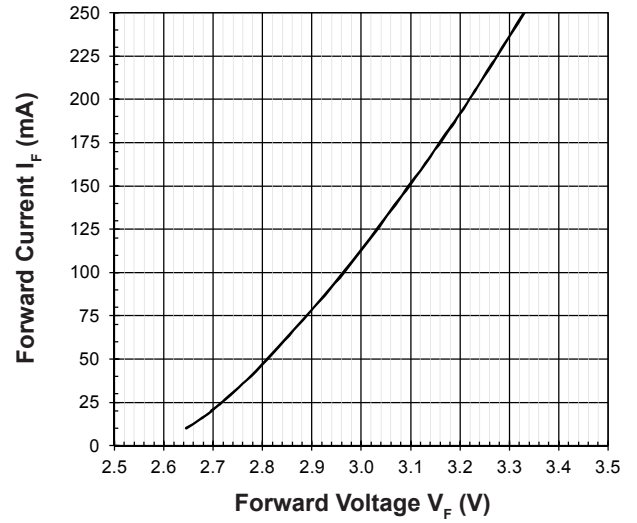
Relative Luminous Flux Vs Forward Current

$\Phi_{rel}/\Phi_{rel}(150mA) = f(I_F); T_j = 25^\circ C$



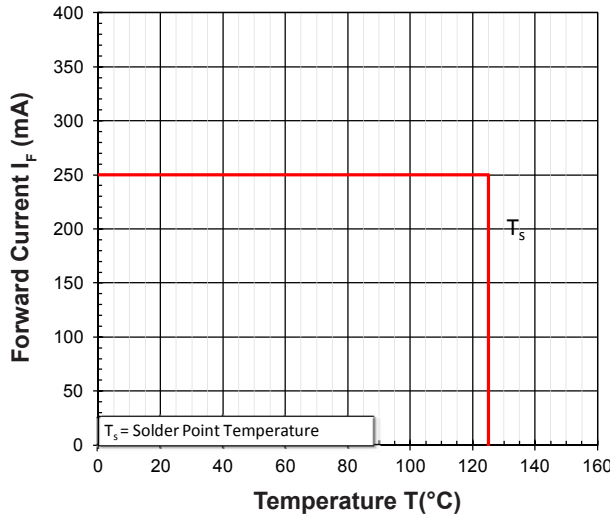
Forward Current Vs Forward Voltage

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



