

SST-20-W

High CRI Specialty White LED

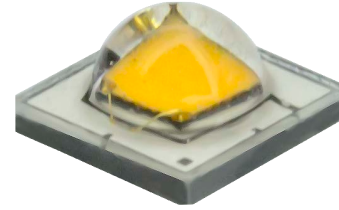


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Features:

- Compact monolithic emitter ideal for directional lighting applications with high uniformity
- Available in 2700K, 3000K, 3500K and 4000K color points with 95 CRI Minimum
- Engineered to eliminate observable inter-device color-point variability common with high power LEDs
- Binned at 350 mA, 85 °C
- Maximum drive current: 2 A
- High thermal conductivity package - junction thermal resistance of only 1.6 °C/W
- 120° viewing angle
- 8000V HBM ESD rating per JEDEC/ESDA STANDARD JS-001
- Electrically isolated thermal path
- RoHS and REACH compliant

Applications

- Spot light
- Horticulture grow light
- Stage light
- Residential
- Studio light

General Considerations

Environmental Considerations:

As a leading provider of solid-state lighting solutions, luminus implements strict substance control policies to ensure all of its products are environmentally friendly. As all Luminus LEDs, the SST-20-W series are compliant with the restriction of hazardous substances directive (rohs) and reach directives from the european community.

Product Testing:

Every SST-20-W LED is fully production tested to ensure it meets the high quality standards customers have come to expect from Luminus products. Devices are binned to correlated values at 350 mA, 20 msec pulse condition at $T_j = 85^{\circ}\text{C}$. Current and temperature curves are provided in this document allowing users to predict the LED performance and characteristics under their own driving and thermal conditions.

Product Testing:

Luminus SST-20-W LED series are required to pass a rigorous suite of environmental and mechanical stress tests, including mechanical shock, vibration, temperature cycling and humidity. These tests ensure that the devices deliver high performance and achieve reliable long term operation in the automotive and other demanding environments. Please contact Luminus for further information.conditions.

Flux Binning Structure

SST-20-W LEDs are binned for luminous flux based on $I_f = 350$ mA and 85 °C junction temperature (T_j) conditions.

Flux Bin (FF)* ¹	Min. Flux(lm) 350 mA, 85 °C	Max. Flux(lm) 350 mA, 85 °C	Min. Flux(lm) 350 mA, 25 °C	Correlated Minimum Luminous Flux(lm)@85 °C		
				700 mA	1000 mA	2000 mA
L3	164	172	180	295	402	672
L2	156	164	172	281	382	640
K5	148	156	163	266	363	607
K4	139	148	153	250	341	570
K3	130	139	143	234	319	533
K2	122	130	134	220	299	500
J5	114	122	125	205	279	467
J4	107	114	118	193	262	439
J3	100	107	110	180	245	410
J2	93	100	102	167	228	381
H5	86	93	94	155	211	353

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

Note 2: Correlated flux values at 700 mA, 1000 mA and 2000 mA are for reference only.

Forward Voltage Binning Structure

SST-20-W LEDs are binned for forward voltage based on $I_f = 350$ mA and 85 °C junction temperature (T_j) conditions.

Voltage Bin ³	Min. Voltage (V)	Max. Voltage (V)
VH	2.5	2.7
VJ	2.7	2.9
VK	2.9	3.1

Note 3: Individual voltage bins are not orderable.

