

SpiceLED

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 SpiceLED packs a powerful performance and is a highly reliable design device. Its versatility enables its application in automotive appliances, key-pad illumination, hand-held devices such as PDAs, notebooks, compact back-lighting applications, consumer appliances, office equipment, audio and video equipment.



Features:

- > High brightness surface mount LED.
- > High operating temperature up to 110°C
- > Super wide viewing angle of 160°.
- > Equivalent to 0603 package outline. Copper lead-frame construction.
- > Qualified according to JEDEC moisture sensitivity Level 2.
- > Compatible to IR reflow soldering.
- > Environmental friendly; RoHS compliance.
- > Compliance to automotive standard; AEC-Q102.
- > Superior corrosion resistant.



Applications:

- > Automotive: interior applications, eg: switches, climate control system, dashboard, etc.
- > Consumer Appliances: LCD illumination as in PDAs, LCD TV.
- > Communication: indicator and backlight in mobilephone.
- > Display: full color display video notice board.
- > Industrial: white goods (eg: Oven, microwave, etc.).

Optical Characteristics at Tj=25°C

Part Number	Color	Viewing Angle°	Luminous Intensity @ 20mA IV (mcd) <i>Appx. 1.1</i>		
			Min.	Typ.	Max.
SSS-NLD-ST1-1	Super Red, 632 nm	160	180.0	285.0	355.0
SSR-NLD-S2T-1	Red, 625 nm	160	224.0	355.0	450.0
SSA-NLD-TU1-1	Amber, 615nm	160	285.0	450.0	560.0
SSO-NLD-TU1-1	Orange, 605 nm	160	285.0	450.0	560.0
SSY-NLD-TU1-1	Yellow, 587 nm	160	285.0	450.0	560.0
SSY-NLD-S2T1-2	Yellow, 587nm	160	224.0	285.0	355.0
SSY-NLD-S2T-7	Yellow, 587nm	160	224.0	355.0	450.0

Electrical Characteristics at Tj=25°C

Part Number	Min. (V)	Vf @ If = 20mA <i>Appx. 3.1</i>			Vr @ Ir = 10uA <i>Appx. 6.1</i>
		Typ. (V)	Max. (V)	Min. (V)	
SSx-NLD	1.8	2.1	2.6	12	

Absolute Maximum Ratings

	Maximum Value	Unit
DC forward current	30	mA
Peak pulse current; (Ts = 55°C; tp ≤ 100µs, Duty cycle = 0.03)	250	mA
Reverse voltage <i>Appx. 6.1</i>	12	V
ESD threshold (HBM)	2000	V
LED junction temperature	125	°C
Operating temperature	-40 ... +110	°C
Storage temperature	-40 ... +110	°C
Power dissipation (at room temperature)	80	mW
Thermal resistance (Rated current = 20mA, Ts = 25 °C)		
- Junction / ambient, Rth JA	400	K/W
- Junction / solder point, Rth JS	200	K/W

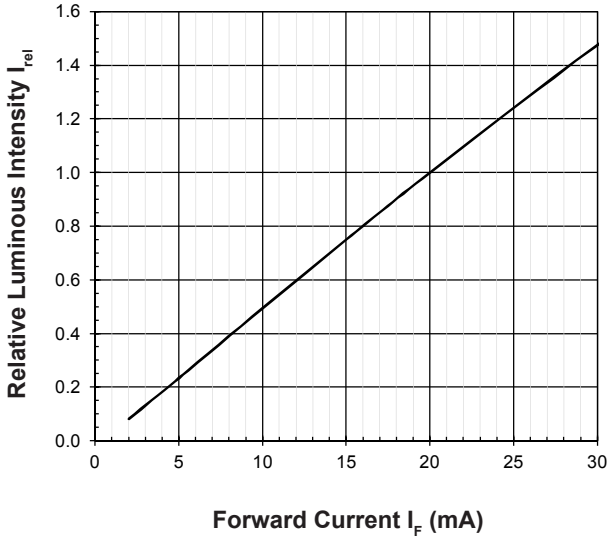
Wavelength Grouping

Color	Group	Wavelength distribution (nm) <i>Appx. 2.2</i>
SSS; Super Red	Full	625 - 640
SSR; Red	Full	620 - 630
SSA; Amber	Full	610 - 621
	W	610 - 615
	X	615 - 621
SSO; Orange	Full	600 - 612
	W	600 - 603
	X	603 - 606
	Y	606 - 609
	Z	609 - 612
SSY; Yellow	Full	582 - 594
	W	582 - 585
	X	585 - 588
	Y	588 - 591
	Z	591 - 594

Brightness Group	Luminous Intensity <i>Appx. 1.1</i> IV (mcd)
S1	180.00...224.00
S2	224.00...285.00
T1	285.00...355.00
T2	355.00...450.00
U1	450.00...560.00