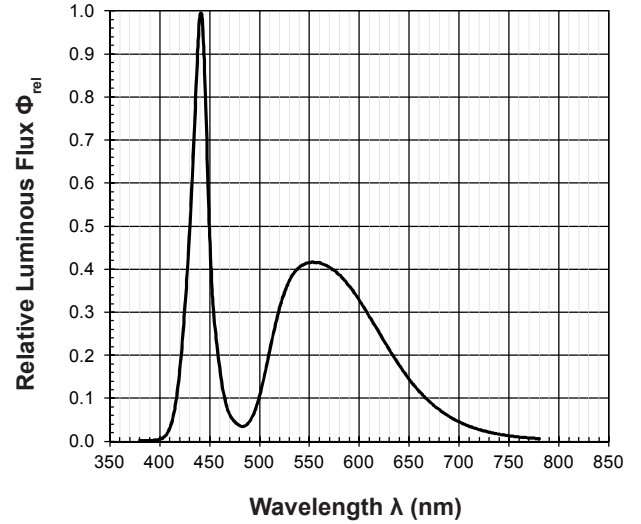
Maximum Current Vs Temperature

$I_F = f(T)$



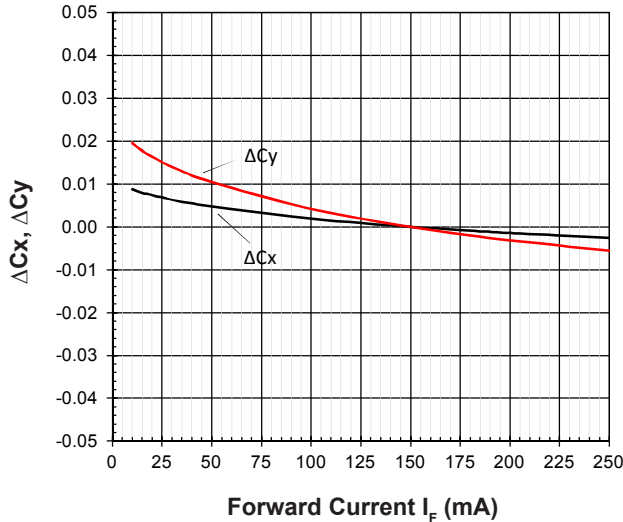
Relative Spectral Emission

$\Phi_{rel} = f(\lambda); T_j = 25^\circ C; I_F = 150mA$



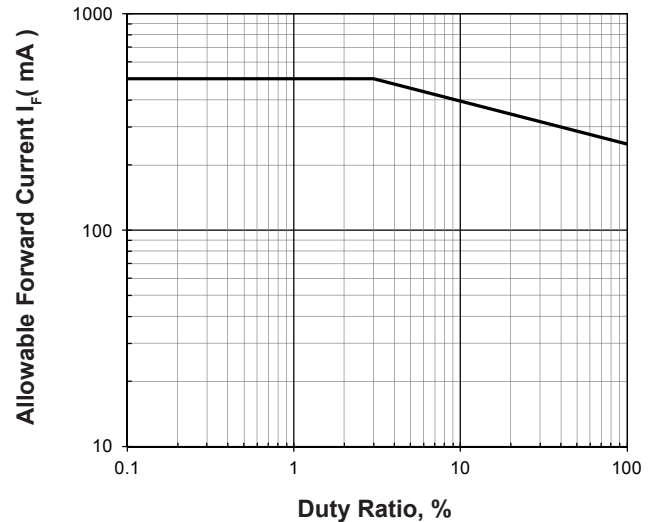
Chromaticity Coordinate Shift Vs Forward Current