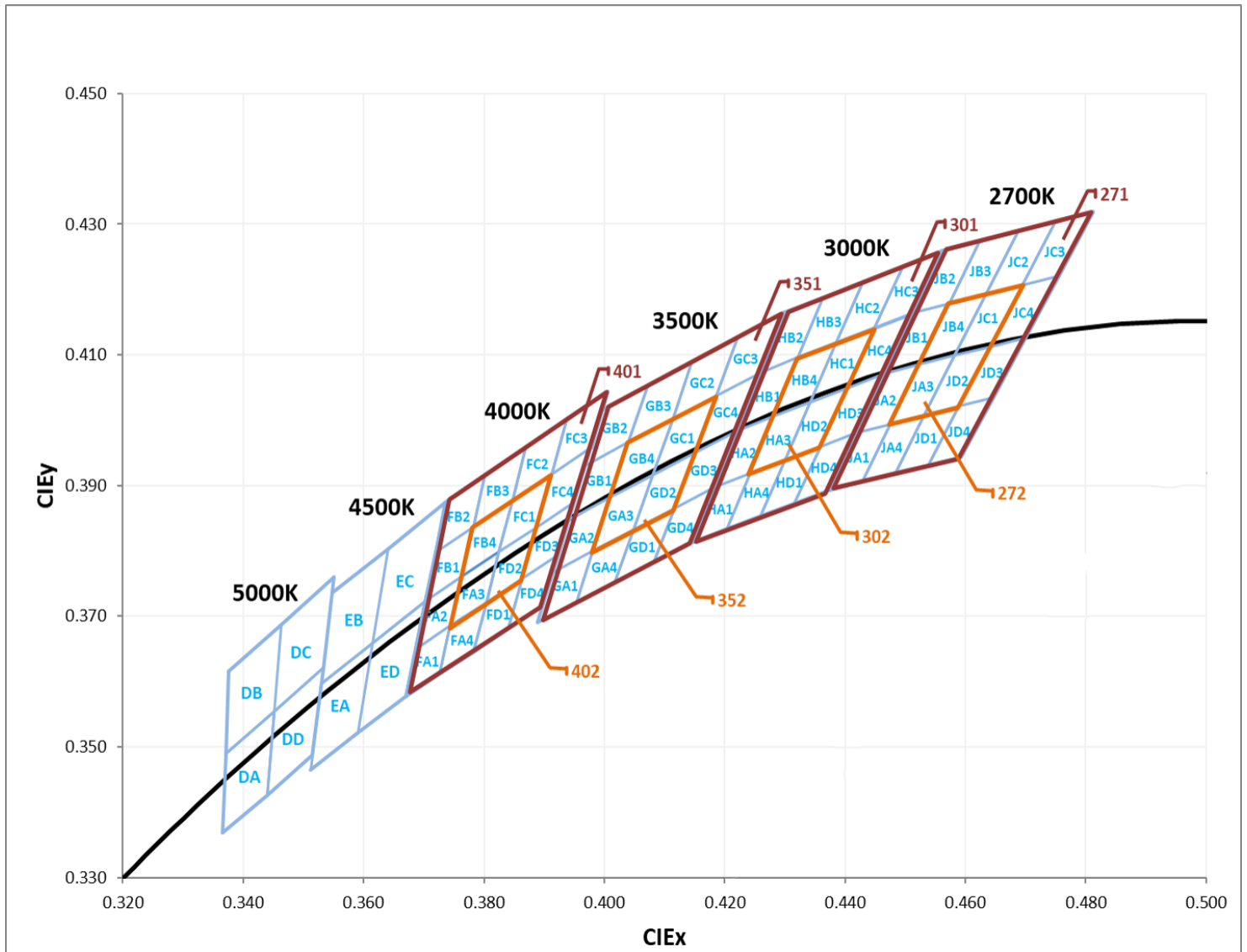
Chromaticity Bin Definitions

CCT	Bin code	CIE-X	CIE-Y	Bin code	CIE-X	CIE-Y	Bin code	CIE-X	CIE-Y	Bin code	CIE-X	CIE-Y
2700	JA1	0.4373	0.3893	JA2	0.4418	0.3981	JA3	0.4475	0.3994	JA4	0.4428	0.3906
		0.4418	0.3981		0.4465	0.4071		0.4523	0.4085		0.4475	0.3994
		0.4475	0.3994		0.4523	0.4085		0.4582	0.4099		0.4532	0.4008
		0.4428	0.3906		0.4475	0.3994		0.4532	0.4008		0.4483	0.3919
	JB1	0.4465	0.4071	JB2	0.4513	0.4164	JB3	0.4573	0.4178	JB4	0.4523	0.4085
		0.4513	0.4164		0.4562	0.426		0.4624	0.4274		0.4573	0.4178
		0.4573	0.4178		0.4624	0.4274		0.4687	0.4289		0.4634	0.4193
		0.4523	0.4085		0.4573	0.4178		0.4634	0.4193		0.4582	0.4099
	JC1	0.4582	0.4099	JC2	0.4634	0.4193	JC3	0.4695	0.4207	JC4	0.4641	0.4112
		0.4634	0.4193		0.4687	0.4289		0.475	0.4304		0.4695	0.4207
		0.4695	0.4207		0.475	0.4304		0.4813	0.4319		0.4756	0.4221
		0.4641	0.4112		0.4695	0.4207		0.4756	0.4221		0.47	0.4126
	JD1	0.4483	0.3919	JD2	0.4532	0.4008	JD3	0.4589	0.4021	JD4	0.4538	0.3931
		0.4532	0.4008		0.4582	0.4099		0.4641	0.4112		0.4589	0.4021
		0.4589	0.4021		0.4641	0.4112		0.47	0.4126		0.4646	0.4034
		0.4538	0.3931		0.4589	0.4021		0.4646	0.4034		0.4593	0.3944
3000	HA1	0.4147	0.3814	HA2	0.4183	0.3898	HA3	0.4242	0.3919	HA4	0.4203	0.3833
		0.4183	0.3898		0.4221	0.3984		0.4281	0.4006		0.4242	0.3919
		0.4242	0.3919		0.4281	0.4006		0.4342	0.4028		0.43	0.3939
		0.4203	0.3833		0.4242	0.3919		0.43	0.3939		0.4259	0.3853
	HB1	0.4221	0.3984	HB2	0.4259	0.4073	HB3	0.4322	0.4096	HB4	0.4281	0.4006
		0.4259	0.4073		0.4299	0.4165		0.4364	0.4188		0.4322	0.4096
		0.4322	0.4096		0.4364	0.4188		0.443	0.4212		0.4385	0.4119
		0.4281	0.4006		0.4322	0.4096		0.4385	0.4119		0.4342	0.4028
	HC1	0.4342	0.4028	HC2	0.4385	0.4119	HC3	0.4449	0.4141	HC4	0.4403	0.4049
		0.4385	0.4119		0.443	0.4212		0.4496	0.4236		0.4449	0.4141
		0.4449	0.4141		0.4496	0.4236		0.4562	0.426		0.4513	0.4164
		0.4403	0.4049		0.4449	0.4141		0.4513	0.4164		0.4465	0.4071
	HD1	0.4259	0.3853	HD2	0.43	0.3939	HD3	0.4359	0.3960	HD4	0.4316	0.3873
		0.43	0.3939		0.4342	0.4028		0.4403	0.4049		0.4359	0.396
		0.4359	0.396		0.4403	0.4049		0.4465	0.4071		0.4418	0.3981
		0.4316	0.3873		0.4359	0.396		0.4418	0.3981		0.4373	0.3893

Performance Chromaticity Continued

3500	GA1	0.3889	0.369	GA2	0.3915	0.3768	GA3	0.3981	0.38	GA4	0.3953	0.372
		0.3915	0.3768		0.3941	0.3848		0.401	0.3882		0.3981	0.38
		0.3981	0.38		0.401	0.3882		0.408	0.3916		0.4048	0.3832
		0.3953	0.372		0.3981	0.38		0.4048	0.3832		0.4017	0.3751
	GB1	0.3941	0.3848	GB2	0.3968	0.393	GB3	0.4040	0.3966	GB4	0.401	0.3882
		0.3968	0.393		0.3996	0.4015		0.4071	0.4052		0.404	0.3966
		0.404	0.3966		0.4071	0.4052		0.4146	0.4089		0.4113	0.4001
		0.401	0.3882		0.404	0.3966		0.4113	0.4001		0.408	0.3916
	GC1	0.408	0.3916	GC2	0.4113	0.4001	GC3	0.4186	0.4037	GC4	0.415	0.395
		0.4113	0.4001		0.4146	0.4089		0.4222	0.4127		0.4186	0.4037
		0.4186	0.4037		0.4222	0.4127		0.4299	0.4165		0.4259	0.4073
		0.415	0.395		0.4186	0.4037		0.4259	0.4073		0.4221	0.3984
	GD1	0.4017	0.3751	GD2	0.4048	0.3832	GD3	0.4116	0.3865	GD4	0.4082	0.3782
		0.4048	0.3832		0.408	0.3916		0.415	0.395		0.4116	0.3865
		0.4116	0.3865		0.415	0.395		0.4221	0.3984		0.4183	0.3898
		0.4082	0.3782		0.4116	0.3865		0.4183	0.3898		0.4147	0.3814
4000	FA1	0.367	0.3578	FA2	0.3686	0.3649	FA3	0.3744	0.3685	FA4	0.3726	0.3612
		0.3686	0.3649		0.3702	0.3722		0.3763	0.376		0.3744	0.3685
		0.3744	0.3685		0.3763	0.376		0.3825	0.3798		0.3804	0.3721
		0.3726	0.3612		0.3744	0.3685		0.3804	0.3721		0.3783	0.3646
	FB1	0.3702	0.3722	FB2	0.3719	0.3797	FB3	0.3782	0.3837	FB4	0.3763	0.376
		0.3719	0.3797		0.3736	0.3874		0.3802	0.3916		0.3782	0.3837
		0.3782	0.3837		0.3802	0.3916		0.3869	0.3958		0.3847	0.3877
		0.3763	0.376		0.3782	0.3837		0.3847	0.3877		0.3825	0.3798
	FC1	0.3825	0.3798	FC2	0.3847	0.3877	FC3	0.3912	0.3917	FC4	0.3887	0.3836
		0.3847	0.3877		0.3869	0.3958		0.3937	0.4001		0.3912	0.3917
		0.3912	0.3917		0.3937	0.4001		0.4006	0.4044		0.3978	0.3958
		0.3887	0.3836		0.3912	0.3917		0.3978	0.3958		0.395	0.3875
	FD1	0.3783	0.3646	FD2	0.3804	0.3721	FD3	0.3863	0.3758	FD4	0.384	0.3681
		0.3804	0.3721		0.3825	0.3798		0.3887	0.3836		0.3863	0.3758
		0.3863	0.3758		0.3887	0.3836		0.395	0.3875		0.3924	0.3794
		0.384	0.3681		0.3863	0.3758		0.3924	0.3794		0.3898	0.3716

SST-20-W Warm White Color Space Plotted on the ANSI 1931 Curve



Chromaticity Bin Kit Codes

CCT	Bin Kit	Chromaticity Bins
2700K	271	JA1,JA2,JA3,JA4,JB1,JB2,JB3,JB4,JC1,JC2,JC3,JC4,JD1,JD2,JD3,JD4
	272	JA3,JB4,JC1,JD2
3000K	301	HA1,HA2,HA3,HA4,HB1,HB2,HB3,HB4,HC1,HC2,HC3,HC4,HD1,HD2,HD3,HD4
	302	HA3,HB4,HC1,HD2
3500K	351	GA1,GA2,GA3,GA4,GB1,GB2,GB3,GB4,GC1,GC2,GC3,GC4,GD1,GD2,GD3,GD4
	352	GA3,GB4,GC1,GD2
4000K	401	FA1,FA2,FA3,FA4,FB1,FB2,FB3,FB4,FC1,FC2,FC3,FC4,FD1,FD2,FD3,FD4
	402	FA3,FB4,FC1,FD2

CRI Code Definitions

CRI Code	Min. CRI
S	65
E	70
F	80
G	90
H	95

Part Number Nomenclature

SST — 20 — <WXXY> — <PAA(A)> — <FFCCC>

Product Family	Product series	Color	Package Configuration	Bin kit
SST: Surface Mount Package	20 series	W: White XX: CCT • 30: 3000K typ Y: CRI Code see page 7	P: Soldering pad configuration A type - see page 14 B type - see page 15 AA(A): Viewing angle 120°	See Tables FF=min flux bin CCC: Chromaticity binkit