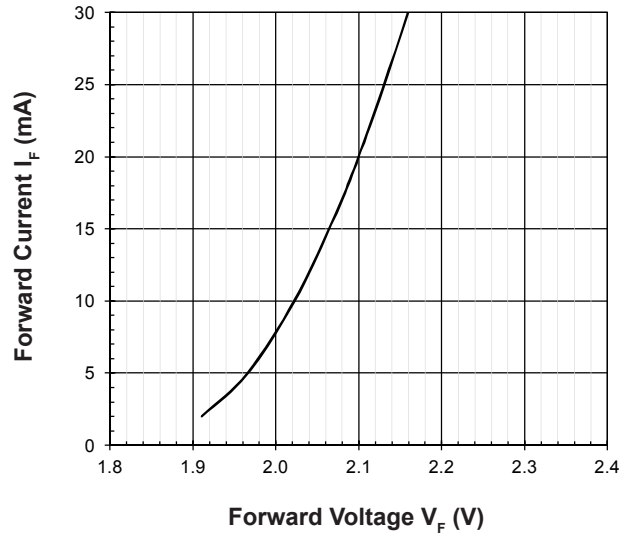
Relative Luminous Intensity Vs Forward Current

$I_v/I_v(20\text{mA}) = f(I_F); T_j = 25^\circ\text{C}$



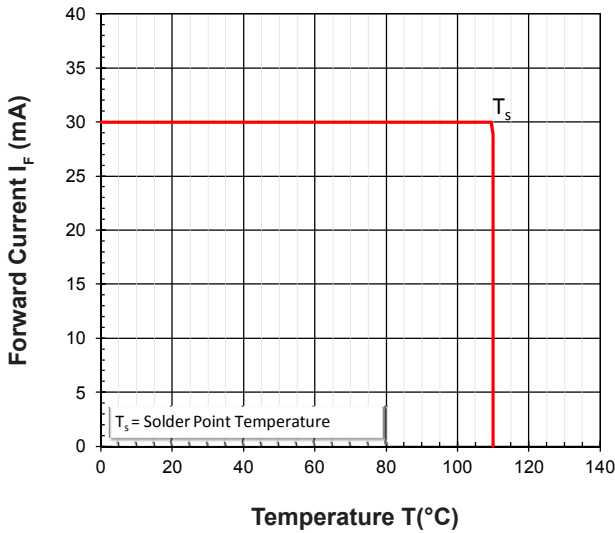
Forward Current Vs Forward Voltage

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



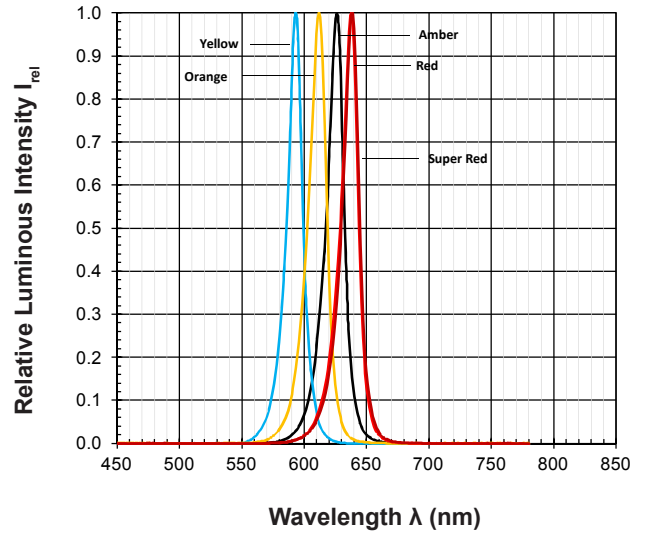
Maximum Current Vs Temperature

$I_F = f(T)$



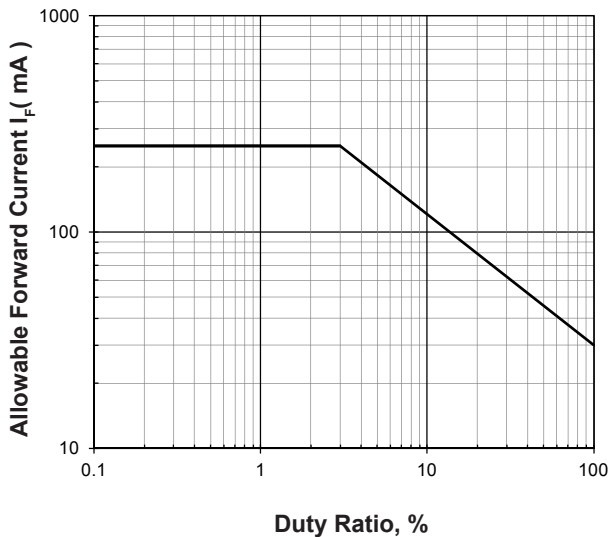
Relative Spectral Emission

$I_{rel} = f(\lambda); T_j = 25^\circ\text{C}; I_F = 20\text{mA}$

