SFM-06X-RAB

Projection LED

Table of Contents

Features:

- Co-packaged Red Amber and Blue LED chipset with each 0.64 mm^2 emitting area designed for Mobile and Augmented Reliability (AR) projection applications, matching 0.2" and 0.23" micro display panels.
- Enables compact and efficient projection engines when designed with companion SFT-10-CG (Converted Green)
- Thermally efficient SMT Package with electrically isolated thermal pad
- Standard 3030 SMT package
- Lambertian emitting profile
- Flat surface emission for high collection efficiency and low optical losses
- Wide color gamut with dominant wavelengths: Red-Amber 613 nm and Blue 455nm
- Environmentally friendly: RoHS and REACH compliant

Applications

- Specifically engineered for stand alone, embedded, or battery-assisted projection display applications.
- Augmented Reality (AR)
- Mobile Projection
- Medical / Life Science
- Industrial

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Ordering Information

Product	Ordering Part Number	Description
SMD	SFM-06X-RAB-J30-###	Red-Amber and Blue die each 0.64 mm^2 die mounted on a small 3.0 x 3.0mm surface mounted, electrical and thermal isolated package with directional indicator.

Part Number Nomenclature

SFM — 06X — RAB — J30 — ###

Product Family	Emitter Area & Technology	Color	Package Configuration	Bin Kit
SFM: Surface-Mount Flat-Top Multi-chip	06 : 0.64 mm^2 X : isolated	RAB = Red-Amber & Blue	J30: 3.0mm x 3.0mm SMD Electrical and Thermal isolated package See Mechanical Drawing section	Refer to Bin kit Order Codes

Bin Kit Order Codes

Each bin kit specifies a minimum flux bin, as well as specific color bin if applicable, allowed. Please note that within each kit a maximum flux is not specified and as a result Luminus may ship any part meeting or exceeding the minimum flux specification. Shipments will always meet the listed color bins. For information on ordering bin kits not listed below, please contact Luminus.

Ordering Part Number with Binkit	Bin Kit Code	Flux Bin Code
SFM-06X-RAB-J30-MPZ	MPZ	1Z, 1A, 1B, 1C
SFM-06X-RAB-J30-MPA	MPA	1A, 1B, 1C, 1D

Note 1: Refer to page 4 for Bin Structure Definition

Note 2: Wavelength bin not orderable. For reference only

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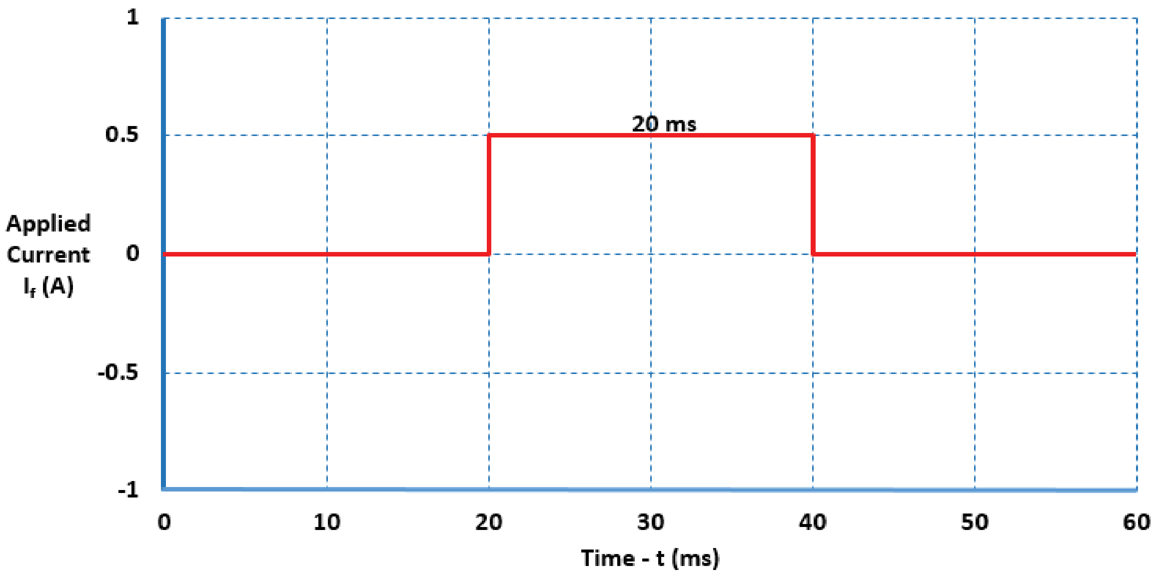
STANDARD TEST CONDITION