Ordering Part Number

CCT	Min. Flux Bin ¹	Min. Flux (lm)	Chromaticity Bin Kit Code ²	Solder Pad Config. ³	Viewing Angle	Ordering Part Numbers
2700K	H5	86	271	A	120	SST-20-W27H-A120-H5271
				B	120	SST-20-W27H-B120-H5271
	J2	93	271	A	120	SST-20-W27H-A120-J2271
				B	120	SST-20-W27H-B120-J2271
	H5	86	272	A	120	SST-20-W27H-A120-H5272
				B	120	SST-20-W27H-B120-H5272
J2	93	272	A	120	SST-20-W27H-A120-J2272	
			B	120	SST-20-W27H-B120-J2272	
3000K	J2	93	301	A	120	SST-20-W30H-A120-J2301
				B	120	SST-20-W30H-B120-J2301
	J3	100	301	A	120	SST-20-W30H-A120-J3301
				B	120	SST-20-W30H-B120-J3301
	J2	93	302	A	120	SST-20-W30H-A120-J2302
				B	120	SST-20-W30H-B120-J2302
J3	100	302	A	120	SST-20-W30H-A120-J3302	
			B	120	SST-20-W30H-B120-J3302	
3500K	J3	100	351	A	120	SST-20-W35H-A120-J3351
				B	120	SST-20-W35H-B120-J3351
	J4	107	351	A	120	SST-20-W35H-A120-J4351
				B	120	SST-20-W35H-B120-J4351
	J3	100	352	A	120	SST-20-W35H-A120-J3352
				B	120	SST-20-W35H-B120-J3352
J4	107	352	A	120	SST-20-W35H-A120-J4352	
			B	120	SST-20-W35H-B120-J4352	
4000K	J4	107	401	A	120	SST-20-W40H-A120-J4401
				B	120	SST-20-W40H-B120-J4401
	J5	114	401	A	120	SST-20-W40H-A120-J5401
				B	120	SST-20-W40H-B120-J5401
	J4	107	402	A	120	SST-20-W40H-A120-J4402
				B	120	SST-20-W40H-B120-J4402
J5	114	402	A	120	SST-20-W40H-A120-J5402	
			B	120	SST-20-W40H-B120-J5402	

Note 1: The minimum flux of each bin kit is determined by the minimum flux bin as defined on page 3. Higher flux bins are eligible to ship against shown bin kits and part numbers.

Note 2: See page 7 for chromaticity bin kit definitions.

Note 3: A and B versions correspond to soldering pad configurations. All product mechanical, electrical and optical specifications are otherwise identical.

Example: The part number SST-20-W30H-A120-J2302 refers to a part with type A package configuration, 3000K, 120 degree viewing angle, flux greater than 93 lm and chromaticity bins HA3,HB4,HC1,HD2 as defined on page 3.

SST-20-W Characteristics¹

Parameter	Symbol	Minimum	Typical				Maximum	Unit
			W27H	W30H	W35H	W40H		
Forward Current at test	I_f		350					mA
Forward Voltage	V_f	2.5	2.73				3.1	V
Luminous Flux	ϕ_v		88	95	107	114		lm
Radiometric Flux ⁴	ϕ_e		427	430	442	468		mW
Photosynthetic Photon Flux ⁴ (400nm to 700nm window)	PPF		1.94	1.95	1.99	2.10		$\mu\text{mol/s}$
Photosynthetic Photon Flux Efficacy ⁴	PPF/W		1.98	1.99	2.03	2.14		$\mu\text{mol/J}$
Viewing Angle	A120, B120	$2 \text{ } \emptyset_{1/2}$	120					Degrees
Color Rendering Index	CRI	95						
Forward Current (CW) ²	$I_{f\text{min}}, I_{f\text{max}}$						2	A
Maximum Surge Current	$I_{f\text{-smax}}$						3	A
Maximum Reverse Current ³	I_{REV}						N.A.	
LED Junction Temperature	T						115	°C
ESD withstand Voltage HBM Per JEDEC/ESDA STANDARD JS-001	V_{HBM}	8000						V
ESD withstand Voltage CDM Per JEDEC/ESDA STANDARD JS-002	V_{CDM}	1000						V
Operating Temperature	T_{OPR}	-40					100	°C
Thermal resistance junction to case (electrical)	$R_{\text{ΘJC-EL}}$		1.6					°C/W

Note 1: Values are at 85°C unless otherwise noted.

Note 2: Sustained operation at maximum current will result in shortened lifetime.

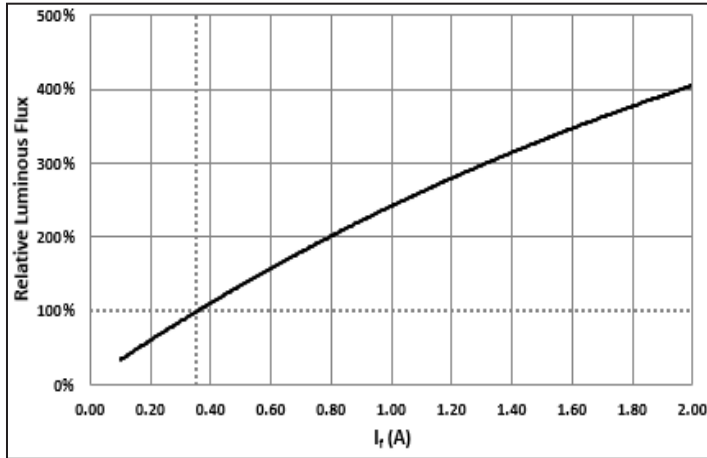
Note 3: Not designed for reverse voltage operation.

Note 4: Values are at 350 mA, T_j 25 °C

Optical & Electrical Characteristics

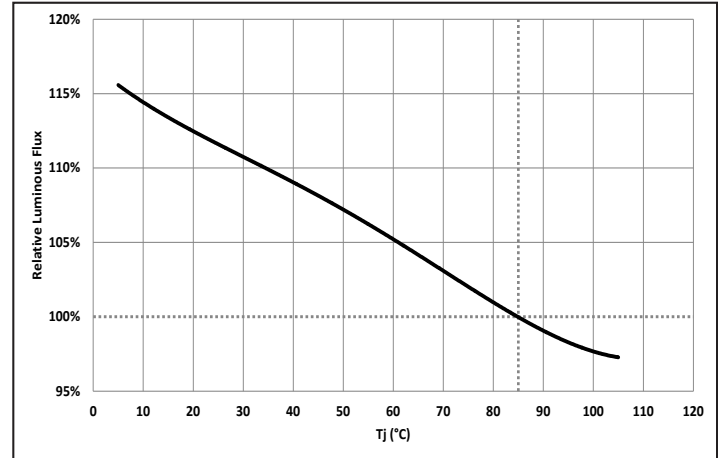
Relative Luminous Flux vs. Forward Current

$\phi_v/\phi_v(.35A)$ Single Pulse 20ms $T_j = 85^\circ C$



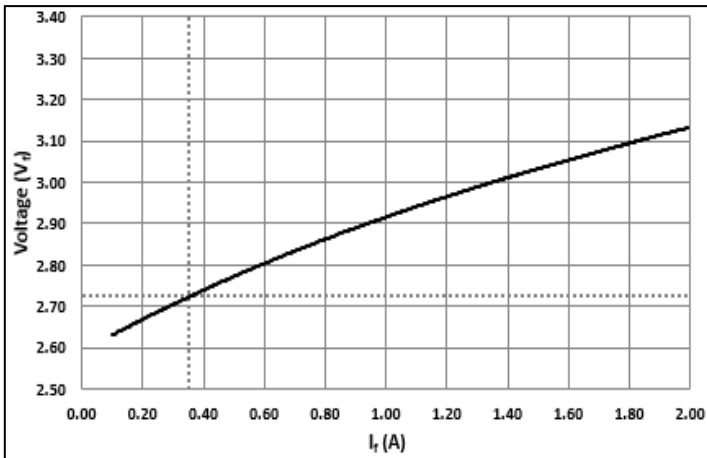
Relative Luminous Flux vs. Temperature (T_j)

