SnapLED

Functional solutions for robust rear combination lamp designs

SnapLED LEDs are a robust solution for customizable 2D and 3D clinch assemblies that allow efficient design solutions for rear lighting applications. The package utilizes Lumileds pioneering solderless clinch technology, designed specifically to meet the automotive industry's need for extreme reliability. SnapLED's proven design simplifies engineering complexity, increases styling flexibility and helps to minimize design cost.

FEATURES AND BENEFITS

- Low stress and low gas permeability silicone encapsulant
- Gold plated leadframe
- Robust and reliable package with reduced risk of de-lamination at high temperatures
- Fewer LEDs to meet functional requirements
- AEC-Q101C qualified and PPAP documentation available

PRIMARY APPLICATIONS

- Mirror/Side Repeater
- Side Marker
- Stop/Tail
  - CHMSL
- Turn

 ©2015 Lumileds Holding B.V. All rights reserved.

Table of Contents

General Information 3

Product Nomenclature 3

Environmental Compliance 3

Selection Guide 4

Dual Product Binning 4

Reliability Testing 5

Electrostatic Discharge (ESD) Test 5

Maximum Ratings, T_j=25°C 5

Optical & Electrical Characteristics 6

Mechanical Dimensions 7

Typical Spatial Radiation Pattern 8

Typical Relative Luminous Flux 9

Typical Junction Temperature vs. Intensity 10

Typical Forward Current Characteristics 11

Current Derating Curves 12

Thermal Resistance 13

Typical Wavelength Characteristics 14

Bin and Option Code Specifications 15

Low Current Luminous Flux Bin Definitions 16

Bin Range Option Codes 17

Color Bin Definition and Wavelength 17

Product Labeling Information 19

 ©2015 Lumileds Holding B.V. All rights reserved.

General Information

Product Nomenclature

The part number designation is explained as follows:
SSLABC-DEFG-xxxx

Where:

- SSL - designates the product type
- ABC - designates the current bin (150mA or 75mA)
- D - designates the package type (N = Narrow or W = Wide)
- E - designates the color (O = Red-orange, A = Amber)
- F - indicates the chip information and binning and packaging scheme
- G - indicates the binning and testing scheme.
- x - designates the minimum flux and flux bin range
- xxx - option codes for full standard part number.

Test Conditions for Optical Characteristics at Junction Temperature

Lumileds tests SnapLED emitters for 20ms integration time at T_a = 25°C. This datasheet specifies performance at a constant temperature of 25°C, except where noted.

Environmental Compliance

Lumileds is committed to providing environmentally friendly products to the solid-state lighting market. SnapLED 75 and SnapLED 150 is compliant to the European Union directives on the restriction of hazardous substances in electronic equipment, namely the RoHS directive. Lumileds will not intentionally add the following restricted materials to the SnapLED 75 and SnapLED 150 lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB) or polybrominated biphenyl ethers (PBDE).

 ©2015 Lumileds Holding B.V. All rights reserved.

Selection Guide

Product Selection Guide [1, 2]

Table 1.

LED Color SnapLed 75	Part Number	Drive Current Dual Mode	Viewing Angle 2θ 1/2 (Degrees) [1] Typ.
Red-Orange	SSL075-NO88	75 mA - 2.5 mA	45
	SSL075-WO88	75 mA - 2.5 mA	85
Amber	SSL075-NA88	75 mA - 2.5 mA	45
	SSL075-WA88	75 mA - 2.5 mA	85
SnapLed 150			
Red-Orange	SSL150-NO88	150 mA - 5 mA	45
	SSL150-WO88	150 mA - 5 mA	85
Amber	SSL150-NA88	150 mA - 5 mA	45
	SSL150-WA88	150 mA - 5 mA	85

Notes for Table 1:

1. $2\theta_{1/2}$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
2. Refer to page 21 for Flux bin selection and contact your respective technical service consultant for detail of Flux Φ_V (Lm) supportability.

Dual Product Binning

Automotive lamp makers can now take advantage of Lumileds flux stability across a wide operating range with SnapLED 75 and SnapLED 150 dual binning. The dual binnned products are designated with an "88" in the part number. SnapLED emitters are optimized and binned for use in dual-mode drive current applications such as automotive stop and tail lights, car and truck marker-turn, and tail-turn applications using low-cost, high-reliability resistor-diode drive circuits.

The optimized dual binned emitters offer 100% flux stabilization at temperature, allowing the user to operate the LEDs with flux & color stability over a dynamic range of forward voltages: SnapLED 75 from 75mA–2.5mA and SnapLED 150 from 150mA–5mA. This industry leading feature enables plug and play, immediate use of the SnapLED products without the need for additional handling, treatment or further characterization.

Key features include:

- Flexible dual binning scheme
- Higher maximum junction temperature of 135°C
- Higher flux at high & low currents
- Consistent color at high current
- Forward voltage bins with high current spacing of 60mV and with low current spacing of 30mV
- 20% flux bins at both high and low current with a guaranteed flux ratio between high and low current.

100% of the SnapLED 75 and SnapLED 150 products have 5 character binning eliminating the need to segregate parts between single and dual mode applications. Dual binning simplifies the production process, and ensures light output and color consistency over a wide operating range.

 ©2015 Lumileds Holding B.V. All rights reserved.

Reliability Testing

Lumileds conducts extensive reliability stress testing before the introduction of new products to ensure that they meet the reliability expectations of the automotive market. The development of SnapLED includes reliability test simulations for both high voltage (24V) jump start and high voltage (18V) alternator failure conditions to ensure LED survivability, performance and quality integrity as well as design margin allowance.

Table 2.

Parameter	Pre-test Condition	SSL150 I_f (mA)	SSL75 I_f (mA)	T_a (°C)	Stress Duration (minute)
Current overstress	High Voltage (24V) Jump Start Simulation	300	150	55	5
	High Voltage (18V) Alternator Failure Simulation	200	100	55	120
Temperature overstress (Junction Temperature)				max 185°C	

Electrostatic Discharge (ESD) Test

Table 3.

Electrostatic Discharge (ESD) Test	Test Conditions	Rating
Human Body Model	8000 V, 3 positive pulses, 3 negative pulses	JEDEC Class 3B (AEC: Class H3A)
Machine Model	400 V, 3 positive pulses, 3 negative pulses	JEDEC Class B (AEC: Class 3M)
Charged Device Model	1000V, 3 positive pulses, 3 negative pulses	JEDEC Class III (AEC : Class C4)

Maximum Ratings, T_j=25°C

Table 4.