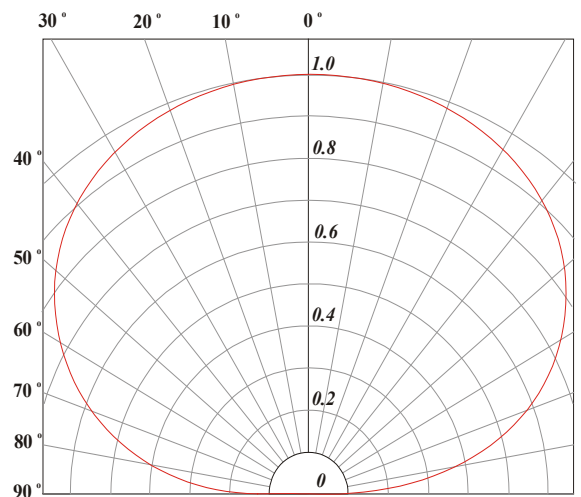


Allowable Forward Current Vs Duty Ratio

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

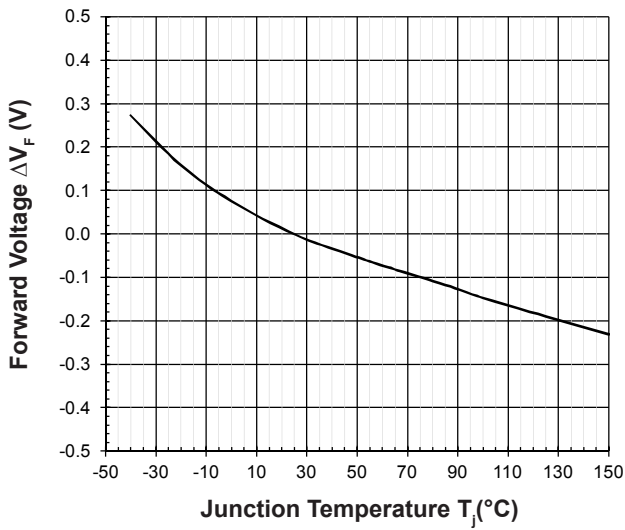


Radiation Pattern



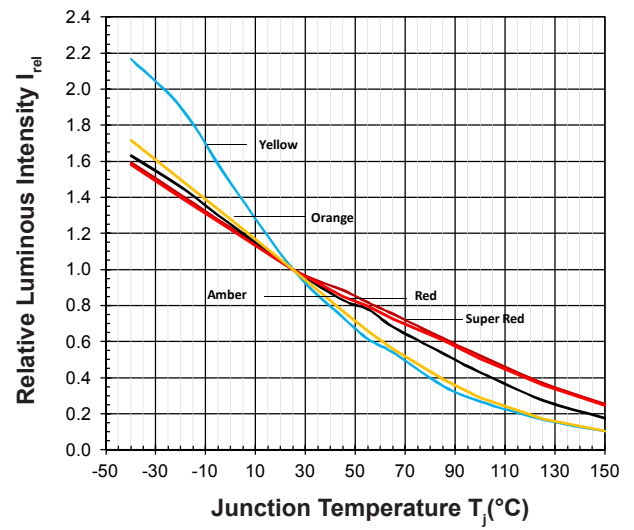
Forward Voltage Vs Junction Temperature

$$\Delta V_F = V_F - V_F(25^\circ\text{C}) = f(T_j); I_F = 20\text{mA}$$



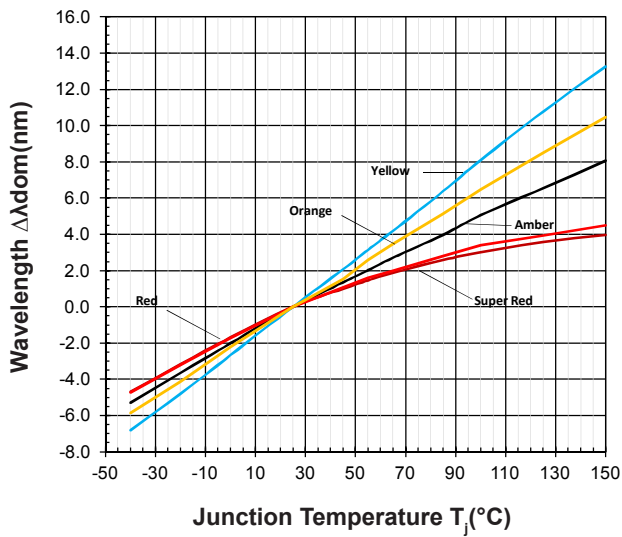
Relative Luminous Intensity Vs Junction Temperature