$\phi_v/\phi_v(85^\circ C)$ Single Pulse 20ms $I_f = 0.35A$



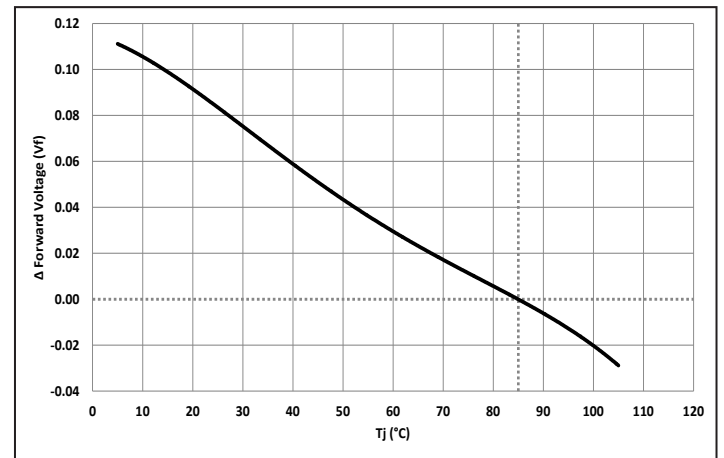
Forward Voltage vs. Forward Current

$V_f(I_f)$ Single Pulse 20ms $T_j = 85^\circ C$



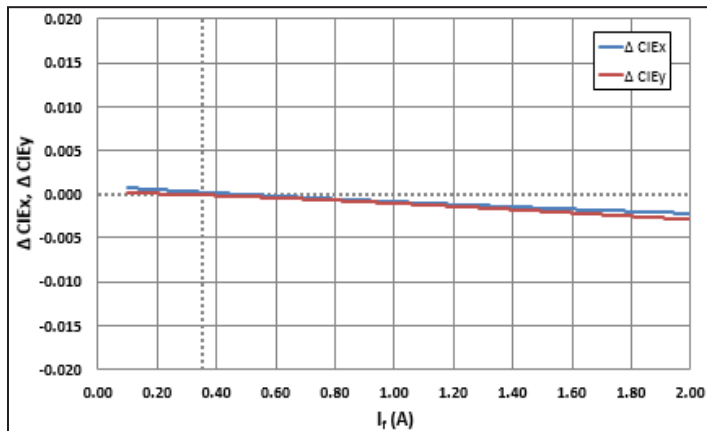
Relative Forward Voltage vs. Temperature (T_j)

$\Delta V_f = V_f(T_j) - V_f(85^\circ C)$ Single Pulse 20ms $I_f = 0.35A$



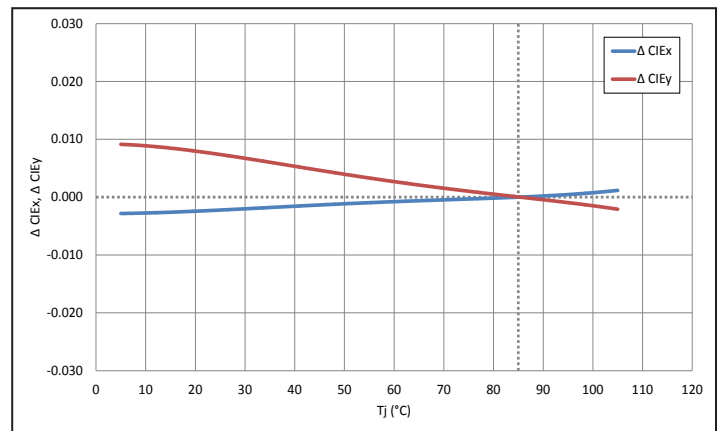
Relative Chromaticity Shift vs. I_f

$\Delta CIE_{x,y} = CIE_{x,y}(I_f) - CIE_{x,y}(.35A)$, Single Pulse 20ms $T_j = 85^\circ C$



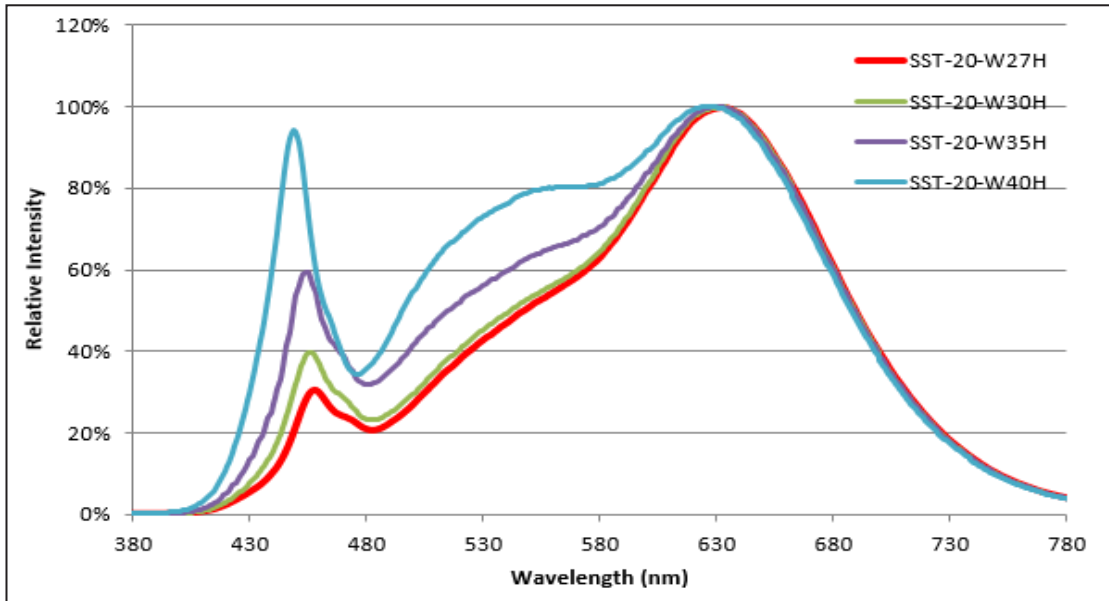
Relative Chromaticity Shift vs. T_j

$\Delta CIE_{x,y} = CIE_{x,y}(T_j) - CIE_{x,y}(85^\circ C)$ Single Pulse 20ms $I_f = 0.35A$

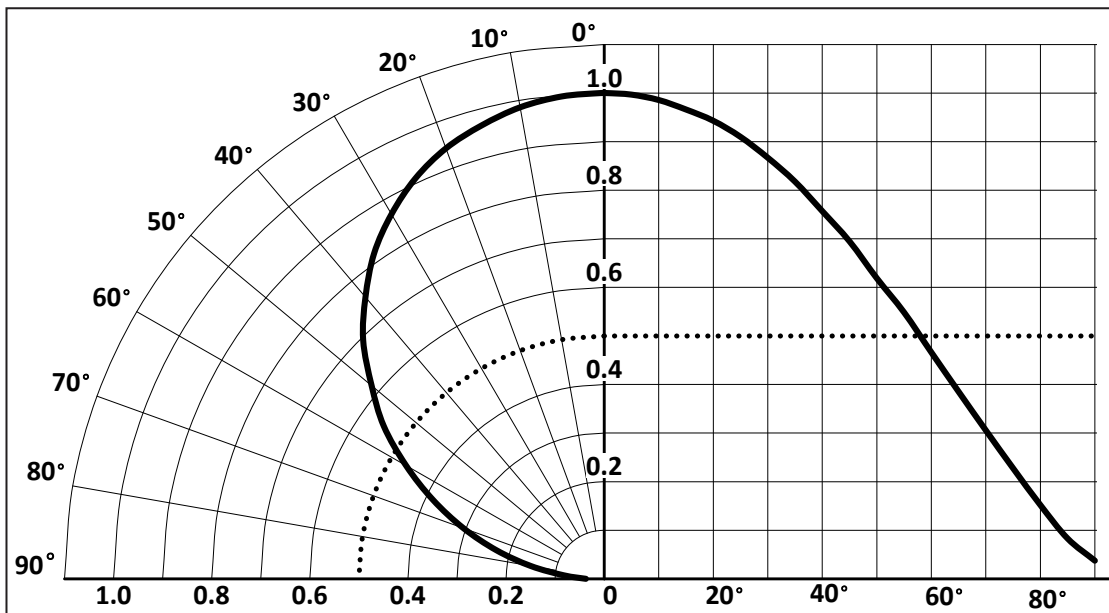


Optical & Electrical Characteristics

Typical Relative Radiant Power (%)¹



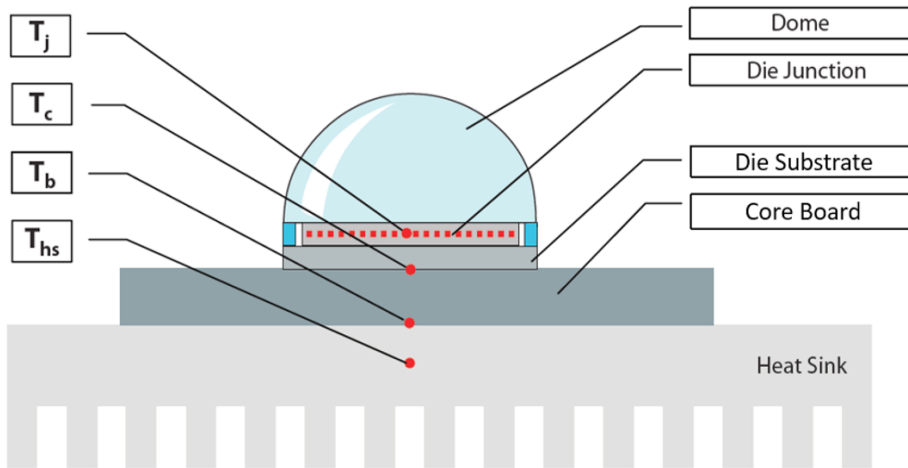
Typical Angular Pattern of Radiant Power Types A120 and B120²



Note 1: Relative radiant power measurements were made at 350mA, 85°C.