Parameter	Symbol	SSL150 Rating	SSL075 Rating	Units
DC Forward Current [1, 2]	I_F	150	75	mA
Pulsed Forward Current	I_{FP}	300	150	mA
Min DC Forward Current [2]	I_F	5	2.5	mA
Power Dissipation		446	223	mW
Ambient Temperature Range	T_a	-40 to +115		°C
Storage Temperature Range		-55 to +110		°C
High Temperature Chamber		125 (2 hrs)	125 (2 hrs)	°C
LED Junction Temperature	T_j	135	135	°C

Notes for Table 4:

1. Derating is linearly as shown in derating curves.
2. Min and Max currents recommended for continuous DC mode.

 ©2015 Lumileds Holding B.V. All rights reserved.

Optical & Electrical Characteristics

Optical Characteristics, T_j=25°C [5]

Table 5.

Part Number	Ratio of Luminous Intensity to total Flux I_v(Cd/Φ_v (lm) [1] Typ.	Dominant Wavelength (nm) [2] λ_d Typ.	Peak Wavelength λ_{peak} (nm) [2] Typ.	Total included Angle θ0.90V (Degrees) [3] peak (nm) Typ.	Viewing Angle $2\theta^{1/2}$ (Degrees) [4] Typ.
SSL075-NO88	2.0	617	626	70	45
SSL075-WO88	0.6	617	626	120	85
SSL075-NA88	2.0	590	592	70	45
SSL075-WA88	0.6	590	592	120	85
SSL150-NO88	2.0	617	628	70	45
SSL150-WO88	0.6	617	628	120	85
SSL150-NA88	2.0	592	593	70	45
SSL150-WA88	0.6	592	593	120	85

Notes for Table 5:

1. Intensity/Flux at HV axis
2. Dominant wavelength is derived from the CIE 1931 Chromaticity diagram and represents the perceived color. Lumileds maintains a tolerance of ±0.5 nm for dominant wavelength measurements.
3. θ0.90V is the included angle at which 90% of the total luminous flux is captured.
4. $2\theta_{1/2}$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.

Electrical Characteristics, T_j = 25°C

Table 6.

Parameter	Symbol	SSL150 Rating	SSL075 Rating	Units
Forward Voltage V_F (V)	V_F	2.8	2.8	V (Typ)
Reverse Voltage (I_R = 100μA)	V_R	10	10	V
Capacitance V_F=0, f=1MHz	C	50	25	pF(Typ)
Thermal Resistance	$R\theta_{J\text{-}PIN}$	60	75	°C/W
Speed of Response Time Constant, $e^{-t/\tau}$ s	τs	20	20	ns

 ©2015 Lumileds Holding B.V. All rights reserved.

Mechanical Dimensions

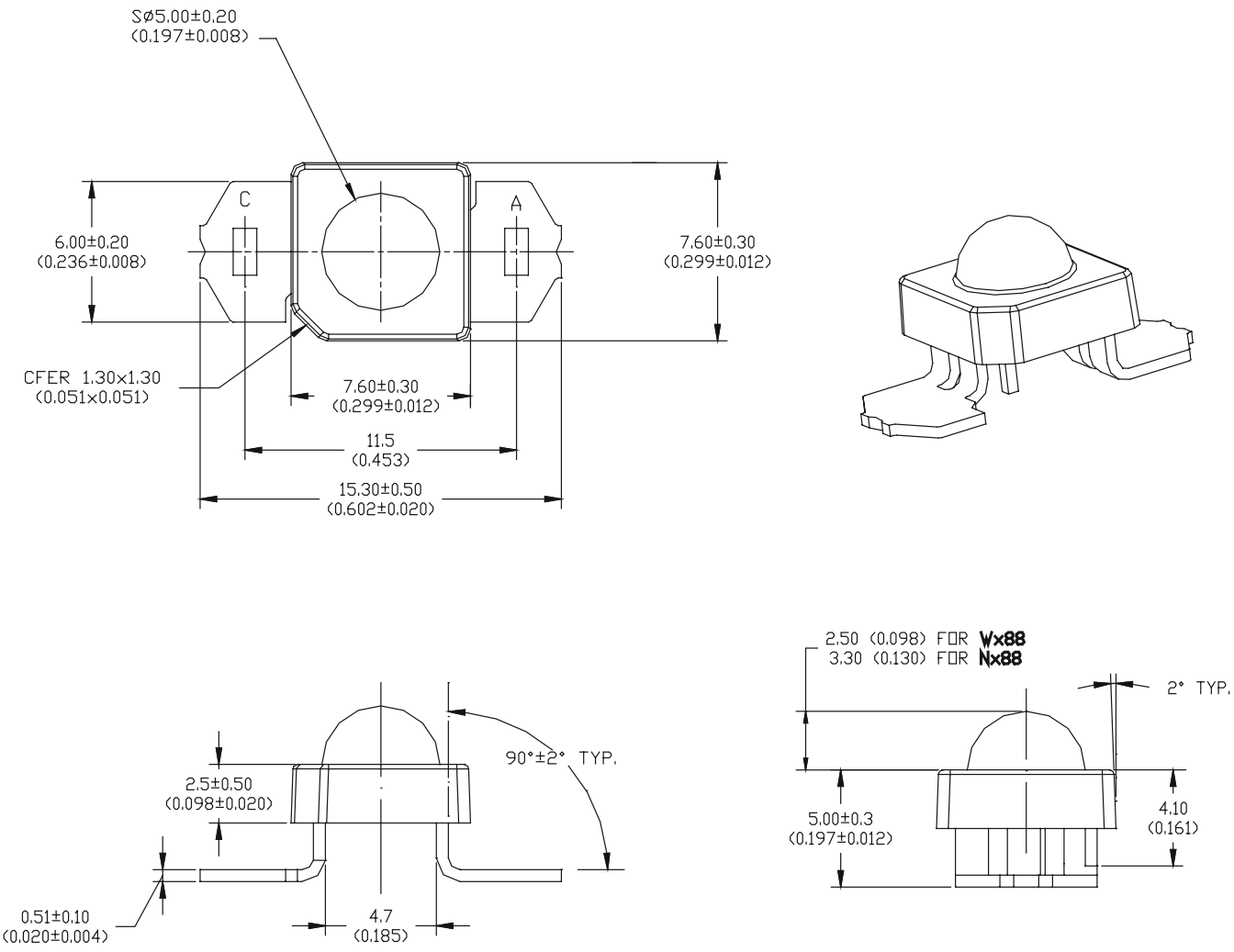

Figure 1. Package outline drawing.