$\Delta Cx, \Delta Cy = f(I_F); T_j = 25^\circ C$

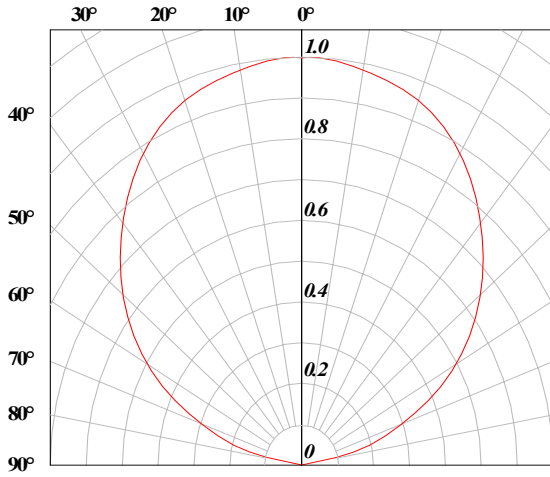


Allowable Forward Current Vs Duty Ratio

$(T_s = 55^\circ C; t_p \le 100\mu s)$

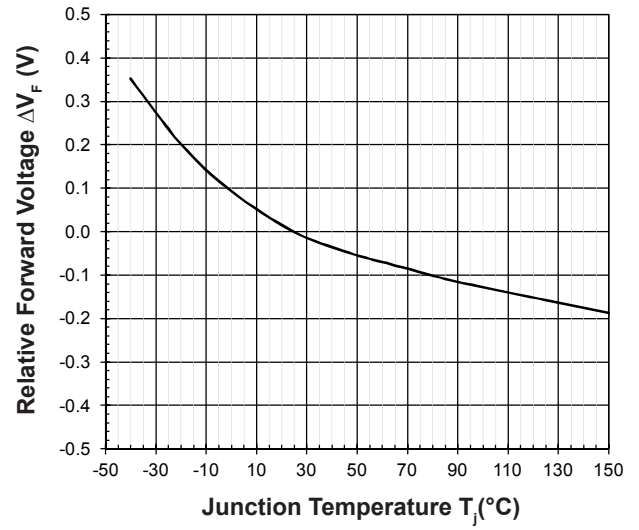


Radiation Pattern



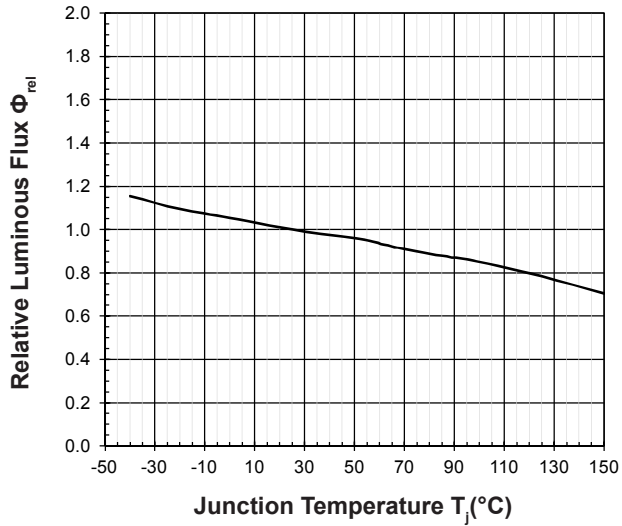
Relative Forward Voltage Vs Junction Temperature

$$\Delta V_F = V_F - V_F(25^\circ\text{C}) = f(T_j); I_F = 150\text{mA}$$



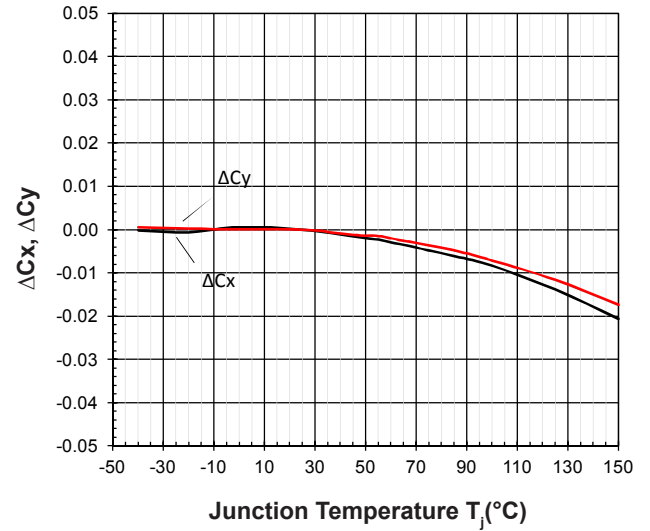
Relative Luminous Flux Vs Junction Temperature