All performance metrics of the SFT and SFM Series of LED's are characterized from a single current "PULSE" [1,2]
On SFM-06X, the pulse duration is 20ms, and the applied current is 0.5A under $T_C = 25°C$
Rise and Fall times of the signal are negligible.



Note 1: Case temperature 25°C

Note 2: Luminus maintains a tolerance of +/- 6% on flux measurements

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Binning Structure

Flux Bins [1,2,3]

Flux Bin Code	Red Amber Minimum Flux (lm)	Red Amber Maximum Flux (lm)	Blue Minimum Flux (mW)	Blue Maximum Flux (mW)
1Z	50	60	650	950
1A	60	70	650	950
1B	70	80	650	950
1C	80	90	650	950
1D	90	100	650	950

Note 1: Test condition at drive current 500mA, 20ms single pulse at T_C = 25°C as described on page 3.

Note 2: LED packing reel of single flux bin code.

Note 3: Luminus maintains a test measurement accuracy for LED flux and power of +/-6%.

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Optical & Electrical Characteristics

General Characteristics		Symbol	Red Amber	Blue	Unit
Emitting Area			0.64	0.64	mm^2
Emitting Area Dimensions			0.8 x 0.8	0.8 x 0.8	mm x mm
Performance at Standard Test Conditions (See definition on page 3)					
Peak Luminuous Flux [1]	typ	Φ_v	78	23	lm
Peak Radiometric Flux [1]	typ	Φ_r	270	700	mW
Dominant Wavelength	min	λ_{dmin}	609	449	nm
	typ	λ_d	613	455	
	max	λ_{dmax}	621	460	
FWHM- Spectral bandwidth at 50% of Φv	typ		16	19	
Chromaticity Coordinates [2]	typ	CIE x	0.66	0.15	
	typ	CIE y	0.32	0.04	
Forward Voltage	min	$V_{F\ min}$	N/A	N/A	V
	typ	V_F	2.35	3.25	
	max	$V_{F\ max}$	3.00	3.80	
Real thermal resisistance [3,4] (junction-solder point)	typ	$R_{thJS\ real}$	10	8	°C/W
Electrical thermal resistance[3,4] (junction-solder point)	typ	R_{thJS}	8	6	°C/W

Note 1: All ratings are based on standard testing conditions as defined on page 3.

Note 2: CIE 1931 chromaticity diagram coordinates, normalized to X+Y+Z=1.

Note 3: Thermal resistance values are based on modeled results correlated to measured $R_{\theta j\text{-}hs}$ data using Forward Voltage sensitivity parametric method., compliant with JEDEC Standards JESD51-14

Note 4: For optimal results, Luminus recommends customer PCB Design in accordance with suggestion provided by the Luminus application note, “Design Guidelines for SFT Chipset Assembly”.

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Optical & Electrical Characteristics

Absolute Maximum Ratings

	Symbol	Red Amber	Blue	Unit
Absolute Minimum Current (CW or Pulsed)[1]		200	200	mA
Absolute Maximum Current (CW)[2]		1.0	1.0	A
Absolute Maximum Reverse Drive Drive Current (CW or Pulsed)		0 - Reverse current operation is not allowed		A
Absolute Maximum Current (Pulsed) [2] (Frequency > 240 Hz, duty cycle <70%)		1.5	1.5	A
Absolute Maximum Surge Current [2] (Frequency > 240 Hz, duty cycle =10%, t= 1ms)		2.0	2.0	A
Absolute Maximum Junction Temperature [3]	T_{jmax}	110	150	°C
Storage Temperature Range		-40 / +100	-40 / +100	°C
ESD sensitivity ANSI/ESDA/JEDEC JS-001 (HBM, Class 2)	V_{ESD}	2000		V

Note 1: Product performance and lifetime data is specified at recommended forward drive currents. Sustained operation at or near absolute minimum currents may result in a reduction of device performance and device lifetime compared to recommended forward drive currents.

