DOMINANT™
Opto Technologies
Innovating Illumination

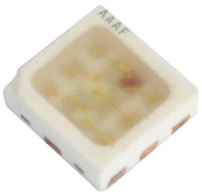
DATASHEET

SpicePlus 2120 Multi Color

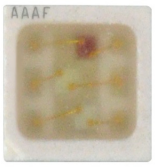
SKRTB-FHG

SpicePlus 2120 Multi Color

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 versality enables its application in automotive applicances, 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.
- > Viewing angle of 120°.
- > Small package outline (LxWxH) of 2.1 x 2.0 x 0.7mm.
- > Qualified according to JEDEC moisture sensitivity Level 2.
- > Compatible to IR reflow soldering.
- > Environmental friendly; RoHS compliance.
- > Superior Corrosion Resistance.
- > LED chips can be controlled separately to display various colors including white.
- > Compliance to automotive standard; AEC-Q102.

Applications:

- > Automotive: Interior applications, eg: ambient lighting, switches, telematics, etc.
- > Consumer Appliances: LCD illumination as in PDAs, LCD TV.
- > Communication: indicator and backlight in mobilephone.
- > Display: full color display video notice board.
- > Industry: white goods (eg: Oven, microwave, etc.).

Optical Characteristics at Tj=25˚C

Part Number	Color, λ_{dom} (nm)			Luminous Intensity @ If = 20mA IV (mcd) *Appx. 1.1*		
	Chip #1	Chip #2	Chip #3	Chip #1	Chip #2	Chip #3
● SKRTB-FHG-U3V3+W3X3+S3T3-1	Red 625nm	True Green 525nm	Blue 465nm	650.0-1280.0	1300.0-2500.0	200.0-400.0

● Not for new design

Electrical Characteristics at Tj=25˚C

	Vf @ If = 20mA *Appx. 3.1*			V_r @ I_r = 10uA *Appx. 6.1*
	Min. (V)	Typ. (V)	Max. (V)	Min. (V)
Red	1.9	2.2	2.5	12
True Green	2.7	3.0	3.3	5
Blue	2.7	3.0	3.3	5

Absolute Maximum Ratings

	Maximum Value	Unit
DC forward current (Red / True Green / Blue)	50	mA
Peak pulse current; (tp ≤ 10µs, Duty cycle = 0.005)	200	mA
Reverse voltage *Appx. 6.1*	Red = 12, True Green / Blue = 5	V
ESD threshold (HBM)	2000	V
LED junction temperature	125	˚C
Operating temperature	-40 … +115	˚C
Storage temperature	-40 … +125	˚C
Thermal resistance (single chips on) (Rated current = 20mA, Ts = 25 ˚C)		
- Real Thermal Resistance		
Junction / ambient, $R_{th\ JA\ real}$		
Red	260	K/W
Blue	270	K/W
True Green	290	K/W
Junction / solder point, $R_{th\ JS\ real}$		
Red	80	K/W
Blue	70	K/W
True Green	80	K/W

Wavelength Grouping

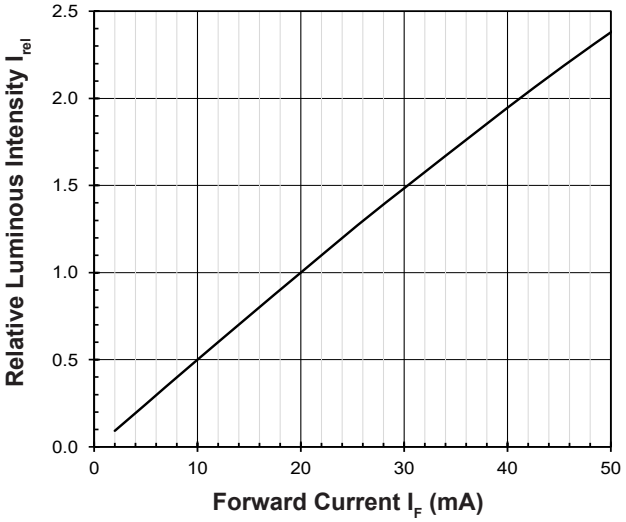
Color	Group	Wavelength distribution (nm) *Appx. 2.2*
Red	Full	619 - 629
True Green	Full	520 - 535
	A	520 - 525
	B	525 - 530
	C	530 - 535
Blue	Full	460 - 470
	A	460 - 465
	B	465 - 470

Luminous Intensity Group at Tj=25˚C

Color	Brightness Group	Luminous Intensity *Appx. 1.1* IV (mcd)
Red	U3	650.0 ... 910.0
	V3	910.0 ... 1280.0
True Green	W3	1300.0 ... 1800.0
	X3	1800.0 ... 2500.0
Blue	S3	200.0 ... 285.0
	T3	285.0 ... 400.0

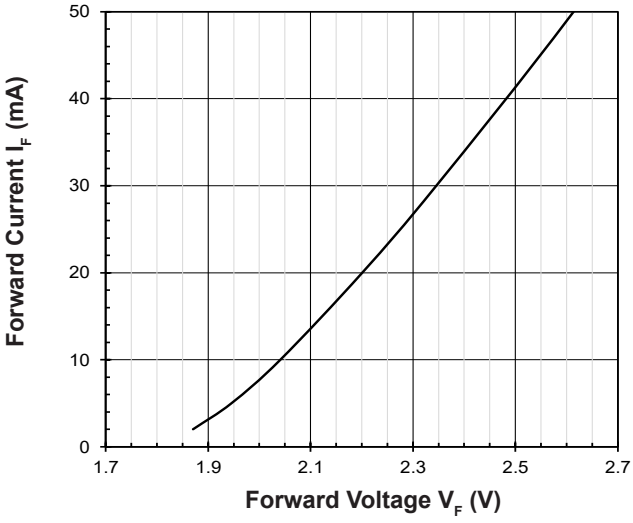
Relative Luminous Intensity Vs Forward Current