$$I_V/I_V(25^\circ\text{C}) = f(T_j); I_F = 20\text{mA}$$

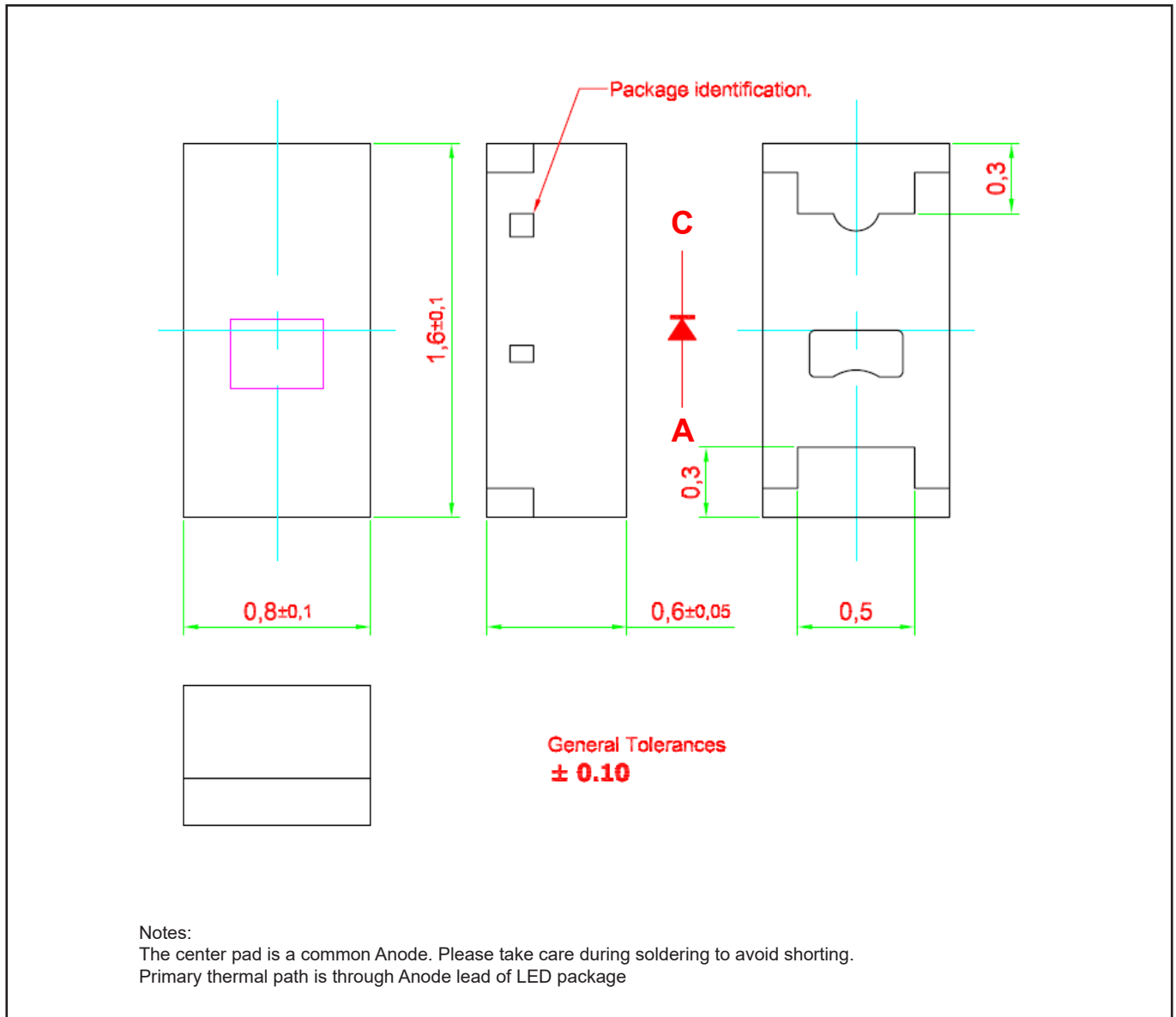


Wavelength Vs Junction Temperature

$$\Delta \lambda_{\text{dom}} = \lambda_{\text{dom}} - \lambda_{\text{dom}}(25^\circ\text{C}) = f(T_j); I_F = 20\text{mA}$$