$$\Phi_V/\Phi_V(25^\circ\text{C}) = f(T_j); I_F = 150\text{mA}$$

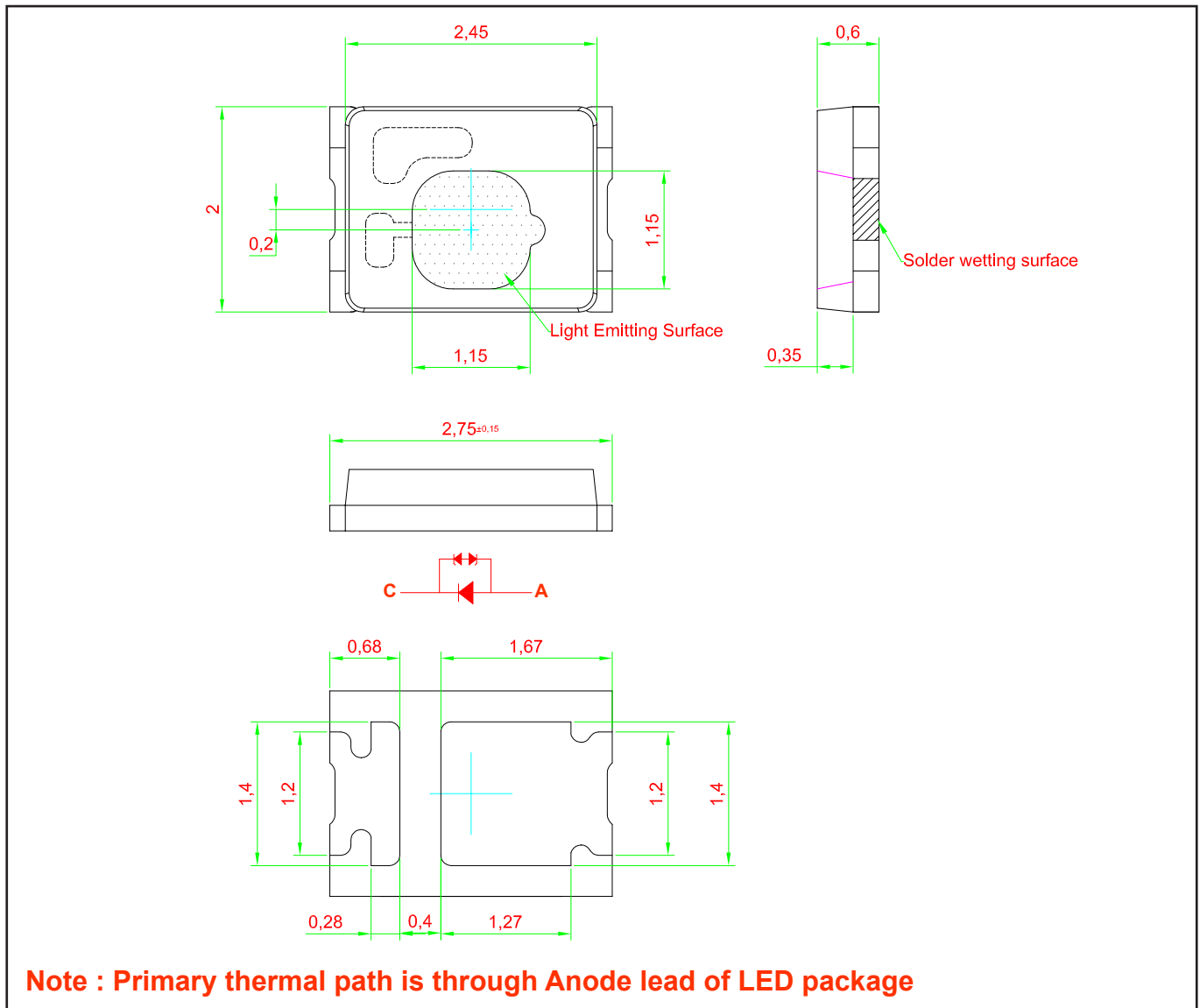


Chromaticity Coordinate Shift Vs Junction Temperature

$$\Delta C_x, \Delta C_y = f(T_j); I_F = 150\text{mA}$$