$I_V/I_V(20mA) = f(I_F)$; Tj = 25°C (Red)



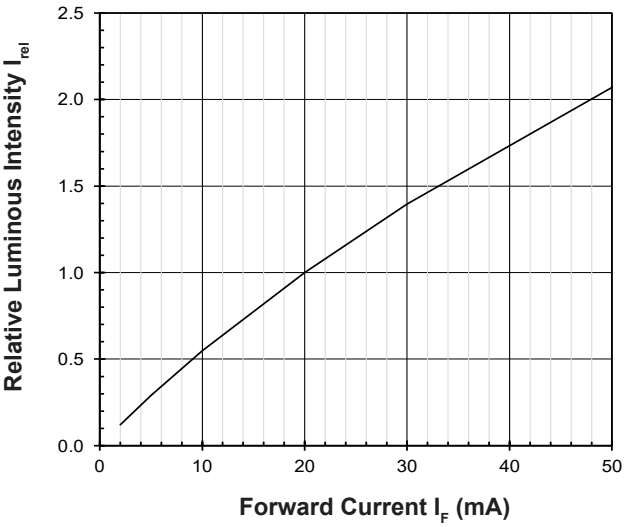
Forward Current Vs Forward Voltage

$I_F = f(V_F)$; T_j = 25°C (Red)



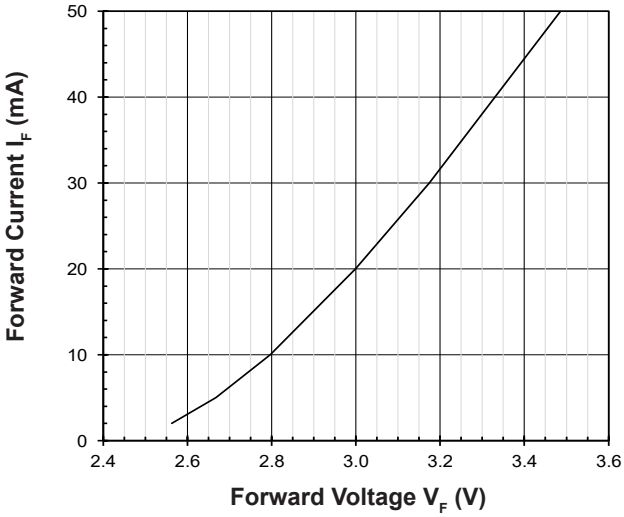
Relative Luminous Intensity Vs Forward Current

$I_V/I_V(20mA) = f(I_F)$; Tj = 25°C (Blue)



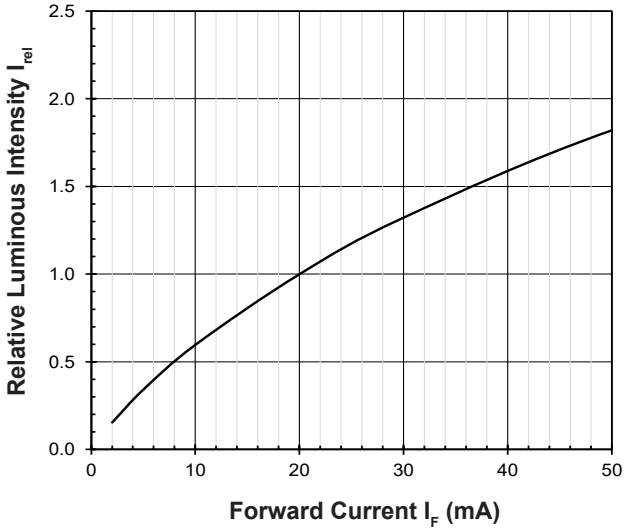
Forward Current Vs Forward Voltage

$I_F = f(V_F)$; T_j = 25°C (Blue)



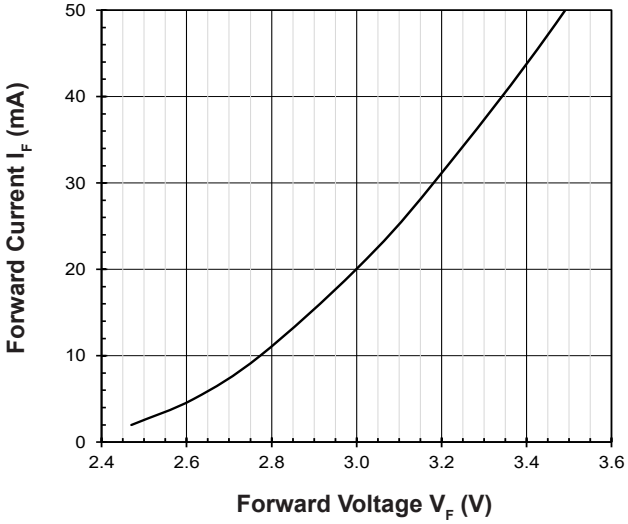
Relative Luminous Intensity Vs Forward Current

$I_V/I_V(20mA) = f(I_F)$; Tj = 25°C (True Green)