Note 2: Sustained operation above maximum currents is not recommended and will result in a reduction of device lifetime compared to specified maximum forward drive currents. Device lifetimes will depend on junction temperature. Please refer to lifetime de-rating curves (available from Luminus) for further information.

Note 3: Sustained operation at Absolute Maximum Operating Junction Temperature (T_{jmax}) will result in reduced device lifetime.

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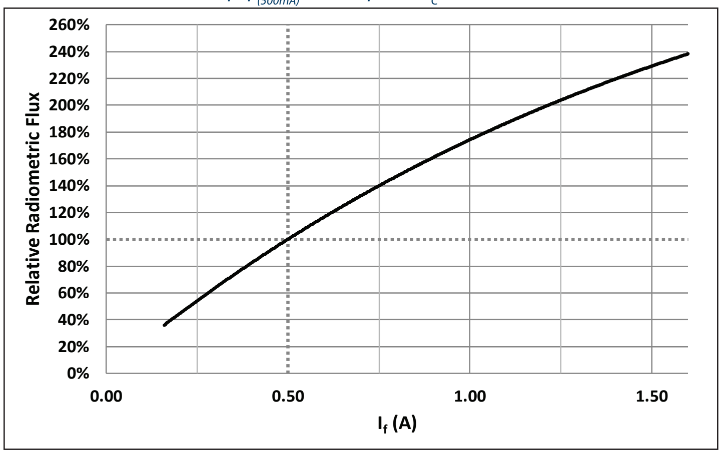
Optical & Electrical Characteristics

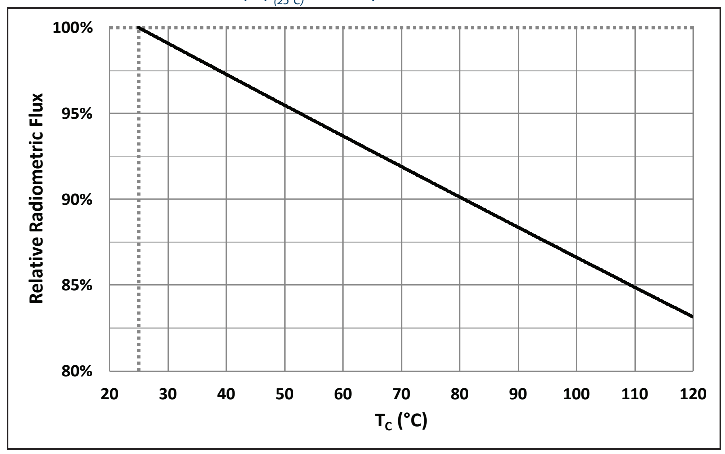
Relative Radiant Power (Blue)

φ/φ(500mA), 20 ms pulse, T_C = 25°C



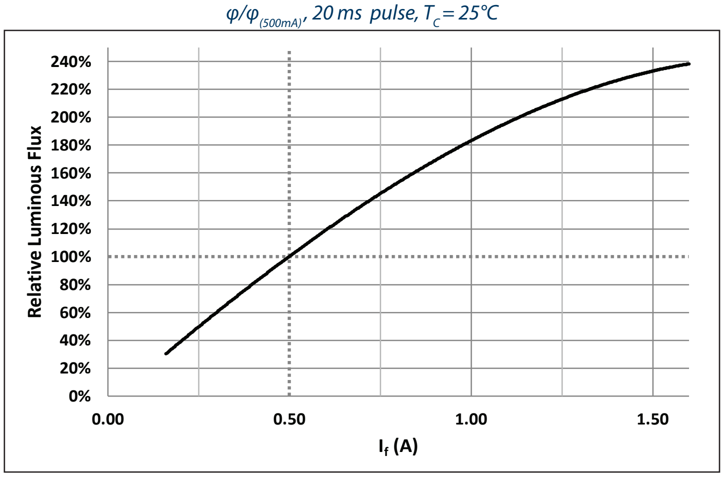
Relative Radiant Power (Blue)