Notes for Figure 1:

- Dimensions are in millimeters.
- Dimensions without tolerances are nominal.
- Cathode lead is indicated with a "C" and anode lead is indicated with an "A." (image is for illustration purposes)
- Clinch joint locations shown in dashed lines on top view of the emitter (11.50 mm spacing).

For more detailed information please visit www.lumileds.com.

 ©2015 Lumileds Holding B.V. All rights reserved.

Typical Spatial Radiation Pattern

SnapLED Wide (phi=0°)

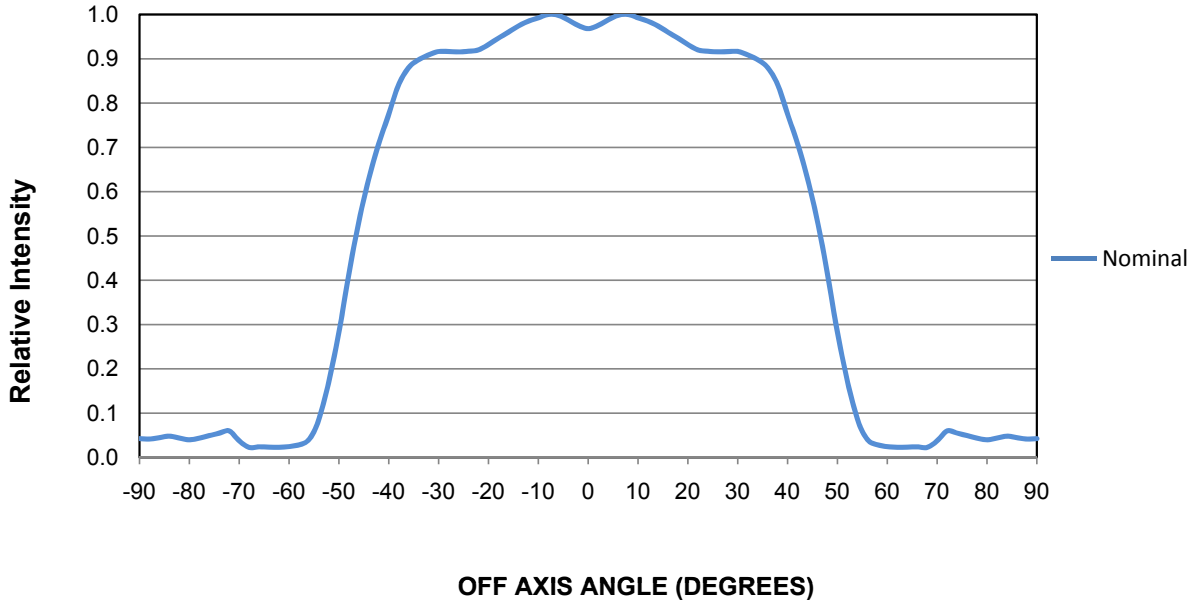

Figure 2. Relative luminous intensity vs. off axis angle (degrees).

SnapLED Narrow (phi=0°)

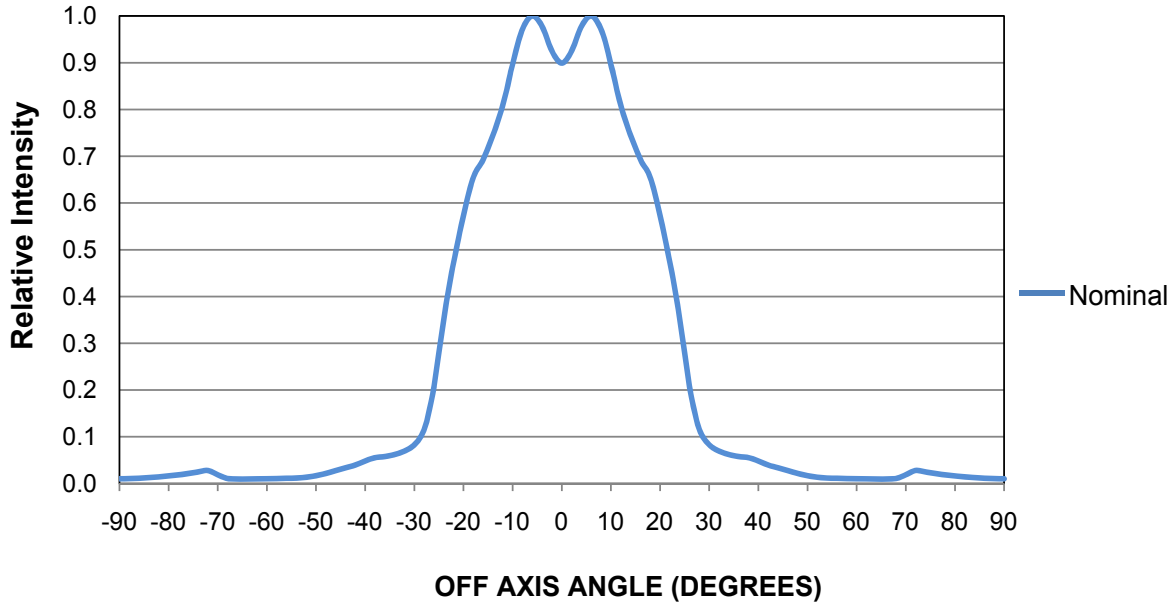

Figure 3. Relative luminous intensity vs. axis angle (degrees).

 ©2015 Lumileds Holding B.V. All rights reserved.