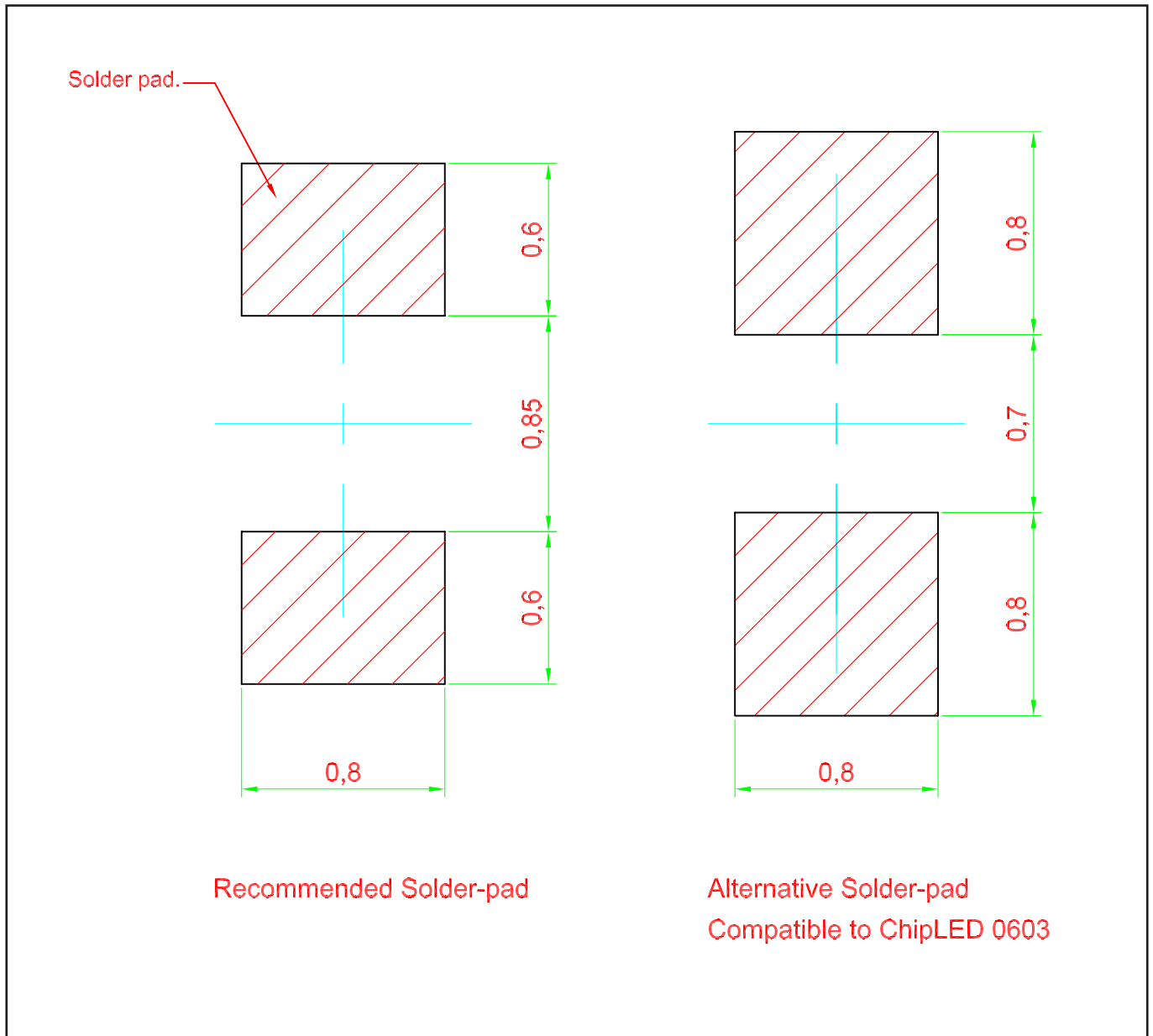
SpiceLED • AllnGaP S-Spice : SSx-NLD Package Outlines