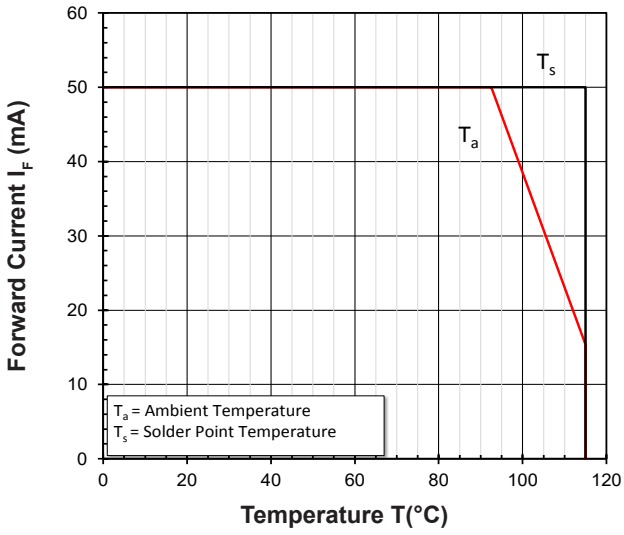


Forward Current Vs Forward Voltage

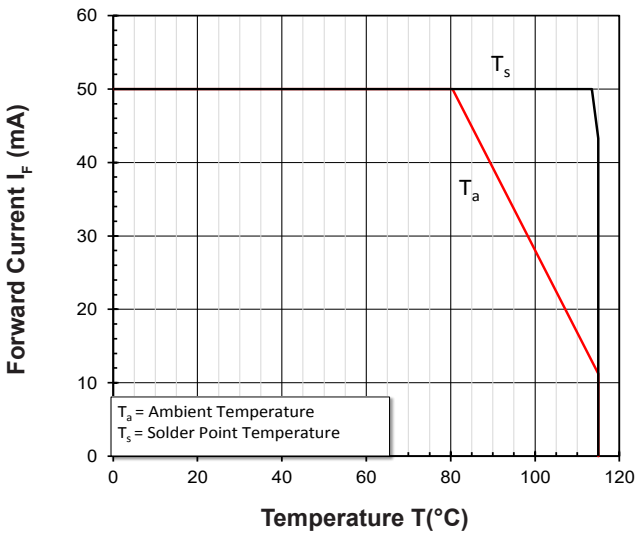
$I_F = f(V_F)$; T_j = 25°C (True Green)



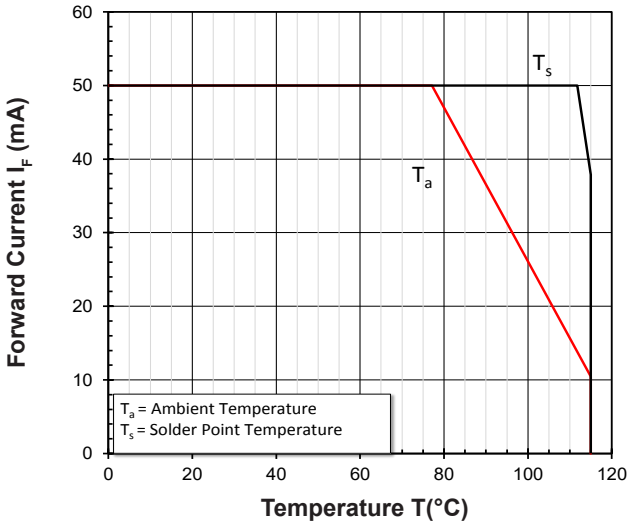
Maximum Current Vs Temperature
I_F=f(T) (Red)



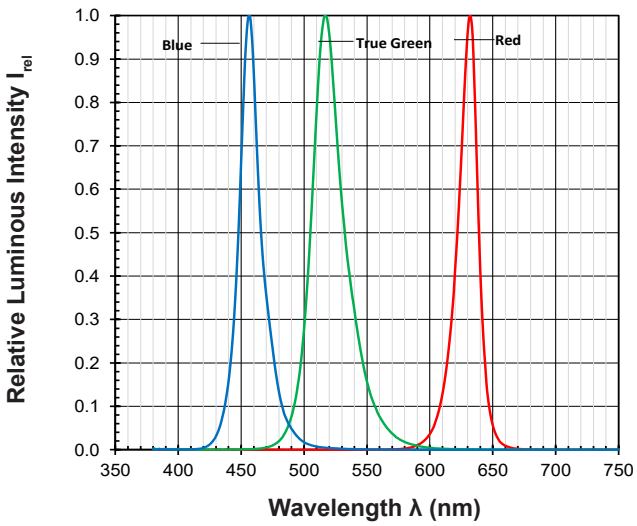
Maximum Current Vs Temperature
I_F=f(T) (Blue)



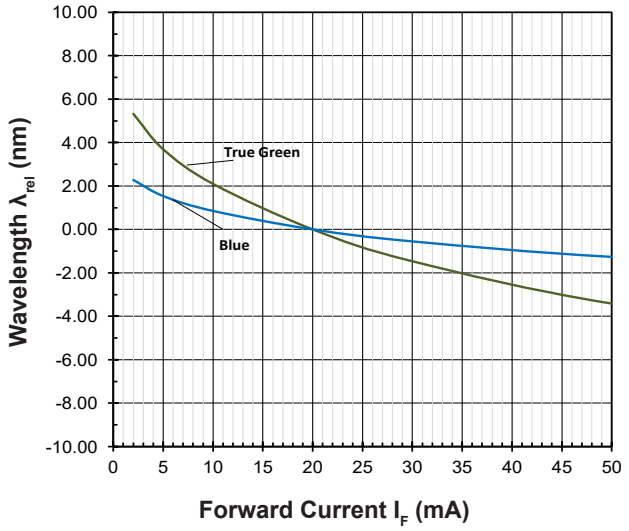
Maximum Current Vs Temperature
I_F=f(T) (True Green)