Typical Relative Luminous Flux

Typical Relative Luminous Flux vs. Forward Current for SnapLED 75

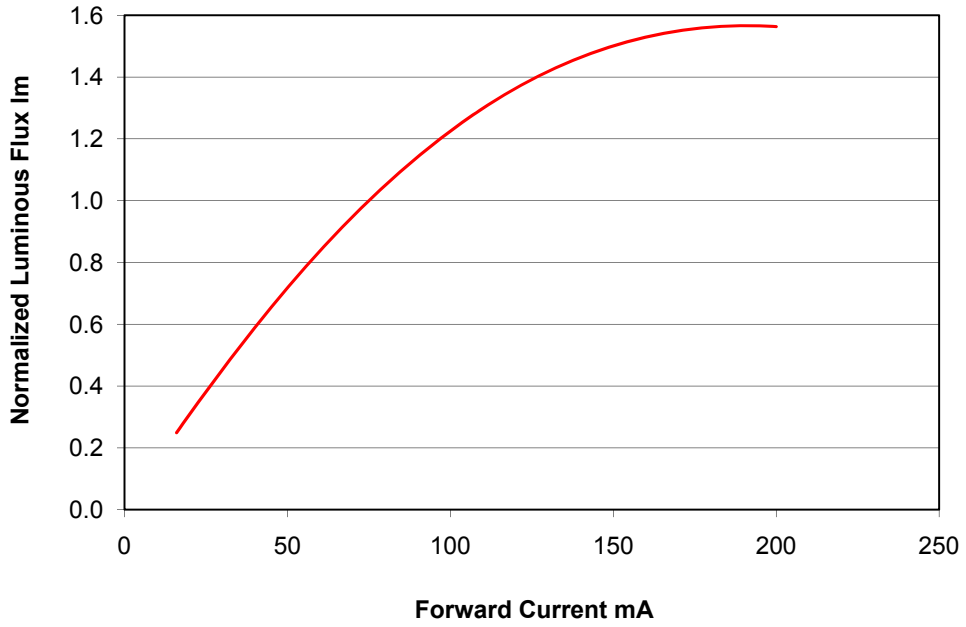

Figure 4. Typical relative luminous flux vs. forward current for SnapLED 75, red-orange & amber, junction temperature = 25°C.

Typical Relative Luminous Flux vs. Forward Current for SnapLED 150

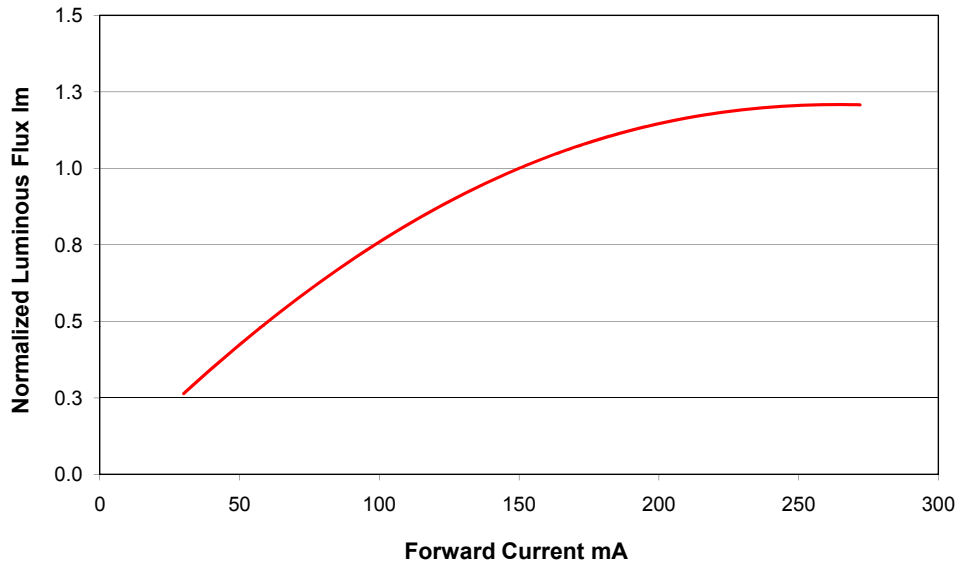

Figure 5. Typical relative flux vs. foward current for SnapLED 150, red-orange & amber, junction temperature = 25°C.

 ©2015 Lumileds Holding B.V. All rights reserved.

Typical Junction Temperature vs. Intensity

SnapLED 75 and SnapLED 150 Red-Orange and Amber Luminous Flux vs. Junction Temperature

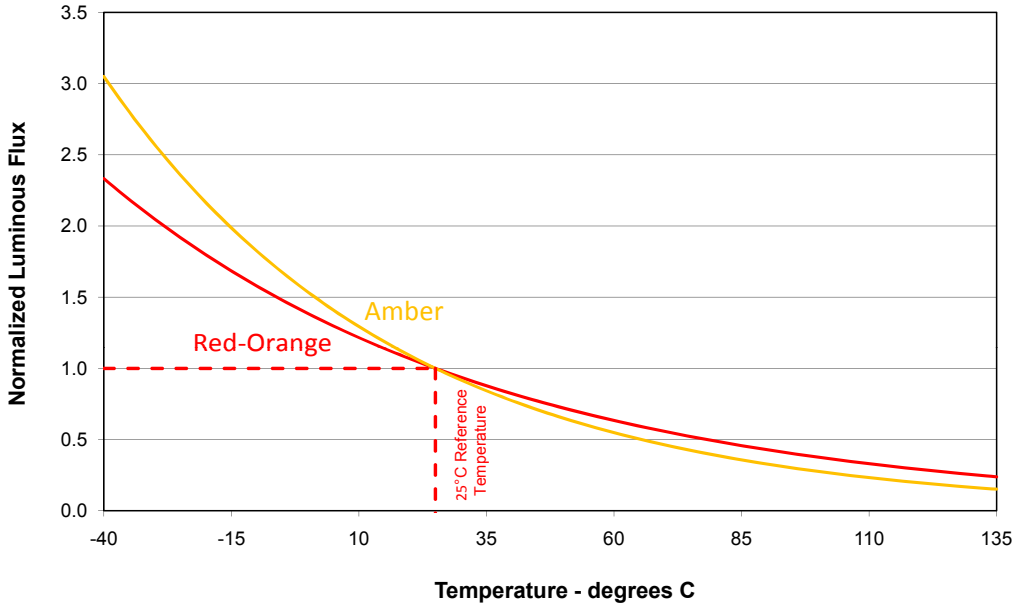

Figure 6. SnapLED luminous flux vs. junction temperature.

 ©2015 Lumileds Holding B.V. All rights reserved.