Note 2: Angular pattern measurements were made at 350mA, 25°C.

Thermal Resistance



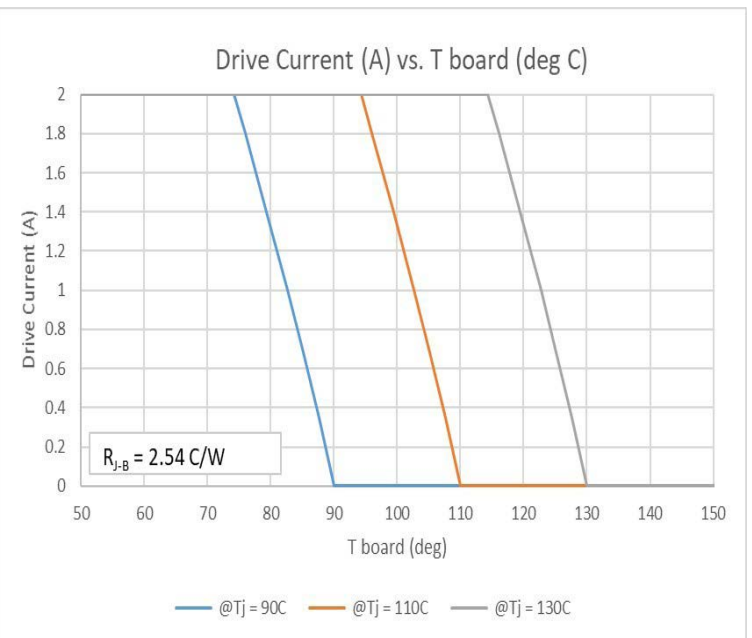
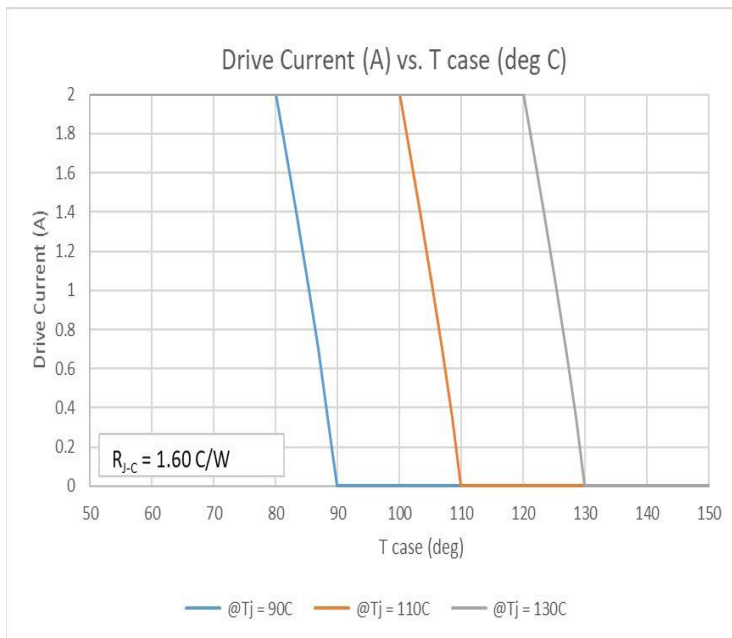
Typical Thermal Resistance

R_{j-c}^{-1}	1.60 °C/W
R_{j-b}^{-1}	2.54 °C/W

Note 1: Thermal resistance values are based on rapid thermal transient testing results.

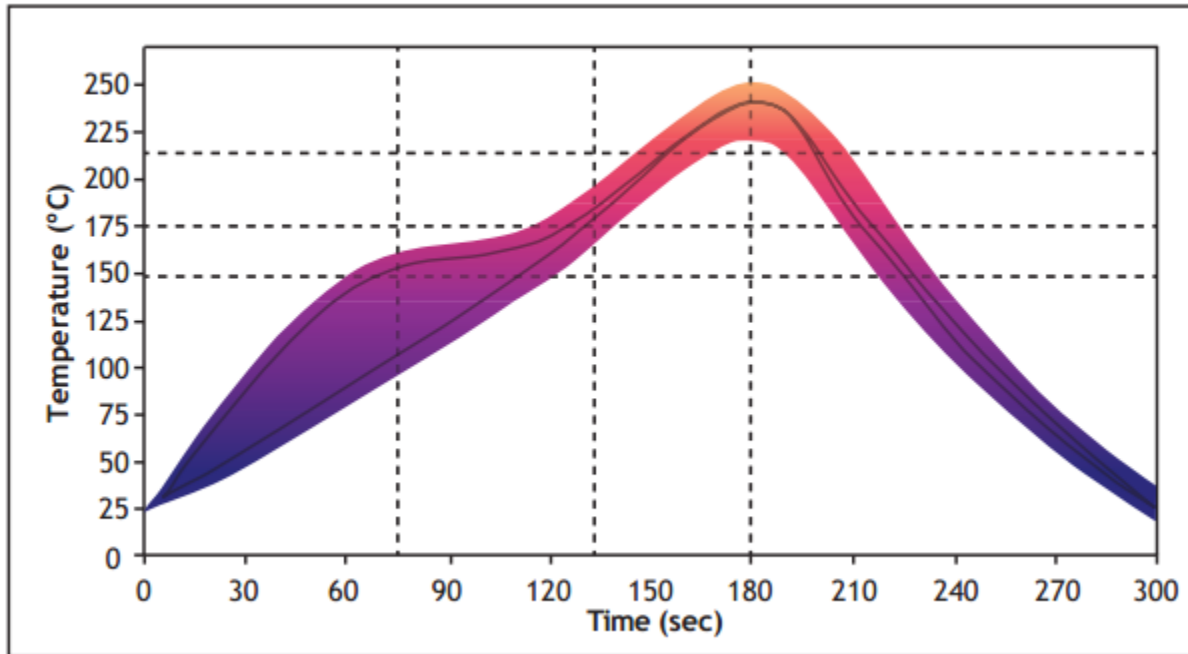
Note 2: Thermal resistance is measured using a SAC305 solder and a Cu-pedestal MCPCB.

Note 3: The values represent the electrical thermal resistance @2A operation @25deg.



Soldering Profile

SAC 305 Reflow Profile Window For Low Density Boards



Lead free solder guideline for low density boards

Solder Profile Stage	Lead-Free Solder	Lead-based Solder
Profile length, Ambient to Peak	2.75 - 3.5 minutes	2.75 - 3.5 minutes
Time Maintained Above: Temperature	217 °C	183 °C
Time Maintained Above: Time	30 - 60 seconds	30 - 60 seconds
Cooldown Rate	≤4° C/sec	≤4° C/sec
Cooldown Duration	45 ± 15 sec	45 ± 15 sec

Note 1: Temperatures are taken and monitored at the component copper layer.

Note 2: Optimum profile may differ due to oven type, circuit board or assembly layout.

Note 3: Recommended lead free, no-clean solder: AIM NC254-SAC305.

Note 4: Refer to APN-001473 soldering and handling application note for additional solder profiles and details.

Note 5: MSL- Level 2A (Glass Lens); MSL Level 1 (Over Molded Design)

Precautions for Use

Storage:

SST-20-W LEDs have an MSL 3 moisture sensitivity rating and should be handled per JEDEC J-STD-020. In addition, Luminus recommends the following storage guidelines.

1. The recommended storage condition is between 5 °C and 30 °C and relative humidity less than or equal to 85% RH in its original package.