φ/φ(25°C), 20 ms pulse, 500mA



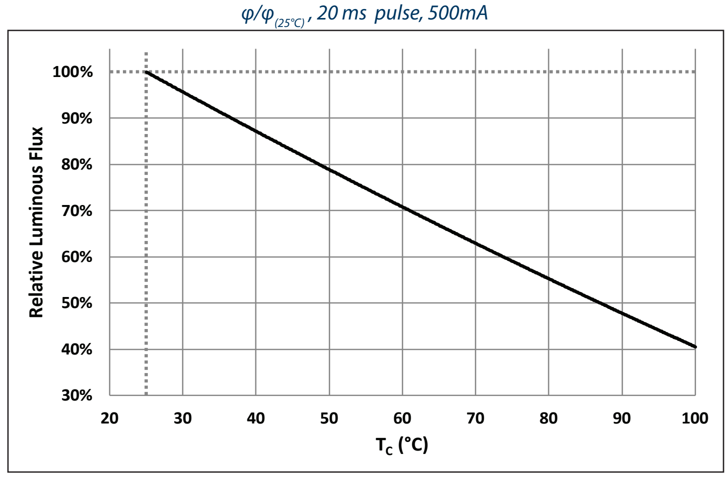
Relative Luminous Flux (Red Amber)

φ/φ(500mA), 20 ms pulse, T_C = 25°C



Relative Luminous Flux (Red Amber)

φ/φ(25°C), 20 ms pulse, 500mA



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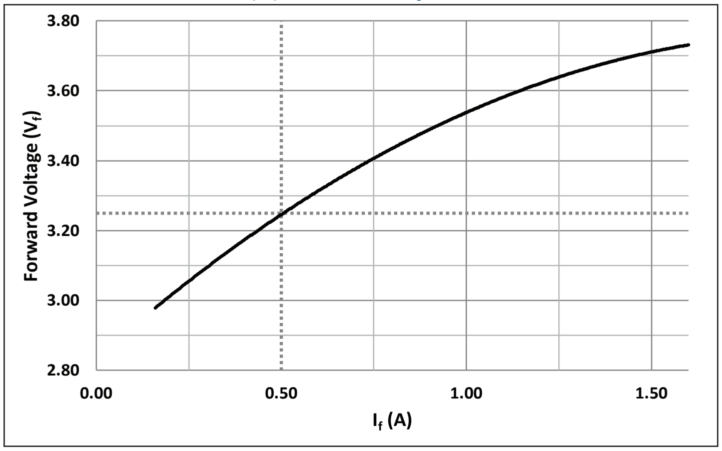
Optical & Electrical Characteristics

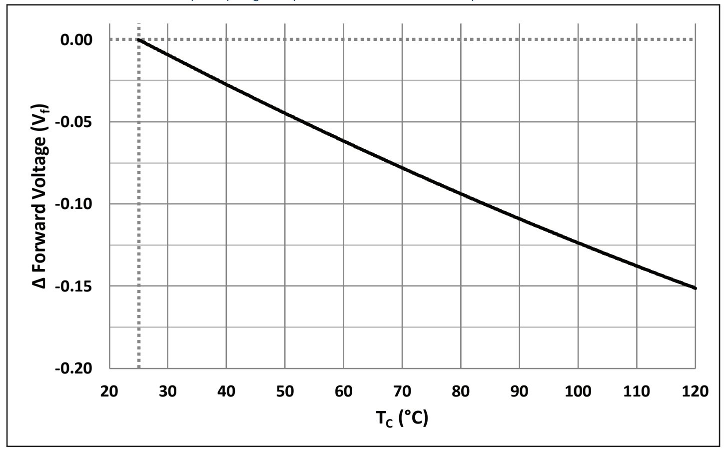
Forward Voltage (Blue)