Typical Forward Current Characteristics

Typical Forward Current Characteristics, Junction Temperature = 25°C

SnapLED 75

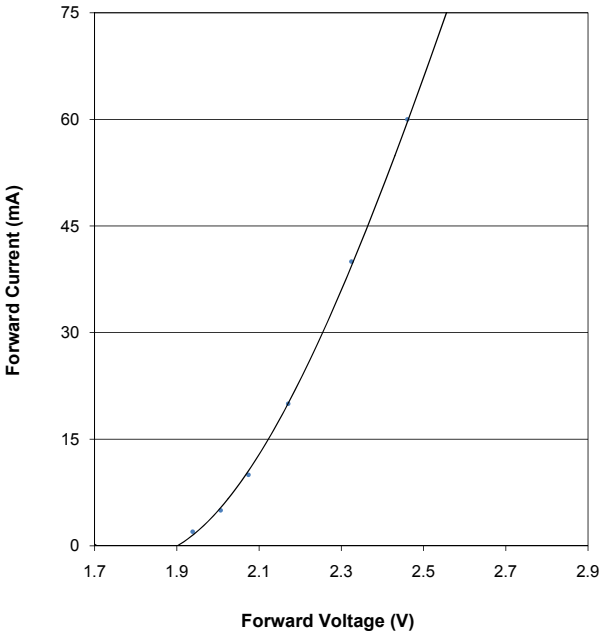

Figure 7. SnapLED 75 red-orange & amber forward current vs. forward voltage. Values are typical unless specified as maximum.

SnapLED 150

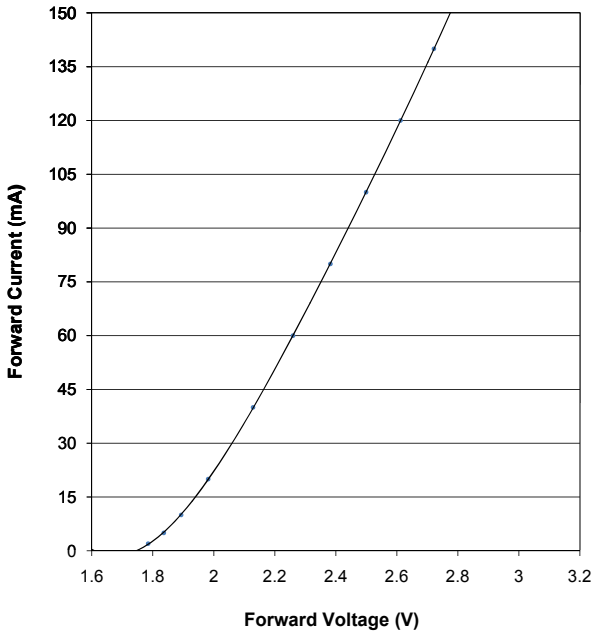

Figure 8. SnapLED 150 red-orange & amber forward current vs. forward voltage. Values are typical unless specified as maximum.

 ©2015 Lumileds Holding B.V. All rights reserved.

Current Derating Curves

SnapLED 75

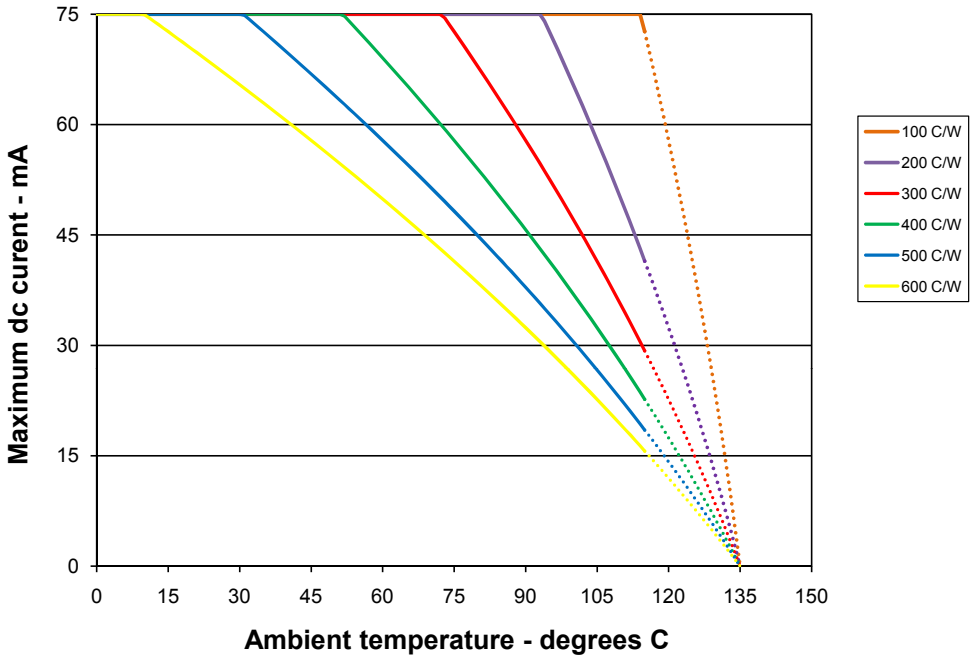

Figure 11. Current derating curve for SnapLED 75mA drive current.