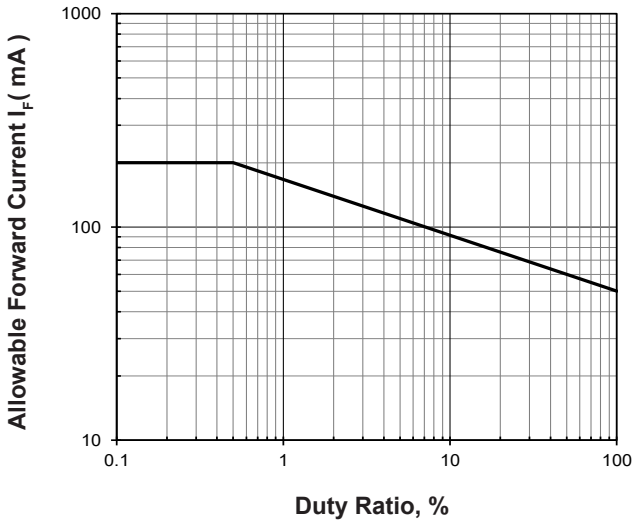
Relative Spectral Emission
I_{rel} = f(λ); T_j = 25°C; I_F = 20mA



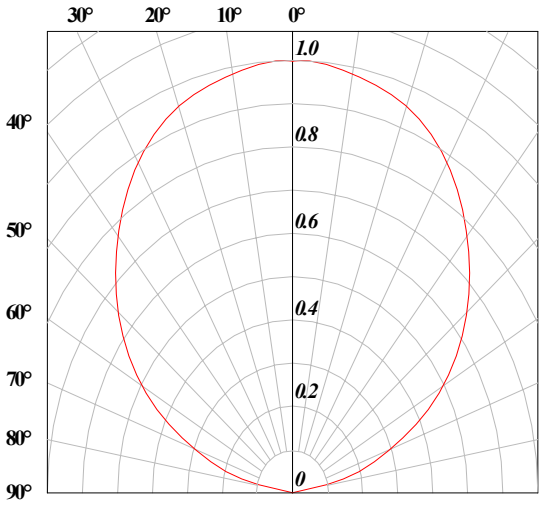
Wavelength Shift Vs Forward Current
λdom = f(I_F); T_i = 25°C



Allowable Forward Current Vs Duty Ratio
(T_j = 25°C; t_p ≤ 10µs)

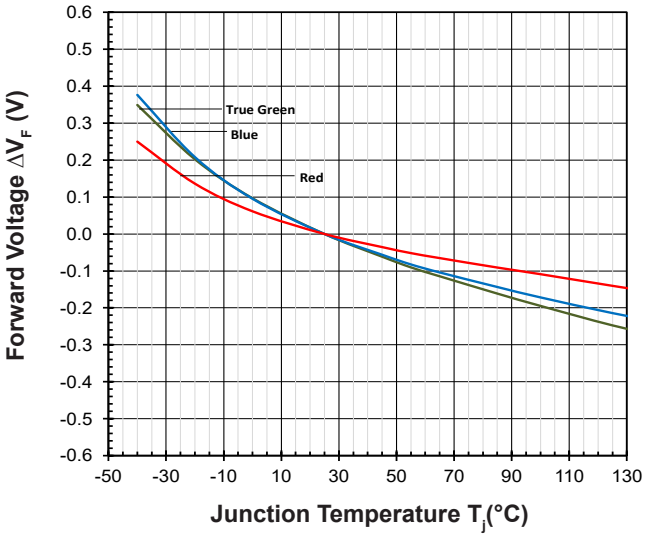


Radiation Pattern



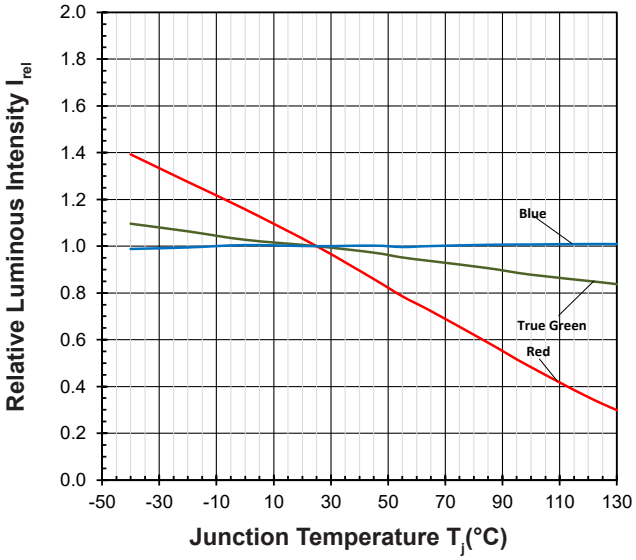
Forward Voltage Vs Junction Temperature

$\Delta V_F = V_F - V_F(25°C) = f(T_j)$; I_F =20mA



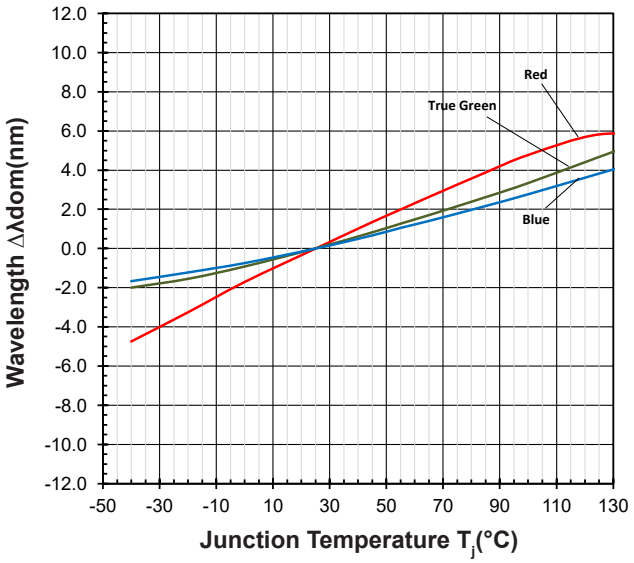
Relative Luminous Intensity Vs Junction Temperature