SpicePlus SLES InGaN: STW-EZHG Package Outlines



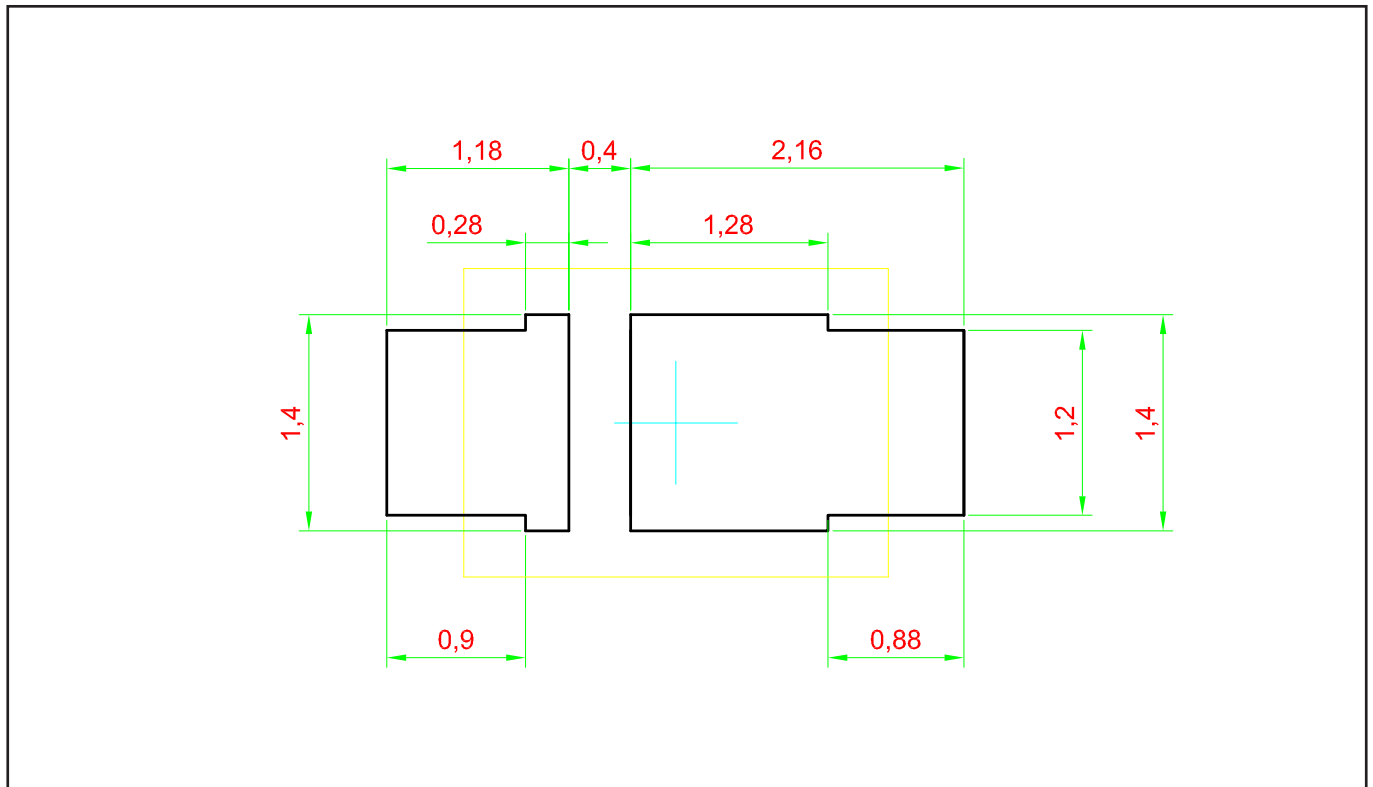
Note:
 Package edge may have plastic burr or protrusion no bigger than 0.05mm.