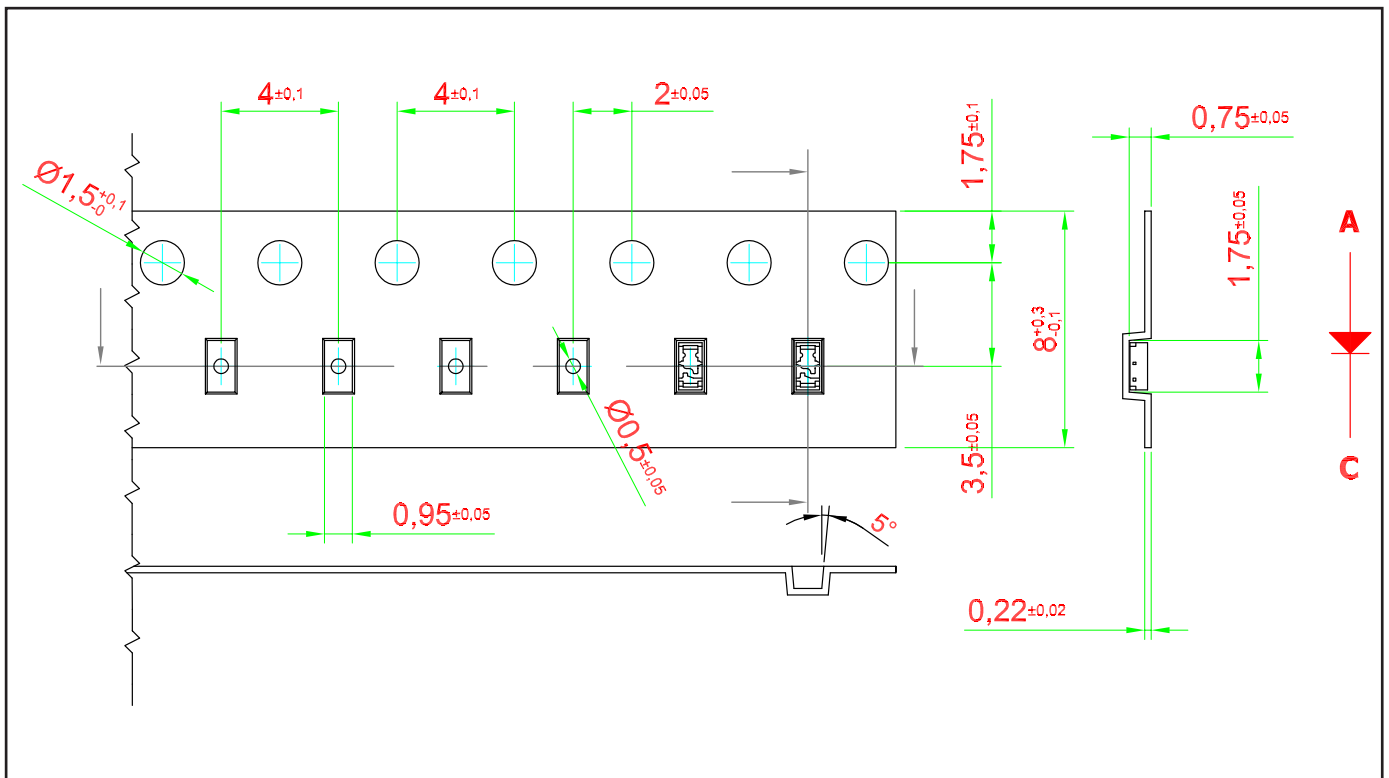
Material

Material	
Lead-frame	Cu Alloy With Au Plating
Package	High Temperature Resistant Epoxy Resin

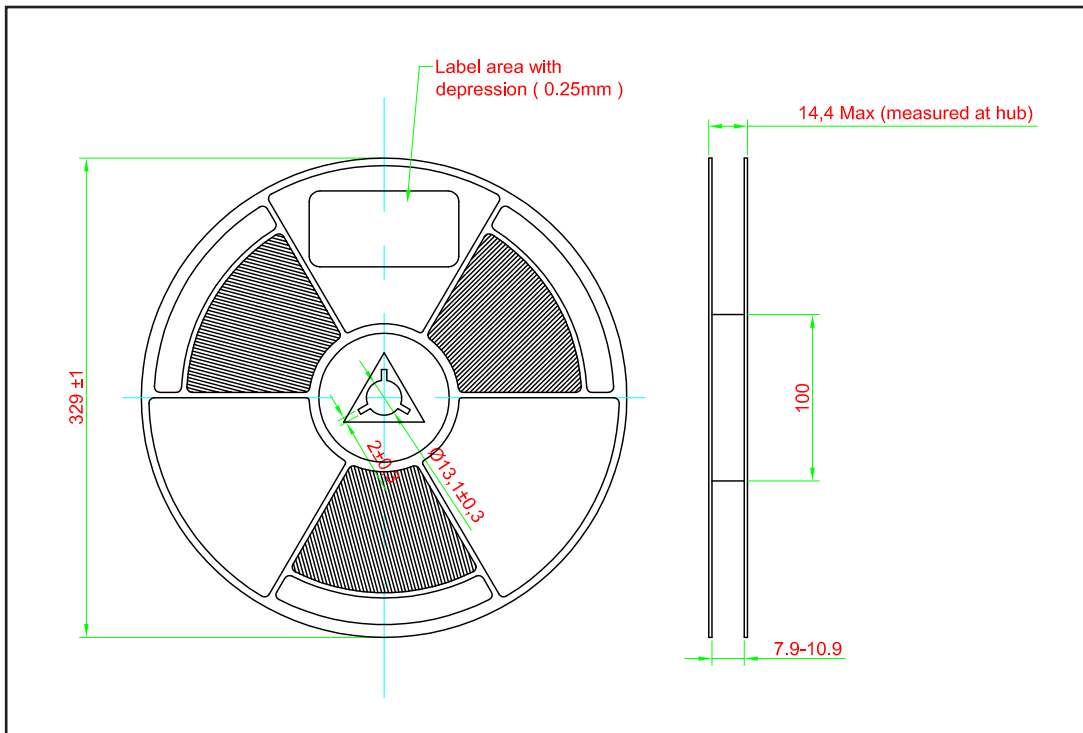
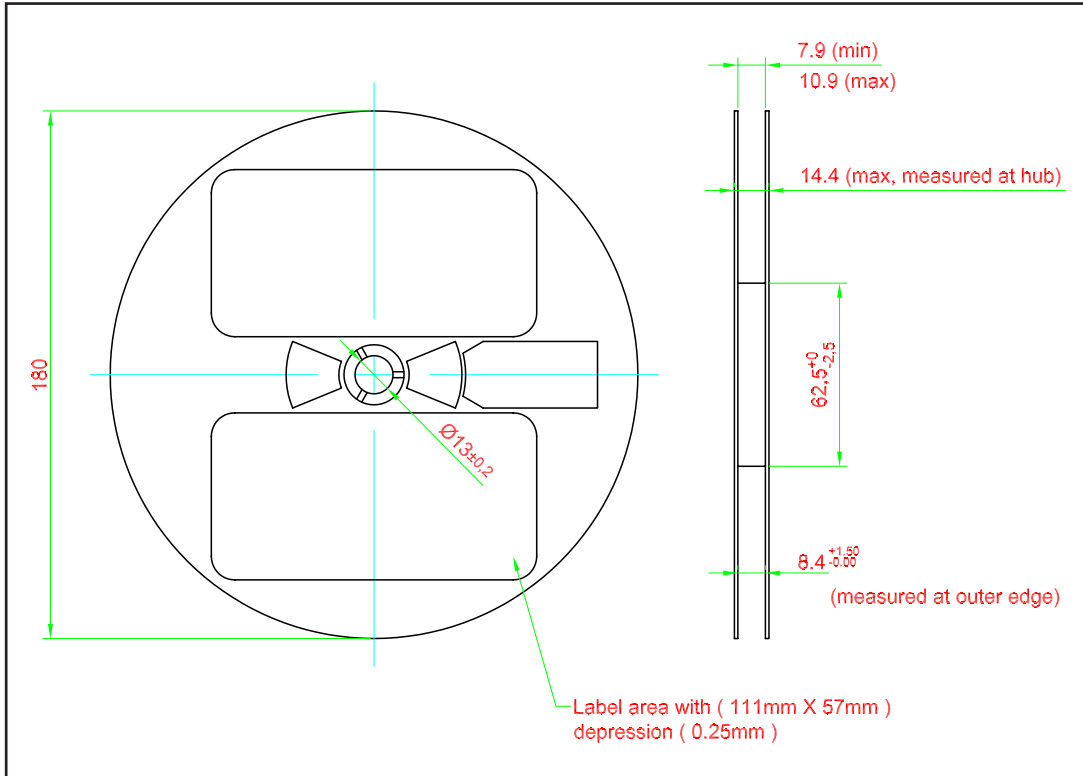
Recommended Solder Pad