$I_V/I_V(25°C) = f(T_j)$; I_F = 20mA

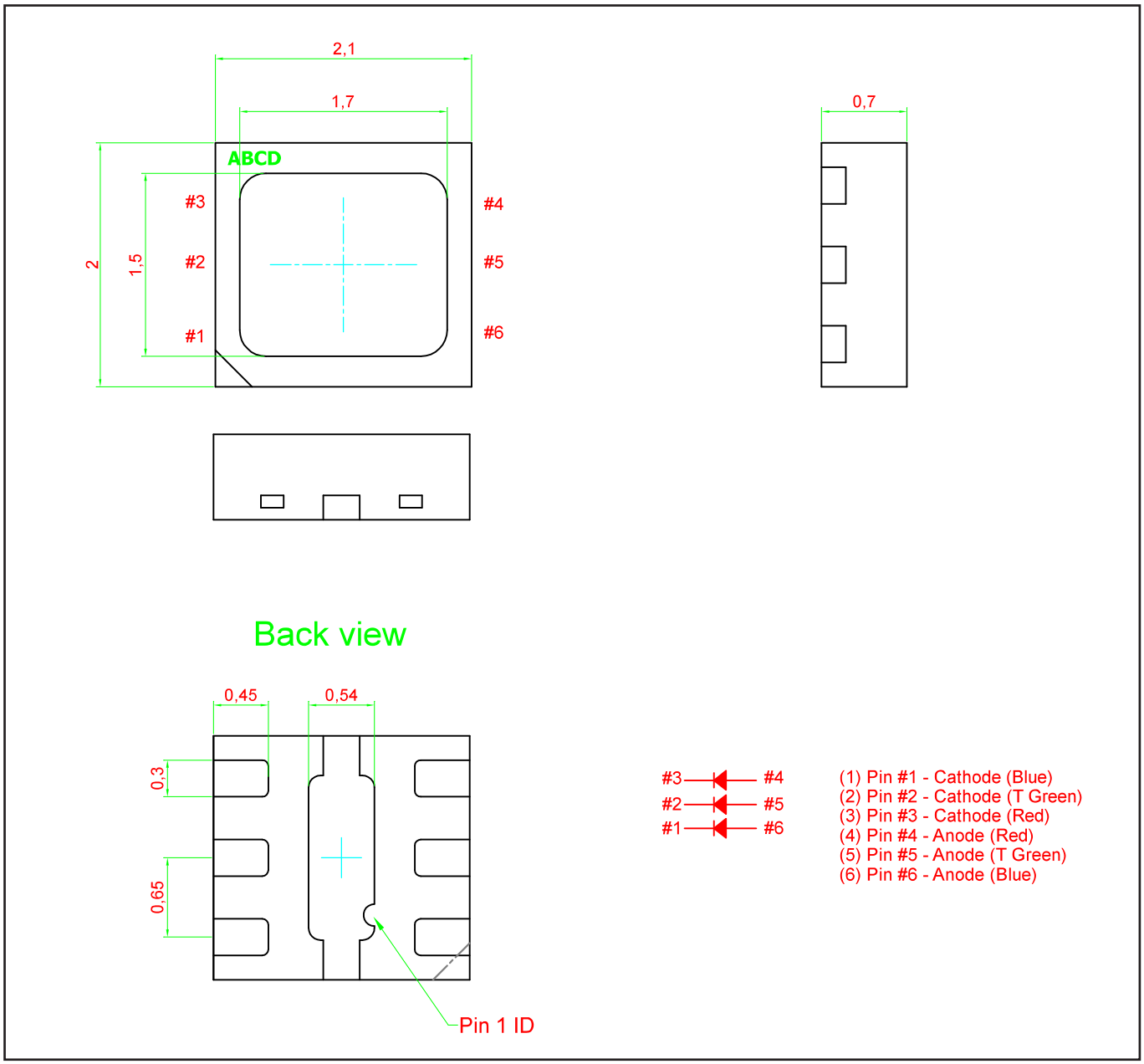


Wavelength Vs Junction Temperature

$\Delta\lambda dom = \lambda