$V_f(I_f)$, 20 ms pulse, $T_c = 25°C$



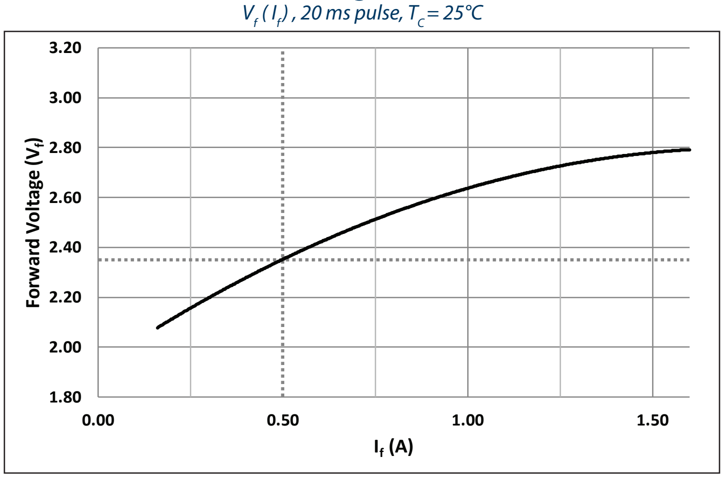
Forward Voltage Shift (Blue)

$\Delta V_f = V_f(T_c) - V_f(25°C)$, 20 ms pulse, $I_f = 500$ mA



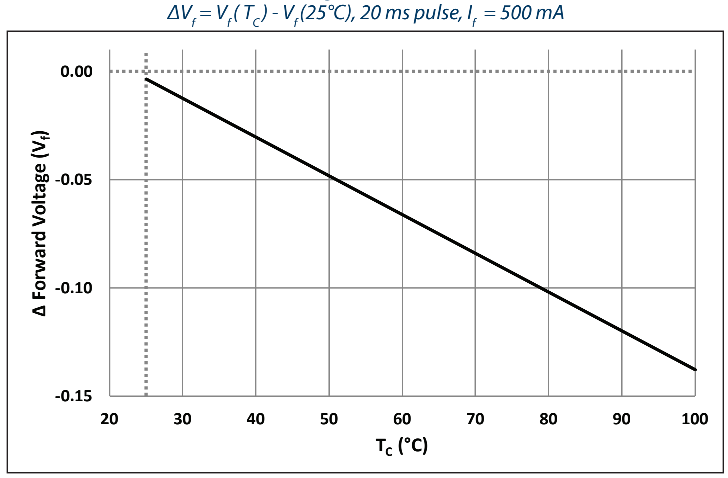
Forward Voltage (Red Amber)

$V_f(I_f)$, 20 ms pulse, $T_c = 25°C$



Forward Voltage Shift (Red Amber)

$\Delta V_f = V_f(T_c) - V_f(25°C)$, 20 ms pulse, $I_f = 500$ mA



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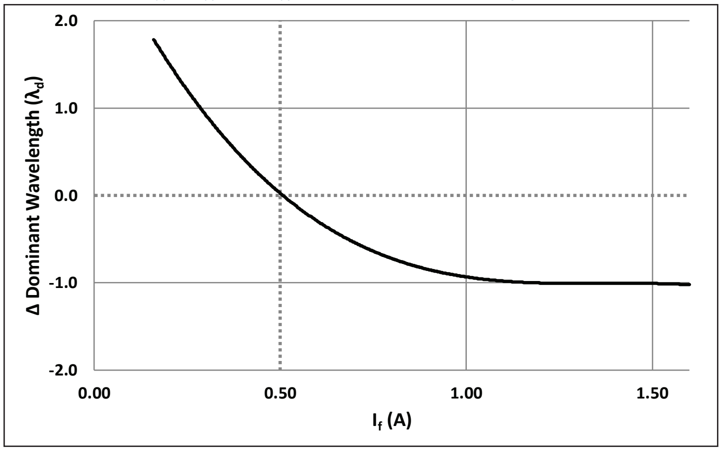
Optical & Electrical Characteristics