The LED's electrode and leadframe are a silver plated copper alloy. The silver surface may be affected by its environment. Please avoid conditions which may cause the LEDs to corrode or become discolored. The corrosion or discoloration might lower the solderability or affect the optical characteristics of the device.

Please avoid rapid transitions in ambient temperature, especially in high humidity environments where condensation can occur.

Static Electricity:

1. The products are sensitive to static electricity, and care should be taken when handling them.

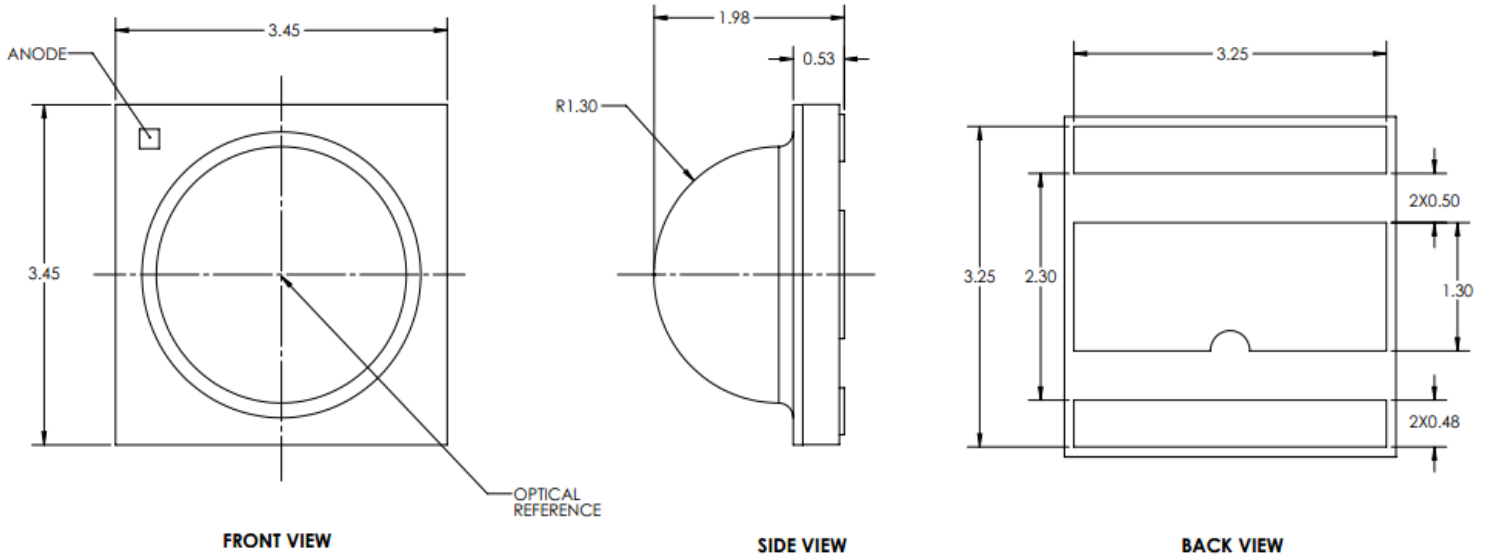
2. Static electricity or surge voltage will damage the LEDs. It is recommended to wear a anti-electrostatic wristband or anti-electrostatic gloves when handling the LEDs.

3. All devices, equipment and machinery must be properly grounded. It is recommended that measures be taken against surge voltage to the equipment that mounts the LEDs.

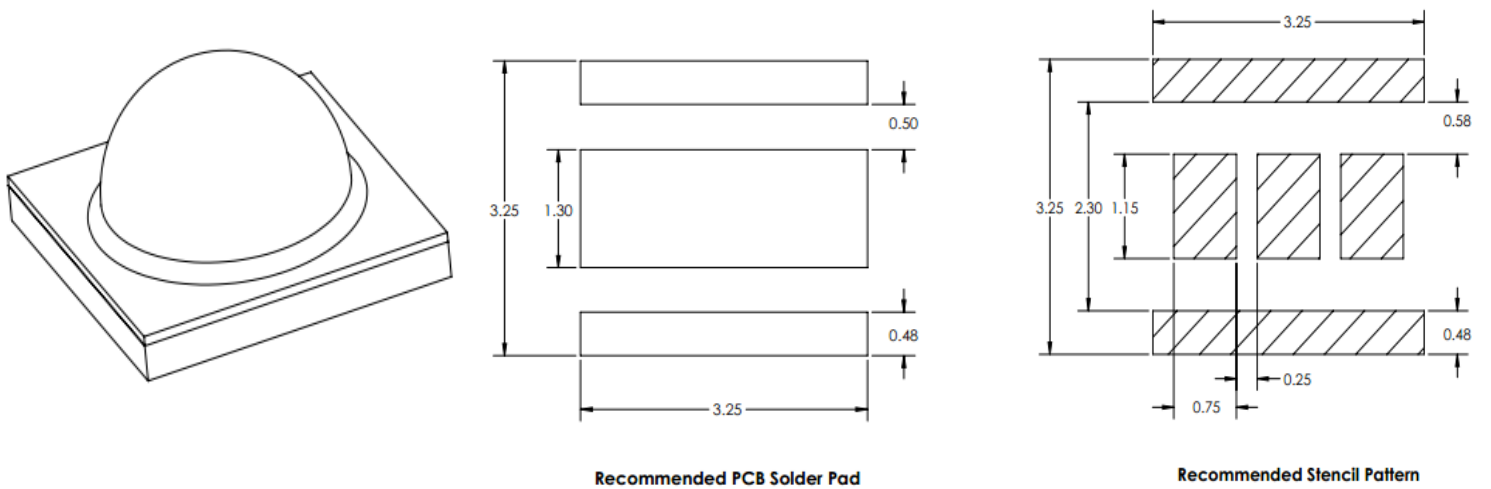
Vision Advisory

WARNING: Looking at an exposed LED during operation can result in eye injury. This LED products has been classified as Risk Group 2 for blue light hazard according to the IEC 62471.

Mechanical Dimensions¹ A120 Package Configuration



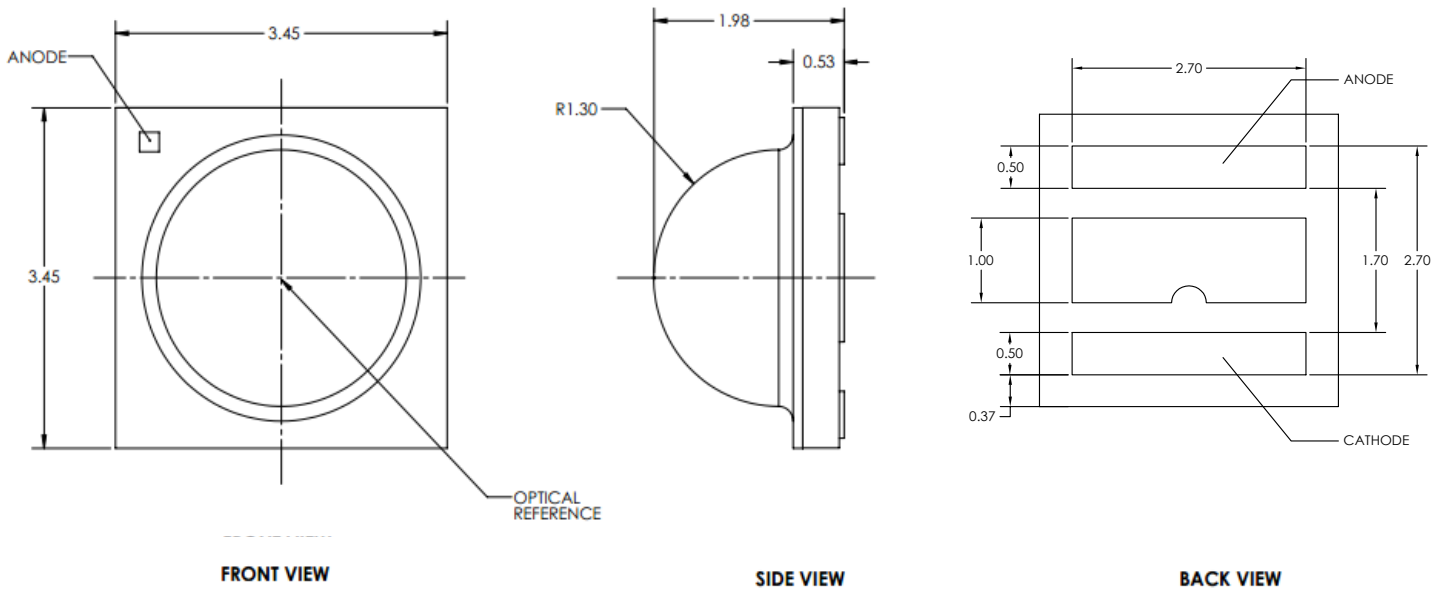
Recommended PCB Solder Pad and Stencil Pattern¹ A120 Package Configuration