dom - \lambda dom\ (25°C) = f(T_j)$; I_F =20mA



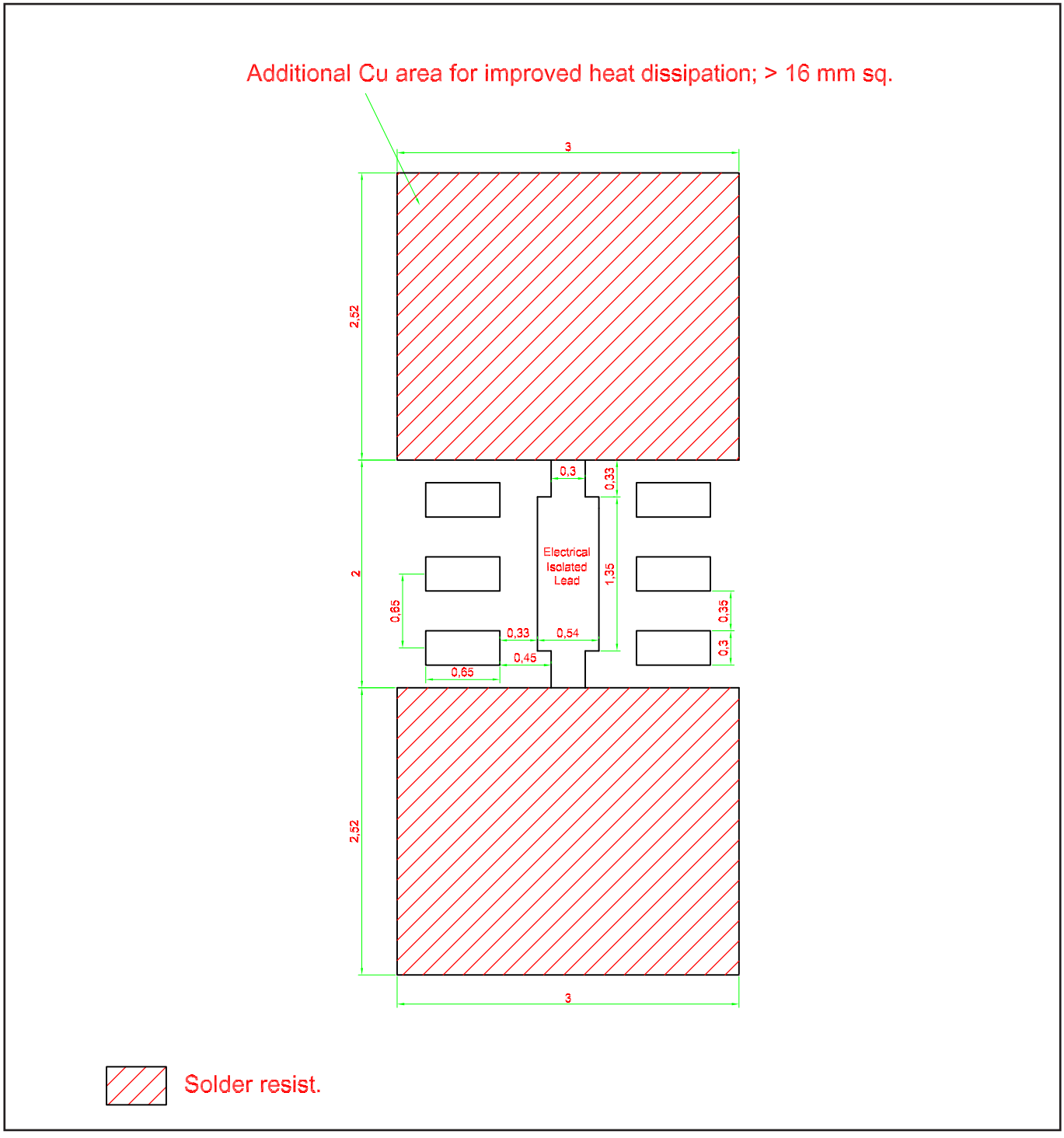
SpicePlus 2120 Multi Color : SKRTB-FHG Package Outlines