SnapLED 150

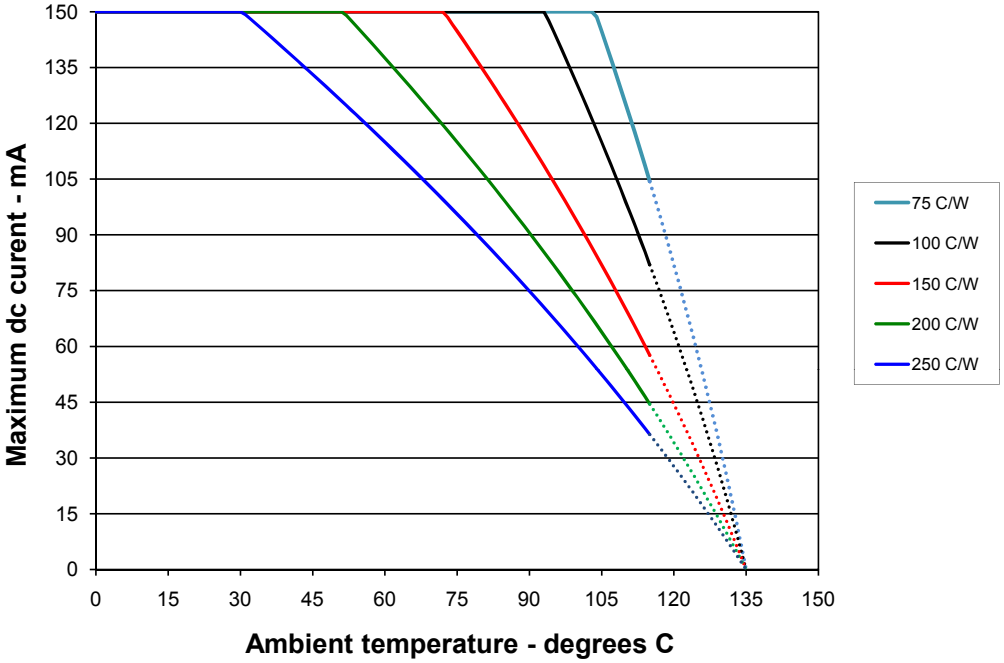

Figure 12. Current derating curve for SnapLED 150mA drive current.

 ©2015 Lumileds Holding B.V. All rights reserved.

Thermal Resistance

Approximate Total Thermal Resistance vs. Clinch Frame Area Per Cathode

SnapLED 75

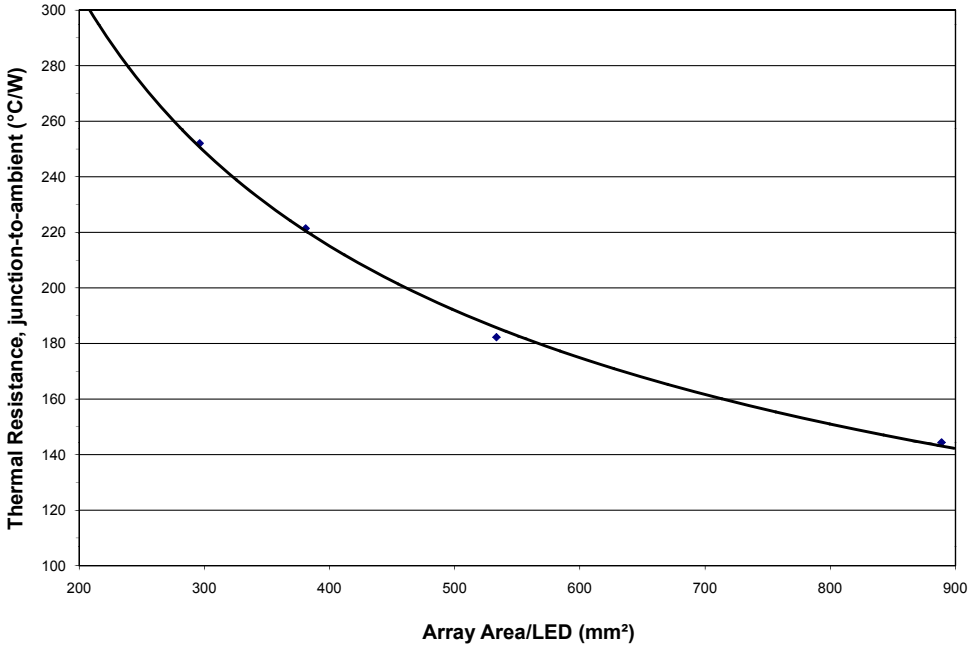

Figure 13. Approximate total thermal resistance vs. clinch frame area/LED - SnapLED 75.

SnapLED 150

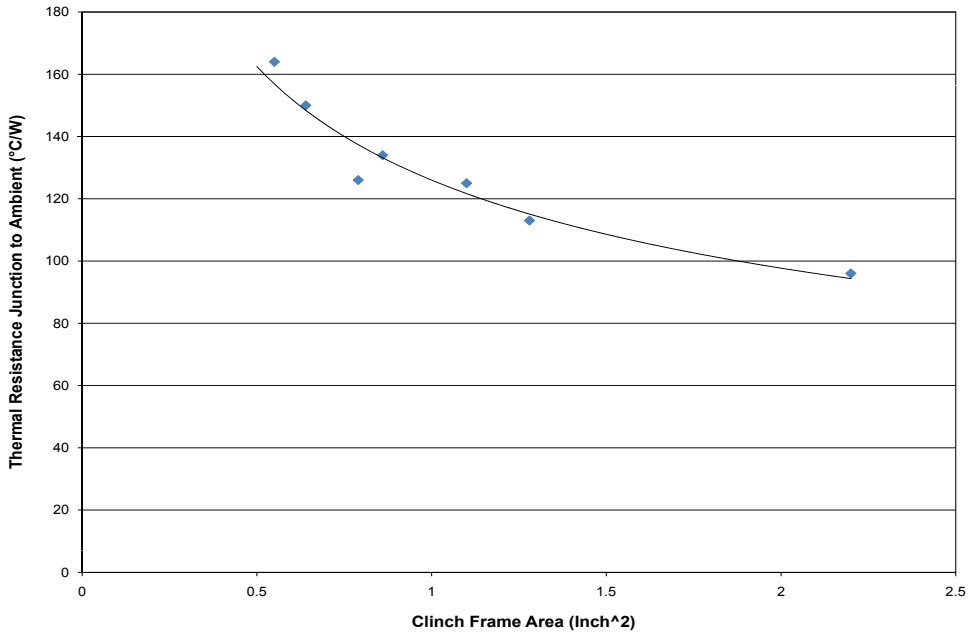

Figure 14. Approximate total thermal resistance vs. clinch frame area/LED - SnapLED 150.

 ©2015 Lumileds Holding B.V. All rights reserved.