Material

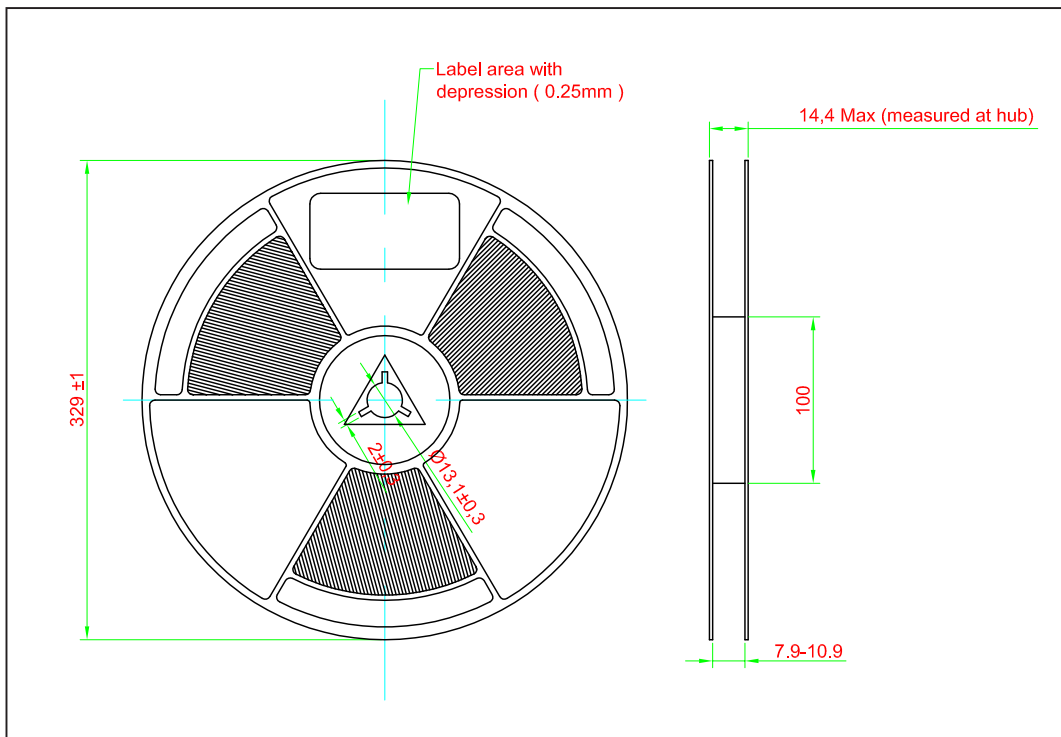
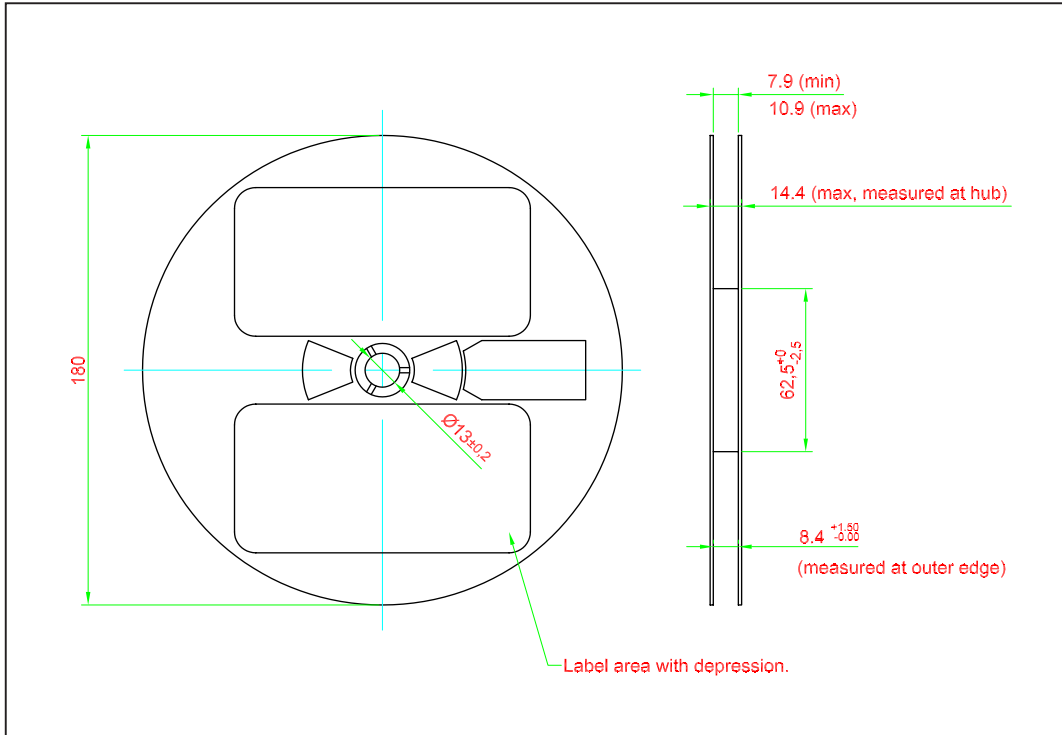
	Material
Lead-frame	Cu Alloy With Au Plating
Package	High Temperature Resistant Plastic, PPA
Encapsulant	Silicone Resin
Soldering Leads	NiSn Plating