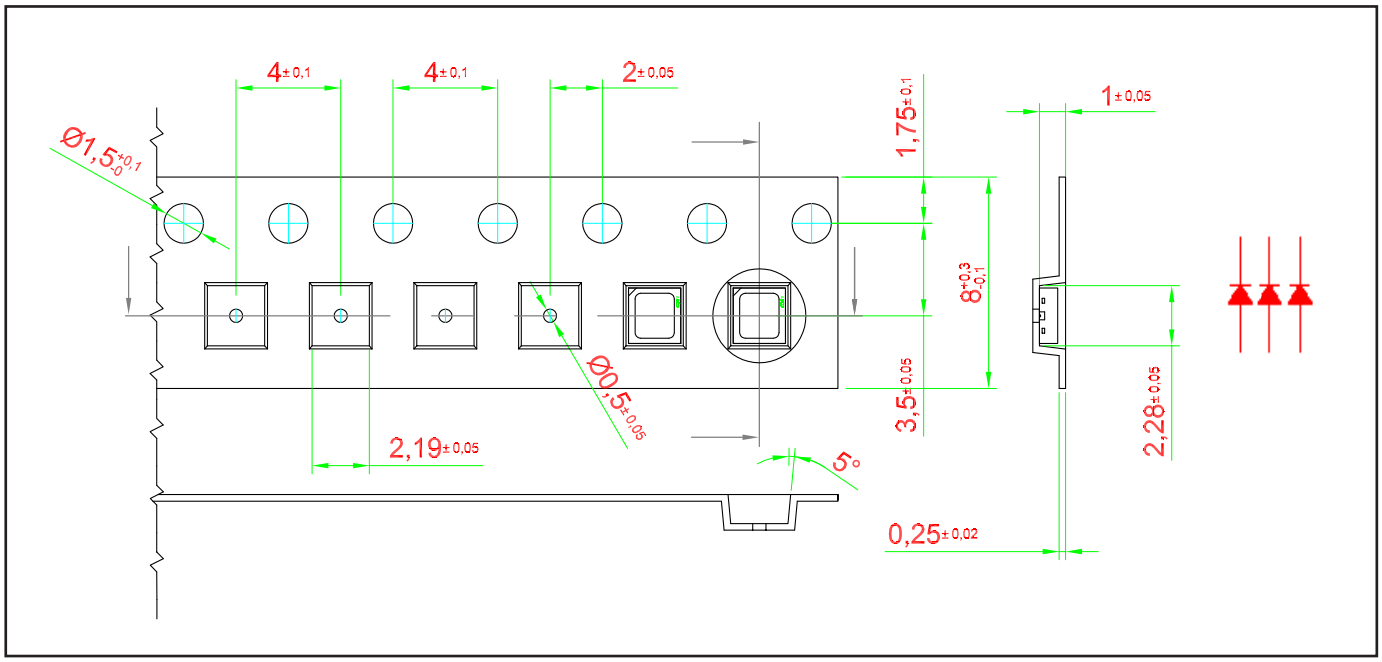
Material

	Material
Lead-frame	Cu Alloy With Au Plating
Package	High Resistant Polymer
Encapsulant	Silicone Resin
Soldering Leads	Au Plating

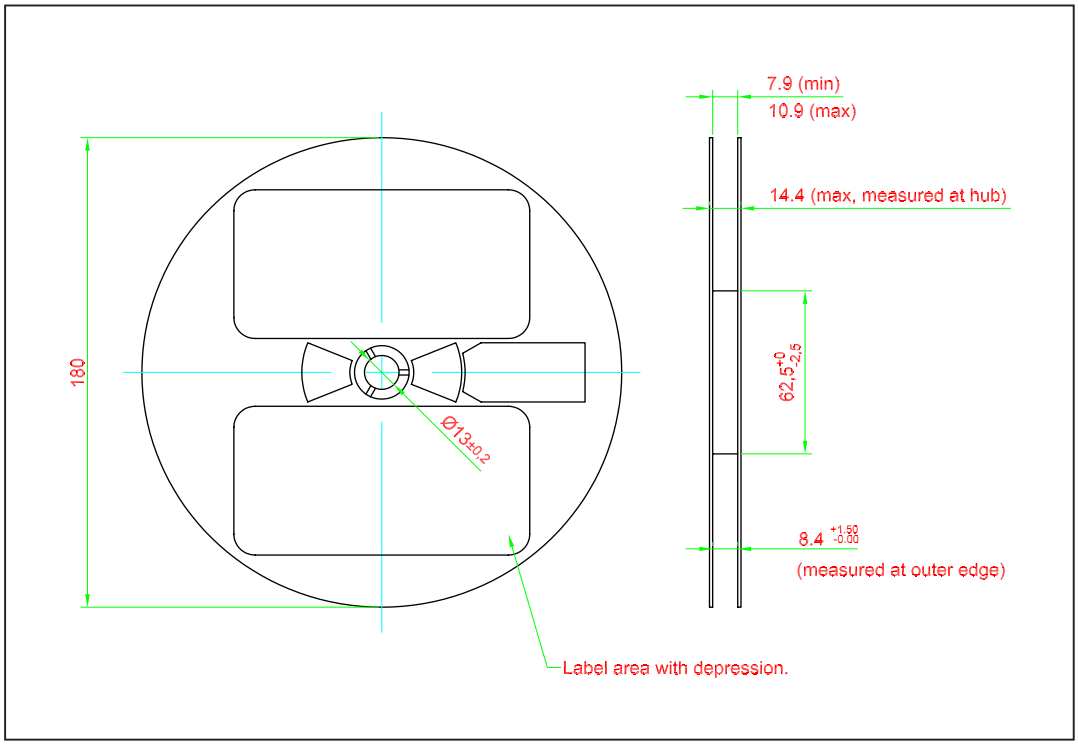
Recommended Solder Pad



Taping and orientation



Packaging Specification

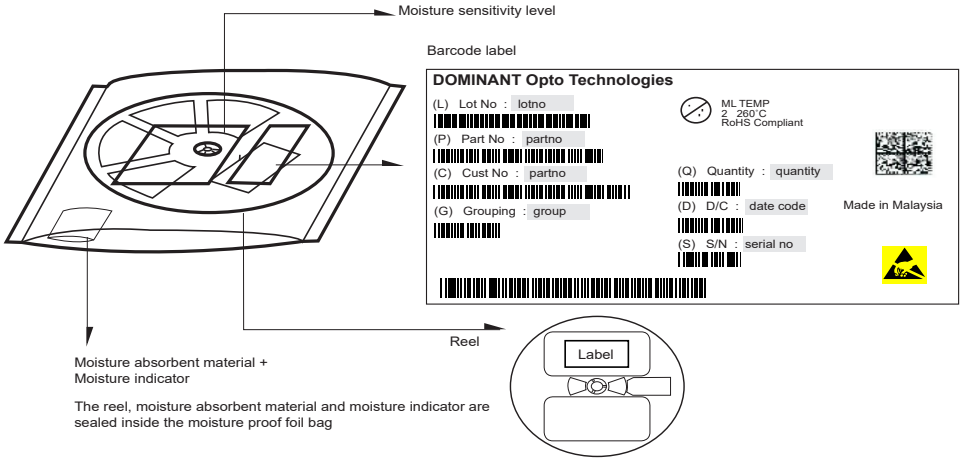


	Reel Diameter (mm)	Quantity (pcs)	*Ordering Number
Standard Packing	180	4000	SKRTB-FHG-xxx+xxx+xxx-1