Note 1: Dimensions are in millimeters +/- 0.13 mm

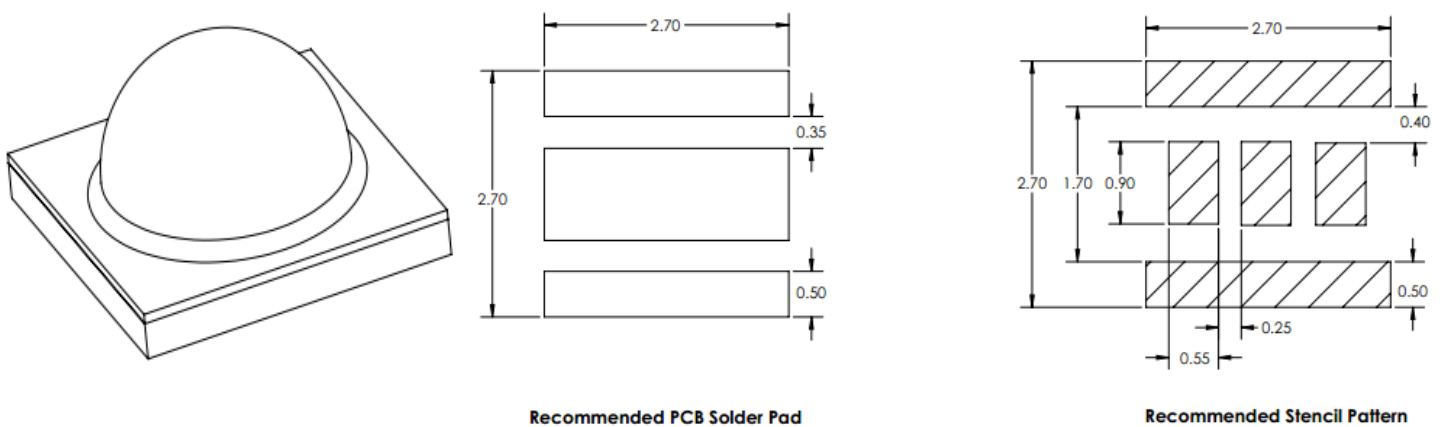
Mechanical Dimensions¹

B120 Package Configuration

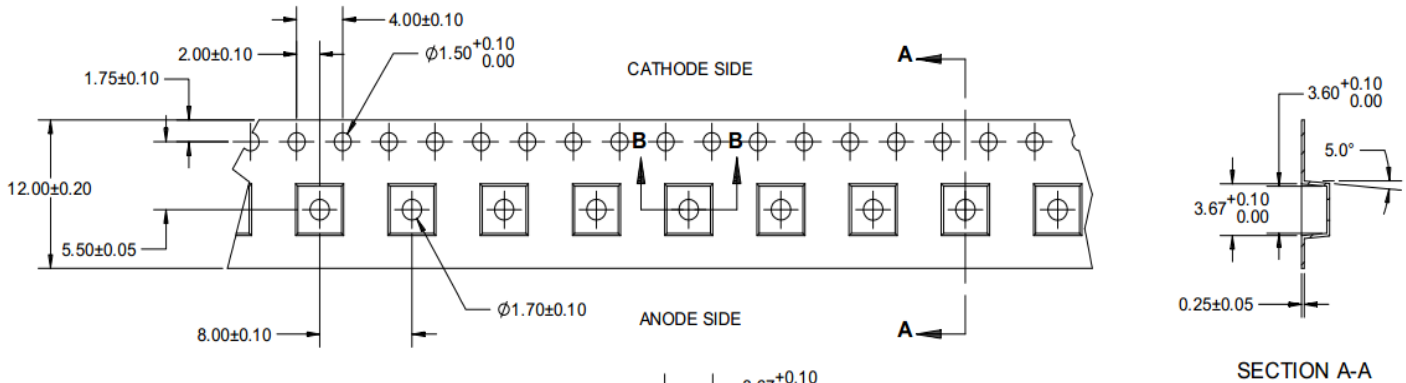


Recommended PCB Solder Pad and Stencil Pattern¹

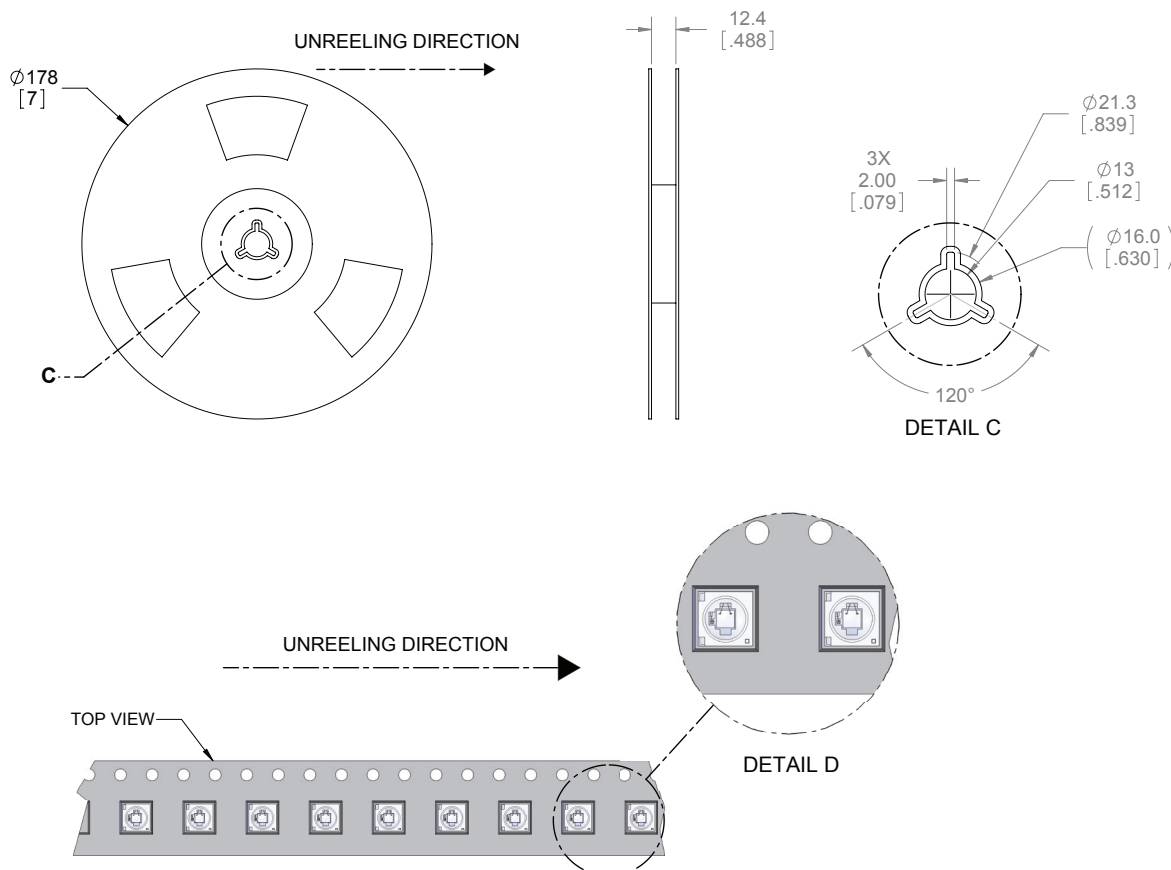
B120 Package Configuration



Note 1: Dimensions are in millimeters +/- 0.13 mm

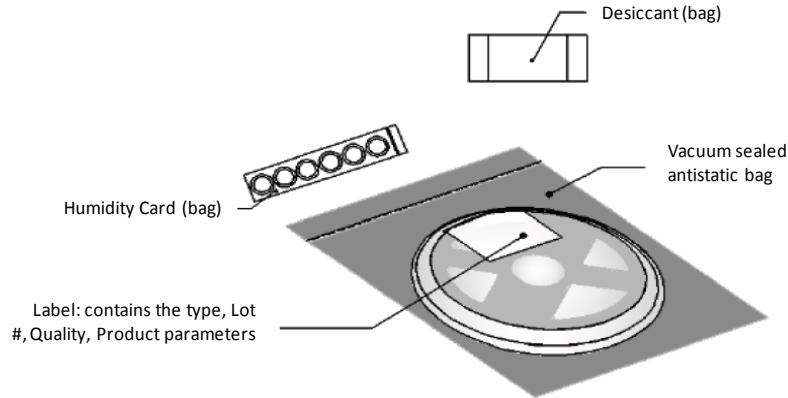
Tape and Reel - A120 and B120 Package Configurations¹