Taping and orientation



Packaging Specification

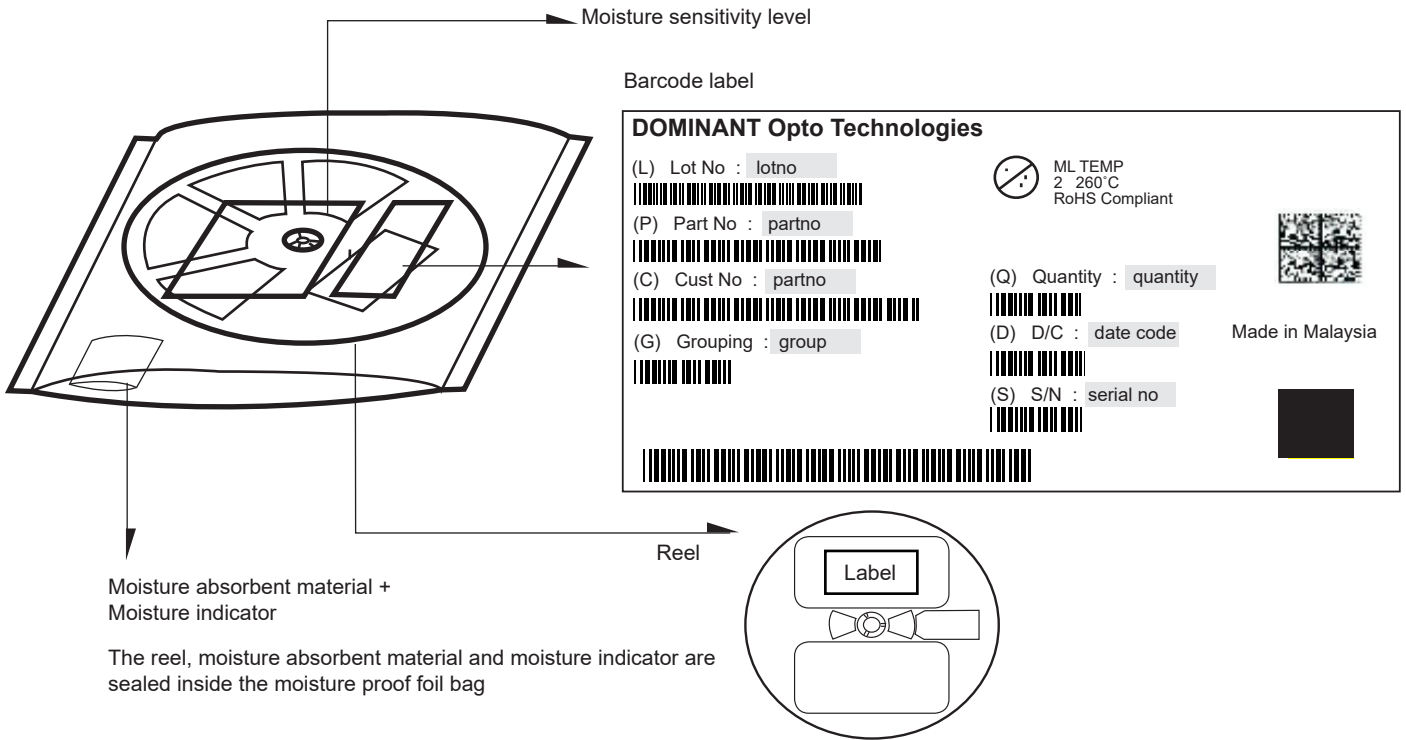


	Reel Diameter (mm)	Quantity (pcs)	*Ordering Number
Standard Packing	180	5000	SSx-NLD-XXX-X
Optional Packing	329	18000	SSx-NLD-XXX-X-M