Typical Wavelength Characteristics

Typical Wavelength Characteristics, Junction Temperature = 25°C

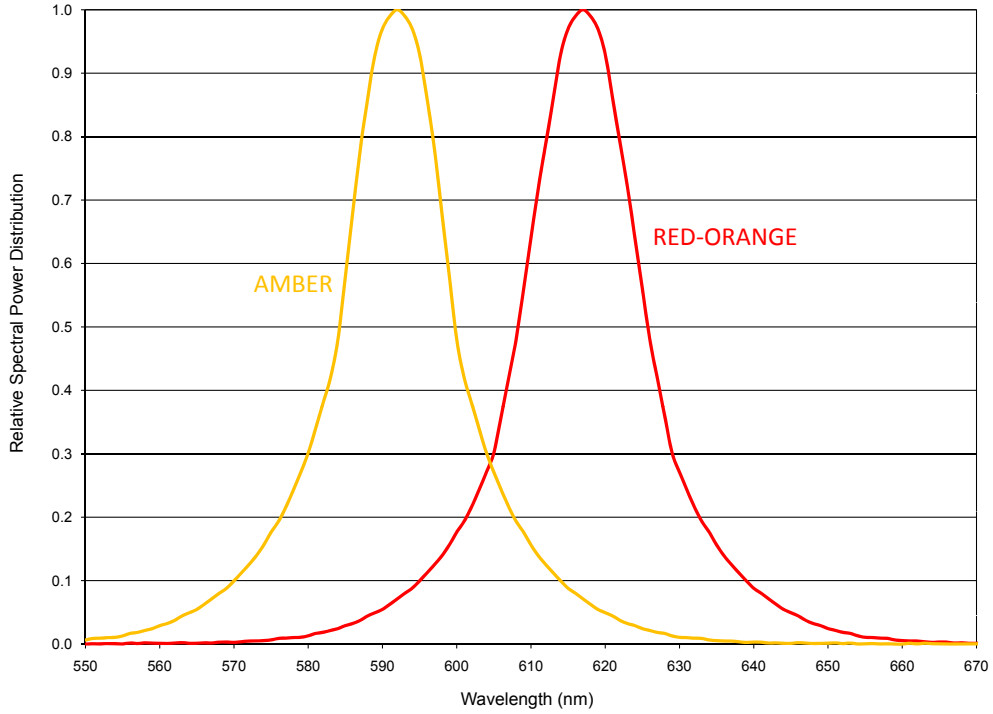

Figure 15. Relative intensity vs. wavelength.

 ©2015 Lumileds Holding B.V. All rights reserved.

Bin and Option Code Specifications

This section provides bin selection assistance for SnapLED LEDs. Product availability varies by color and other factors, and not all bin selection combinations are available. Contact your Lumileds representative for further assistance.

Product availability varies by color and other factors, and not all bin selection combinations are available.

Table 7. Min Flux Bin @ High Current

High Flux Bin	Minimum Flux (lm)	Maximum Flux (lm)	Low Flux Bin
	SnapLED 150 (SSL150-xO88)		
G	10.4	12.5	F, G, H
H	12.5	15.0	G, H, J
J	15.0	18.0	H, J, M
M	18.0	21.0	J, M, N
N	21.0	25.0	M, N, P
P	25.0	30.0	N, P, R
R	30.0	36.0	P, R, U
	SnapLED 150 (SSL150-xA88)		
E	7.3	8.7	C, D, E, F, G
F	8.7	10.4	D, E, F, G, H
G	10.4	12.5	E, F, G, H, J
H	12.5	15.0	F, G, H, J, M
J	15.0	18.0	G, H, J, M, N
M	18.0	21.0	H, J, M, N, P
N	21.0	25.0	J, M, N, P, R
	SnapLED 75 (SSL075-xO88)		
D	6.1	7.3	C, D, E
E	7.3	8.7	D, E, F
F	8.7	10.4	E, F, G
G	10.4	12.5	F, G, H
H	12.5	15.0	G, H, J
J	15.0	18.0	H, J, M
M	18.0	21.0	J, M, N
	SnapLED 75 (SSL075-xA88)		
B	4.3	5.1	A, B, C, D
C	5.1	6.1	A, B, C, D, E
D	6.1	7.3	B, C, D, E, F
E	7.3	8.7	C, D, E, F, G
F	8.7	10.4	D, E, F, G, H
G	10.4	12.5	E, F, G, H, J
H	12.5	15.0	F, G, H, J, M

Note for Table 7:

- Refer to low current luminous flux bin table for low current bin information.

 ©2015 Lumileds Holding B.V. All rights reserved.

Low Current Luminous Flux Bin Definitions

Table 8. Low Current Luminous Flux Binning

Color	Applicable Product	Bin Code	Min Luminous Flux (lm)	Max Luminous Flux (lm)
Red-Orange	SSL150-xO88	F	0.29	0.35
		G	0.35	0.42
		H	0.42	0.50
		J	0.50	0.60
		M	0.60	0.72
		N	0.72	0.86
		P	0.86	1.02
		R	1.02	1.22
		U	1.22	1.46
Amber	SSL150-xA88	C	0.17	0.20
		D	0.20	0.24
		E	0.24	0.29
		F	0.29	0.35
		G	0.35	0.42
		H	0.42	0.50
		J	0.50	0.60
		M	0.60	0.72
		N	0.72	0.86
		P	0.86	1.02
		R	1.02	1.22
Red-Orange	SSL075-xO88	C	0.17	0.20
		D	0.20	0.24
		E	0.24	0.29
		F	0.29	0.35
		G	0.35	0.42
		H	0.42	0.50
		J	0.50	0.60
		M	0.60	0.72
		N	0.72	0.86
Amber	SSL075-xA88	A	0.12	0.14
		B	0.14	0.17
		C	0.17	0.20
		D	0.20	0.24
		E	0.24	0.29
		F	0.29	0.35
		G	0.35	0.42
		H	0.42	0.50
		J	0.50	0.60
		M	0.60	0.72

 ©2015 Lumileds Holding B.V. All rights reserved.

Bin Range Option Codes

Product availability varies by color and other factors and not all bin selection combinations are available.

Table 9.

High Current Flux Bin Codes	
Bin Range Option Codes	Bin Range
0	All bin above the Minimum
2	2 flux bin
3	3 flux bin
4	4 flux bin
5	5 flux bin
6	6 flux bin

Notes:

- Option codes indicate the inclusive range of flux bins allowed above the indicated requested bin.

Color Bin Definition and Wavelength

Table 10.

Color	Color Code	Min (nm)	Max (nm)
Amber	1	588	590
	2	590	594
Red-Orange	3	613	618
	4	618	623
	5	623	628

Note for Table 10:

- Tester error for wavelength maintained at ±1nm.

 ©2015 Lumileds Holding B.V. All rights reserved.