Note: product is Pb free

Recommended Solder Pad

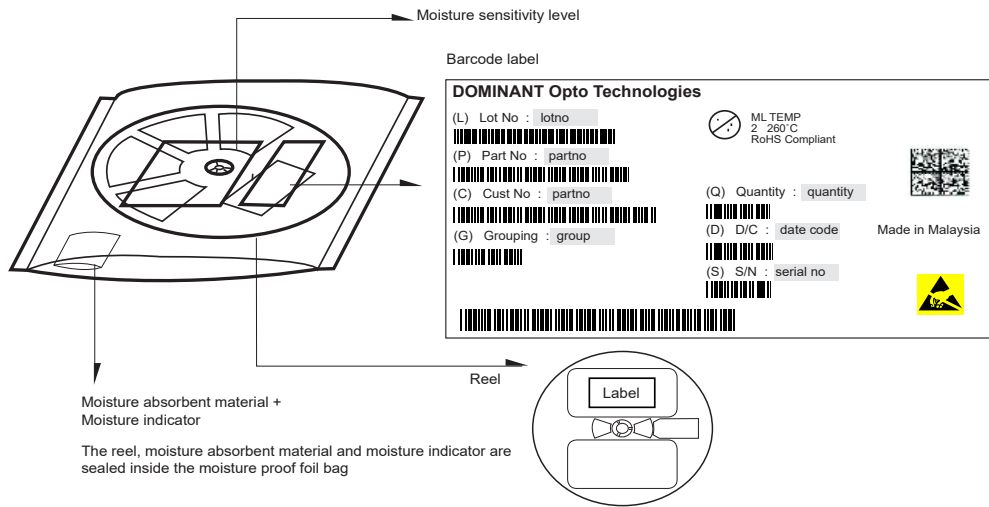


Packaging Specification

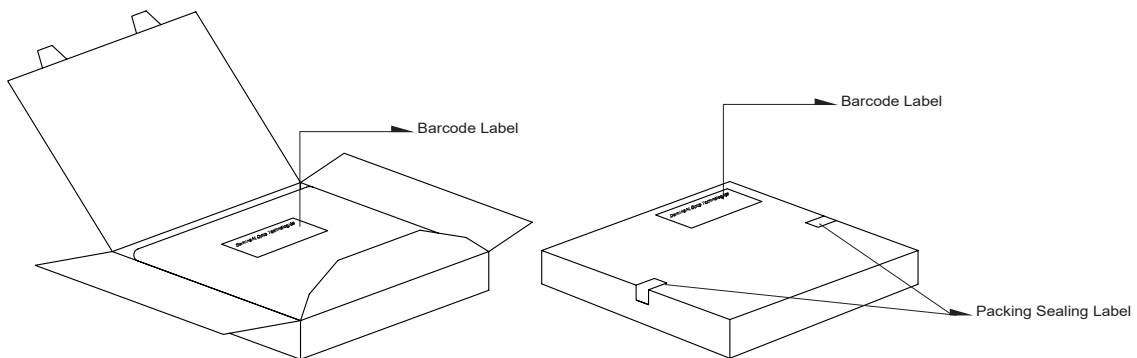


	Reel Diameter (mm)	Quantity (pcs)	Partno
Standard Packing	180	4000	STW-EZHG-xxx-L2P2
Optional Packing	329	15000	STW-EZHG-xxx-L2P2-L