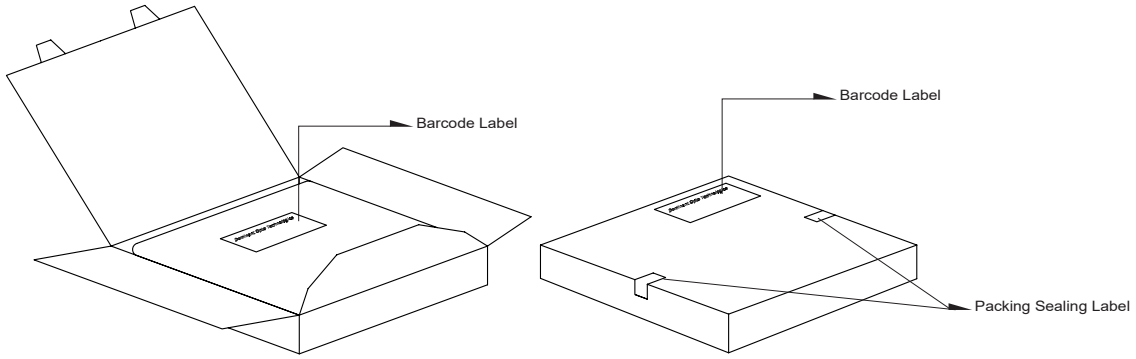
Notes:

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

Packaging Specification



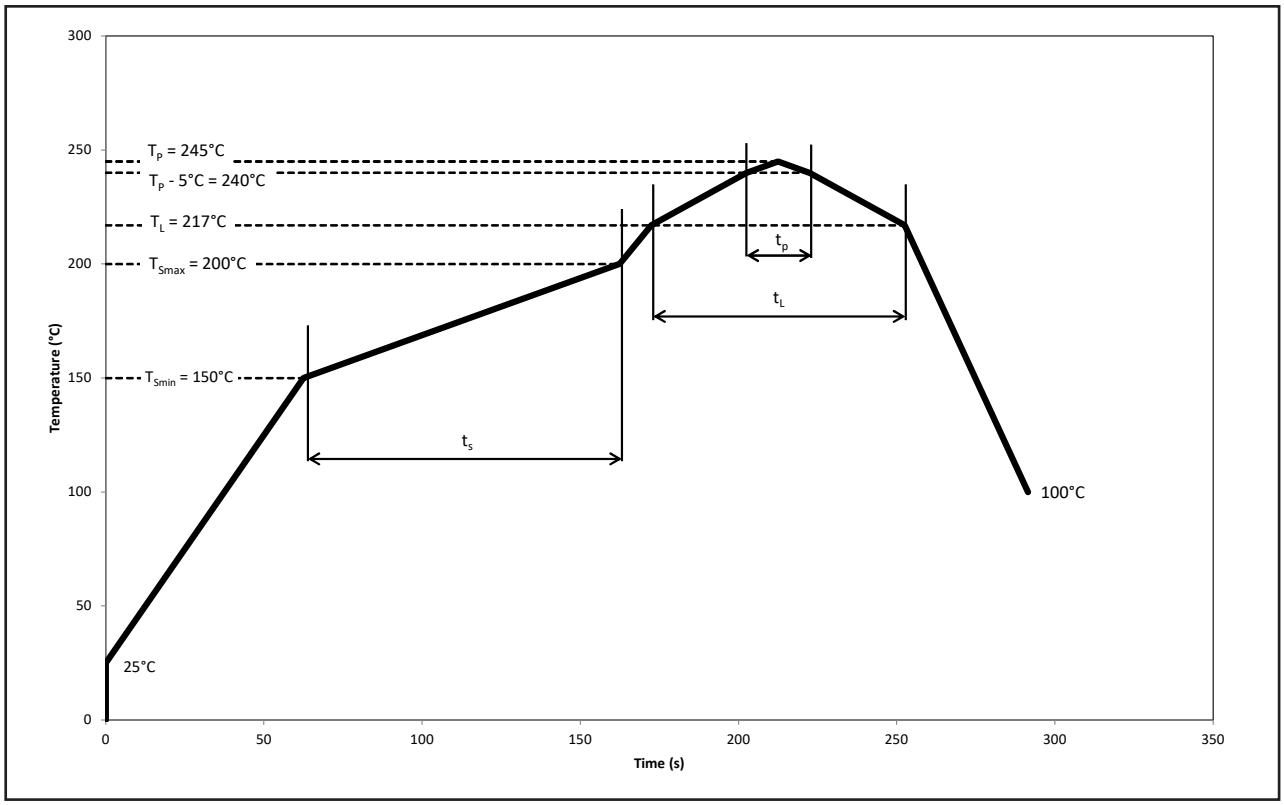
Quantity per bag (pcs)	Average 1pc SpicePlus RGB (g)	1 completed bag (g)
4000	0.008	220 ± 10



Reel Diameter (mm)	Packing Box Dimensions (mm)
180	210 x 210 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°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 ± 8 % and an expanded uncertainty of ± 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 ± 8 % and an expanded uncertainty of ± 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 ± 8 % and an expanded uncertainty of ± 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 ± 8 % and an expanded uncertainty of ± 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 ± 0.5nm and an expanded uncertainty of ± 1nm (accordingly to GUM with a coverage factor of k=3).

3) Voltage:

3.1 Forward Voltage, Vf is measured when a current pulse of 8 ms(typ) with an internal reproducibility of ± 0.05V and an expanded uncertainty of ± 0.1V (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
-	Initial Release	11 May 2018
7	Update Package Outline	27 Jul 2018
12	Error on Recommended Pb-free Soldering Profile	25 Oct 2018
2, 12	Not for New Design: SKRTB-FHG-U3V3+W3X3+S3T3-1 Update Recommended Pb-free Soldering Profile	31 Jan 2023
10, 11	Update Quantity per Reel	25 Sep 2023

NOTE

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

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