NOTES:

1. FINAL TAPE AND REEL PACKAGING MUST MEET THE REQUIREMENTS OF JEDEC-STD-033, LEVEL 2A.
2. LEAVE 304.8 mm [12.00 in] OF TAPE EMPTY FOR LEAD IN (38 EMPTY POCKETS)
3. LEAVE 457.2 mm [18.00 in] OF TAPE EMPTY FOR TRAILER (57 EMPTY POCKETS)
4. MUST COMPLY TO EIA-481-C-2003
5. EACH REEL CONTAINS 1,000 UNITS

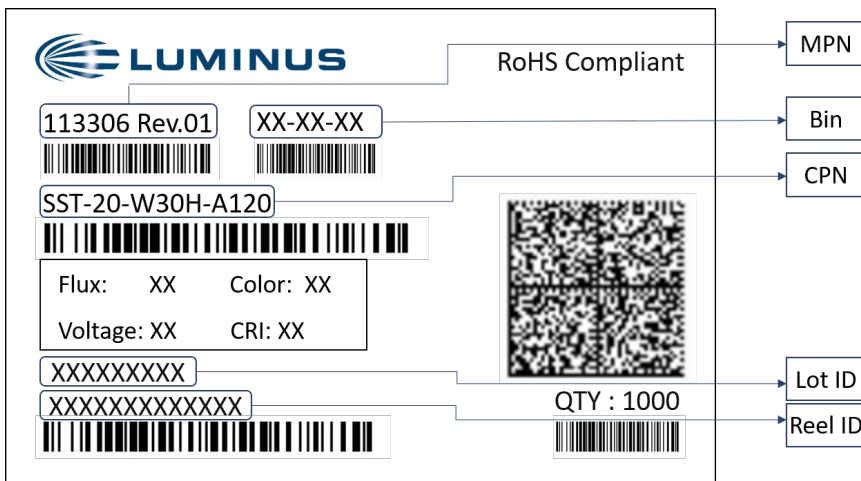


Note 1: Dimensions are in millimeters

Reel Packaging



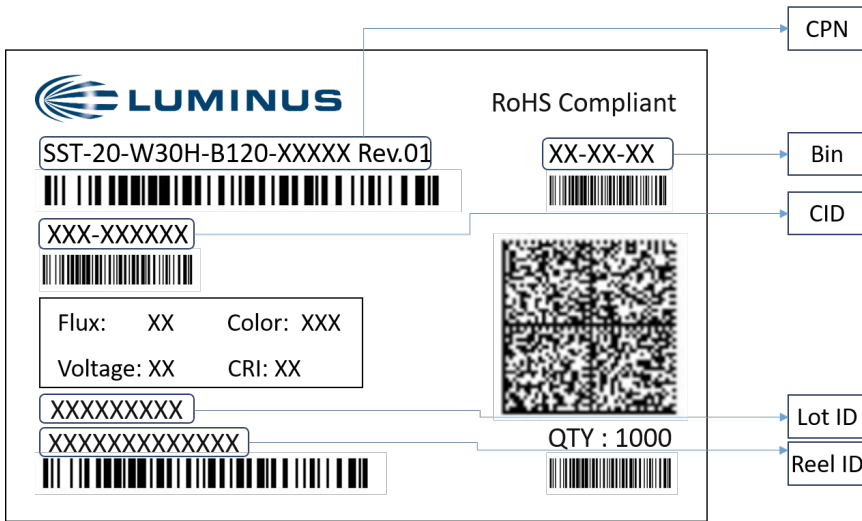
Reel Label



Label Fields:

- CPN: Luminus ordering part number
- MPN: For Luminus internal use
- Qty: On reel
- Flux: Bin as defined on page 3
- Voltage: Bin as defined on page 3
- Color: Bin as defined on page 4
- Mfg Info: For Luminus internal use

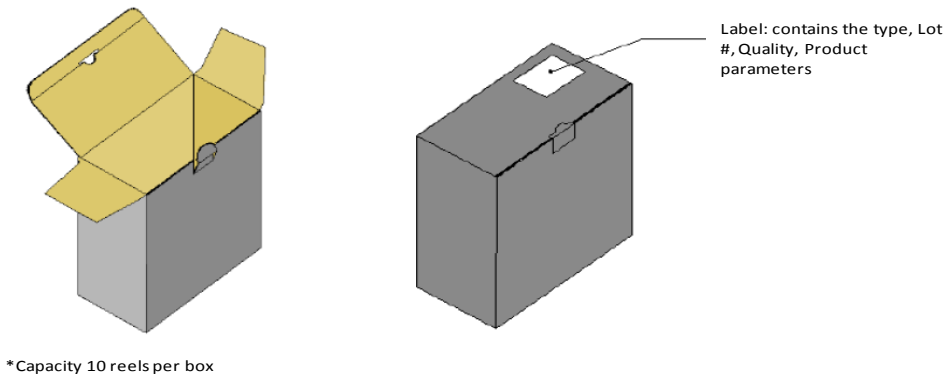
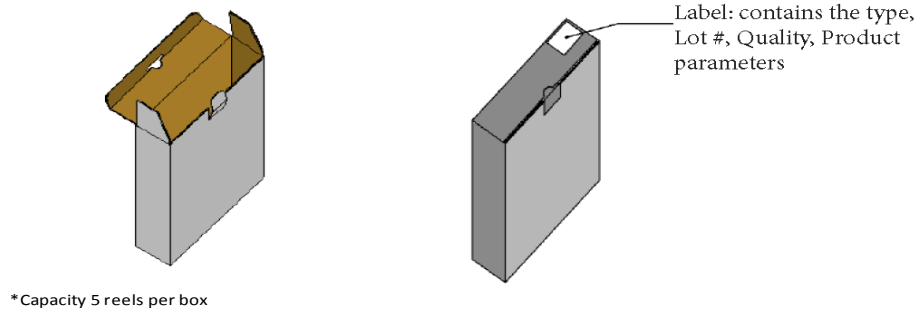
Shipping Label



Label Fields:

- CPN: Luminus ordering part number
- CID: Customer ID
- Qty: On reel
- Flux: Bin as defined on page 3
- Voltage: Bin as defined on page 3
- Color: Bin as defined on page 4

Box Packaging Information



History of Changes

Rev	Date	Description of Change
01	1/8/2018	Initial Release
02	3/2/2018	<ul style="list-style-type: none"> - Correct the graph of Relative Luminous Flux VS. Forward Current - Removed status - Editorial corrections across the document
03	5/4/2018	<ul style="list-style-type: none"> - Added new color points: 2700K, 3500K, and 4000K 95 CRI (Preliminary status) - Removed 301 chromaticity bin kit - Added CRI code definitions - Added label description & shipping label - Minor editorial changes - Chromaticity bin kit code "270", "300", "350", "400" change to "271", "301", "351", "400"
04	6/4/2018	<ul style="list-style-type: none"> - Remove the mark of "Optical Reference" - Updated the Radiometric Flux
05	3/25/2019	<ul style="list-style-type: none"> - Updated the graph of color space - Updated the graph of typical relative radiant power - Added thermal resistance data - Updated soldering profile - Updated the graph of mechanical dimensions - Updated the graph of tape and reel
06	12/17/2019	<ul style="list-style-type: none"> - Change maximum current - Updated the graph of chromaticity bin - Updated the graph of Optical & Electrical Characteristics
07	2/7/2020	<ul style="list-style-type: none"> - Update the graphs of Rth