Packaging Specification



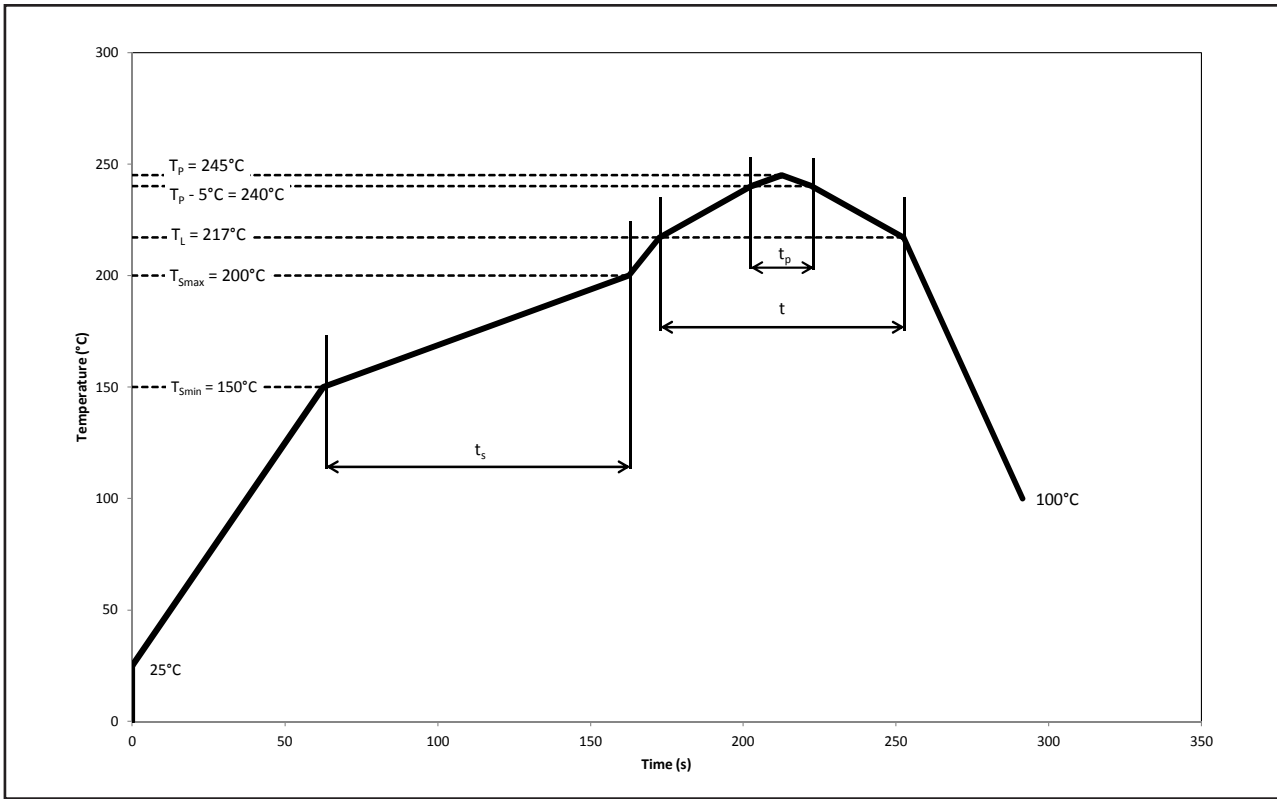
Quantity per bag (pcs)	Average 1pc SpicePlus SLES	1 completed bag (gram)
4000	0.0089	150 ± 10
15000	0.0089	600 ± 10



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	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 °C / 90 % rh / 15 ppm H_2S / 336 h.
= Stricter than IEC 60068-2-43 (H_2S) [25 °C / 75% rh / 10 ppm H_2S / 21 days].

Revision History

Page	Subjects	Date of Modification
-	Initial Release	16 Mar 2021
2, 3	Update Partno from STW-EZHG-R3S-L1P2 to STW-EZHG-R3S-L2P2 Update Color Bin Structure	14 June 2021
1, 2	Add Features Add New Partno: STW-EZHG-R9S-L2P2	22 Feb 2022
8	Update Recommended Solder Pad	16 Mar 2022

NOTE

All the information contained in this document is considered to be reliable at the time of publishing. However, DOMINANT Opto Technologies does not assume any liability arising out of the application or use of any product described herein.

DOMINANT Opto Technologies reserves the right to make changes to any products in order to improve reliability, function or design.

DOMINANT Opto Technologies products are not authorized for use as critical components in life support devices or systems without the express written approval from the Managing Director of DOMINANT Opto Technologies.

Dispose of product is in accordance with local, regional, national and international regulations.

About Us

DOMINANT Opto Technologies is a dynamic company that is amongst the world's leading automotive LED manufacturers. With an extensive industry experience and relentless pursuit of innovation, DOMINANT's state-of-art manufacturing and development capabilities have become a trusted and reliable brand across the globe. More information about DOMINANT Opto Technologies, an IATF 16949 and ISO 14001 certified company, can be found under <http://www.dominant-semi.com>.

Please contact us for more information:

DOMINANT Opto Technologies Sdn. Bhd
Lot 6, Batu Berendam, FTZ Phase III, 75350 Melaka, Malaysia.
Tel: +606 283 3566 Fax: +606 283 0566
E-mail: sales@dominant-semi.com