Table 11. V_F Definition

High Current V_F Binning (150mA / 75mA)			
Color	V_F Label	Min V_F	Max V_F
Amber	1	2.37	2.43
Red-Orange	2	2.43	2.49
Red-Orange	3	2.49	2.55
Red-Orange	4	2.55	2.61
Red-Orange	5	2.61	2.67
Red-Orange	6	2.67	2.73
Red-Orange	7	2.73	2.79
Red-Orange	8	2.79	2.85
Red-Orange	9	2.85	2.91
Amber	A	2.91	2.97
Low Current V_F Binning (5mA - 2.5mA)			
Red-Orange and Amber	1	1.78	1.81
Red-Orange and Amber	2	1.81	1.84
Red-Orange and Amber	3	1.84	1.87
Red-Orange and Amber	4	1.87	1.90
Red-Orange and Amber	5	1.90	1.93
Red-Orange and Amber	6	1.93	1.96
Red-Orange and Amber	7	1.96	1.99
Amber	8	1.99	2.02

Table 12. V_F Definitions

Color	High Current V_F Binning (150mA / 75mA) High V_F	Low Current V_F Binning (5mA - 2.5mA) Low V_F
Red-Orange	2	1
Red-Orange	3	1, 2
Red-Orange	4	1, 2, 3
Red-Orange	5	1, 2, 3, 4
Red-Orange	6	1, 2, 3, 4, 5
Red-Orange	7	1, 2, 3, 4, 5, 6
Red-Orange	8	2, 3, 4, 5, 6, 7
Red-Orange	9	3, 4, 5, 6, 7

Notes:

- V_f Pairing Definition applicable to red-orange only.
- All measurements done with 20ms integration time at T_a = 25°C.
- Tester Error maintained at 3sigma = ±10%. (Applies to lumin only).
- Tester Error maintained at 3sigma = ±0.06V (Applies to forward voltage only).
- Tester Error maintained at 3sigma = ±1nm (Applies to wavelength only).

 ©2015 Lumileds Holding B.V. All rights reserved.

Product Labeling Information

SnapLED Tubes

SnapLED LEDs are packaged in tubes for use with automatic insertion equipment. Each tube contains 60 LEDs. The LEDs in each tube come from a single category code, ensuring they are all well-matched for light output, color, and forward voltage. Each tube contains a rubber stopper at each end.

The tube label has both alphanumeric and bar code information. Figure 16 shows a sample label and a SnapLED LED tube. Labels include the Lumileds logo, the LED device type in alphanumeric above the corresponding bar code, a large 5-digit category code.

Baby Label

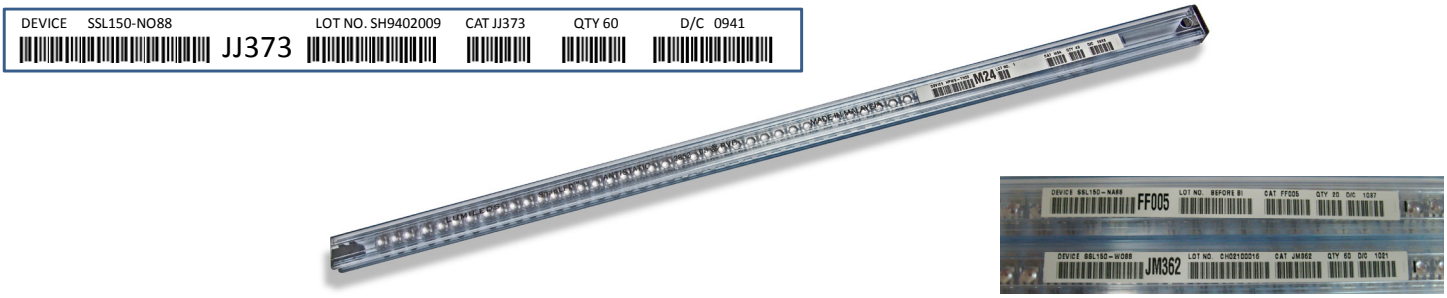

Figure 16.

SnapLED Bundles

SnapLED emitter tubes are also available in shrink wrapped bundles. Each bundle includes 600 SnapLED emitters: ten SnapLED tubes. As with the individual tubes, bundles contain tubes from a single category code.

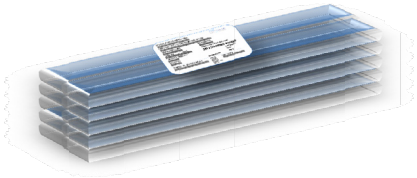

Figure 17. SnapLED bundle.

Product bundles include the following information: Lumileds part number, 5 digit category code, lot code (for Lumileds internal use), quantity, and the date code range.

In addition, the following fields are provided for customer-specific information: vendor code, customer part number, customer revision level, and customer purchase order number. There are some restrictions regarding the format of each field, so please consult your Lumileds representative for more information.

Bundle Label

Each bundle of tubes will have a bundle label as shown in Figure 20. The label indicates the part Number of SnapLED Products with CAT Code and the quantity of the products contained inside the box. Tubes will be packed into bundles of 10 tubes maximum and shipped in boxes measuring is (49.2 cm x 20.1 cm x 11.8 cm).

Figure 18.

 ©2015 Lumileds Holding B.V. All rights reserved.

About Lumileds

Lumileds is the light engine leader, delivering innovation, quality, and reliability.

For 100 years, Lumileds commitment to innovation has helped customers pioneer breakthrough products in the automotive, consumer and illumination markets.

Lumileds is shaping the future of light with our LEDs and automotive lamps, and helping our customers illuminate how people see the world around them.

To learn more about our portfolio of light engines visit www.lumileds.com.

©2015 Lumileds Holding B.V. All rights reserved.
LUXEON is a registered trademark of the Lumileds Holding B.V. in the United States and other countries.

www.lumileds.com

Neither Lumileds Holding B.V. nor its affiliates shall be liable for any kind of loss of data or any other damages, direct, indirect or consequential, resulting from the use of the provided information and data. Although Lumileds Holding B.V. and/or its affiliates have attempted to provide the most accurate information and data, the materials and services information and data are provided "as is," and neither Lumileds Holding B.V. nor its affiliates warrants or guarantees the contents and correctness of the provided information and data. Lumileds Holding B.V. and its affiliates reserve the right to make changes without notice. You as user agree to this disclaimer and user agreement with the download or use of the provided materials, information and data.