Notes:

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

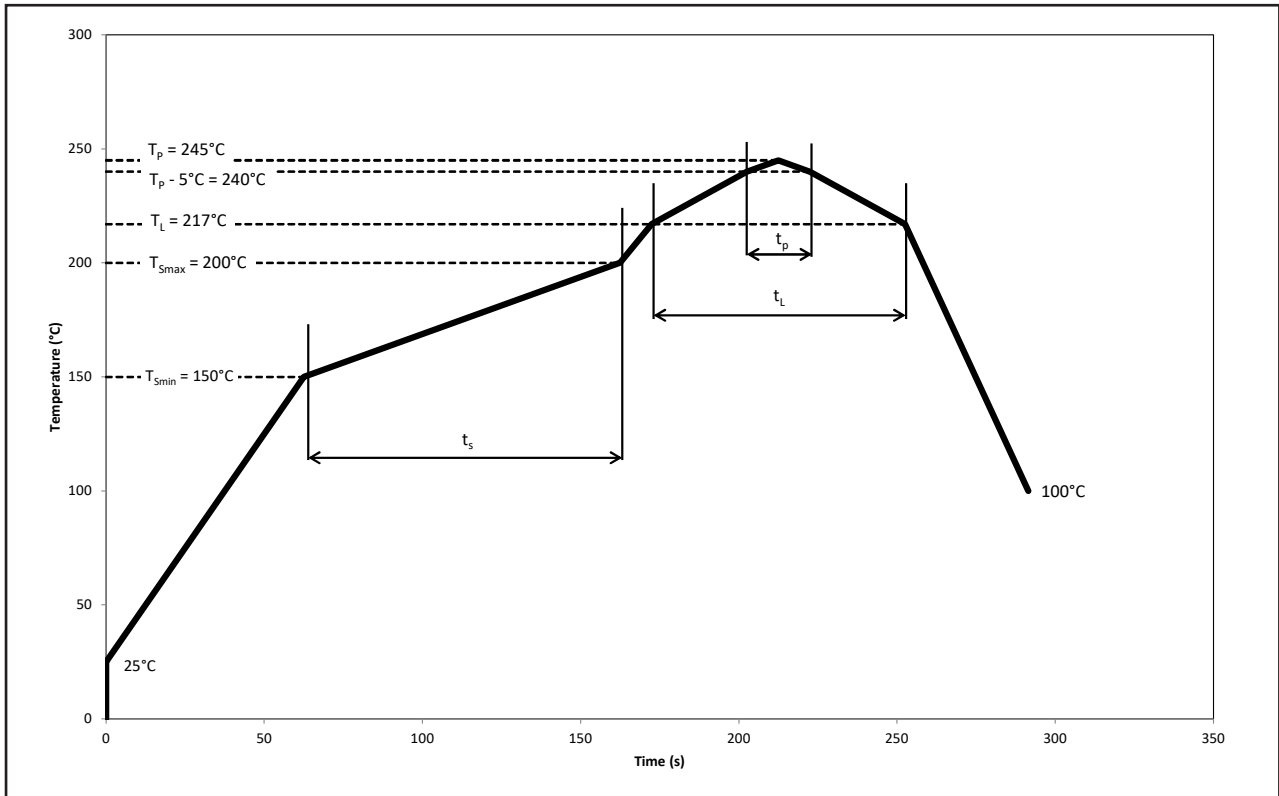
Packaging Specification



Quantity per bag (pcs)	Average 1pc SpiceLED (g)	1 completed bag (g)
5000	0.001	170 ± 10
18000	0.001	470 ± 10

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) **Reverse Voltage:**

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

Revision History

Page	Subjects	Date of Modification
1, 10	Add Features Update Package Specification	26 Oct 2015
1, 5, 6	Add Features Update Graph: Relative Intensity Vs Forward Current & Forward Current Vs Forward Voltage Update Notes in Package Outline	17 Feb 2016
5	Add Graph: Allowable Forward Current Vs Duty Ratio	24 Jun 2016
8, 12	Error on Taping and Orientation Add Appendix	26 Oct 2016
2, 4, 5, 12	Add New Part No: SSY-NLD-S2T1-2 Update Graphs Update Appendix	12 Apr 2018
9, 10, 11	Update Packaging Specification	20 Nov 2019
1, 2, 4, 12	Update Features Add New Partno: SSY-NLD-S2T-7 Update Test Condition for Peak Pulse Current Update Graph: Allowable Forward Current Vs Duty Ratio Update Recommended Pb-free Soldering Profile	29 Oct 2020
9, 10	Update Quantity per Reel (180mm)	21 Feb 2023
6, 10	Update Polarity in Package Outline Update Packaging Specification	31 Jan 2024

NOTE

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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>.

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