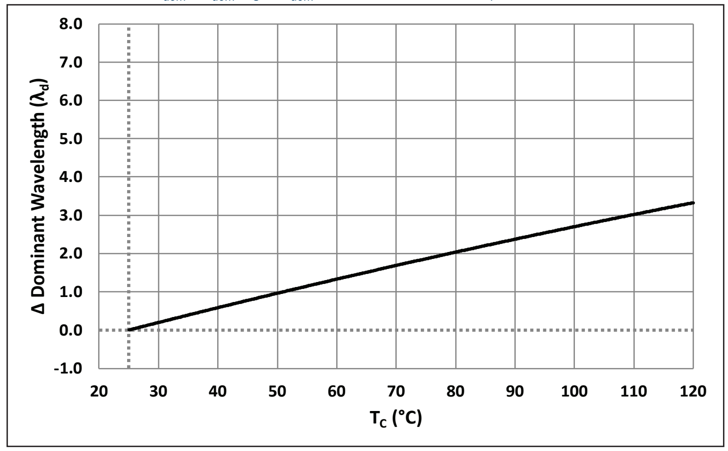
Dominant Wavelength Shift (Blue)

$\lambda_{dom} = \lambda_{dom}(I_f) - \lambda_{dom}(500mA)$, 20 ms pulse, $T_C = 25°C$



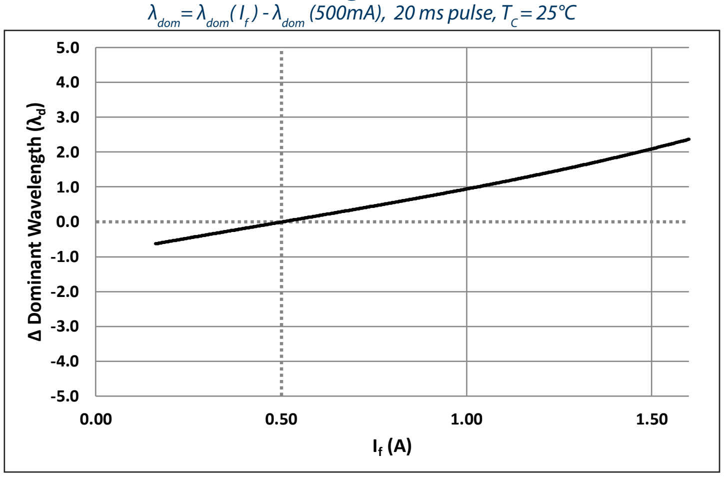
Dominant Wavelength Shift (Blue)

$\lambda_{dom} = \lambda_{dom}(T_C) - \lambda_{dom}(25°C)$, 20 ms pulse, $I_f = 500mA$



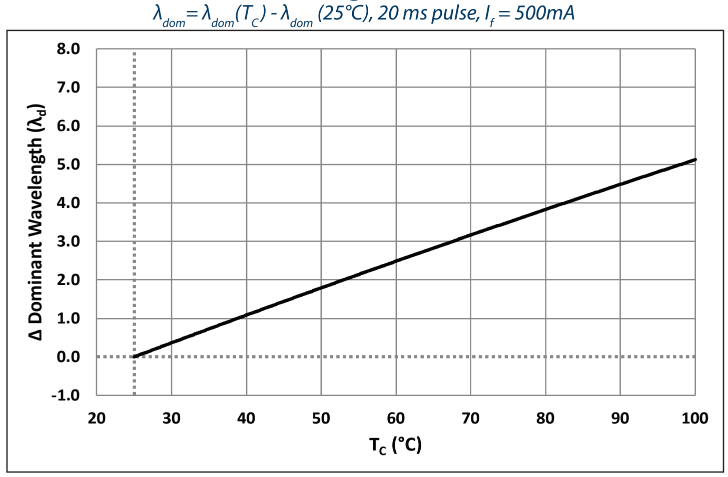
Dominant Wavelength Shift (Red Amber)

$\lambda_{dom} = \lambda_{dom}(I_f) - \lambda_{dom}(500mA)$, 20 ms pulse, $T_C = 25°C$



Dominant Wavelength Shift (Red Amber)

$\lambda_{dom} = \lambda_{dom}(T_C) - \lambda_{dom}(25°C)$, 20 ms pulse, $I_f = 500mA$



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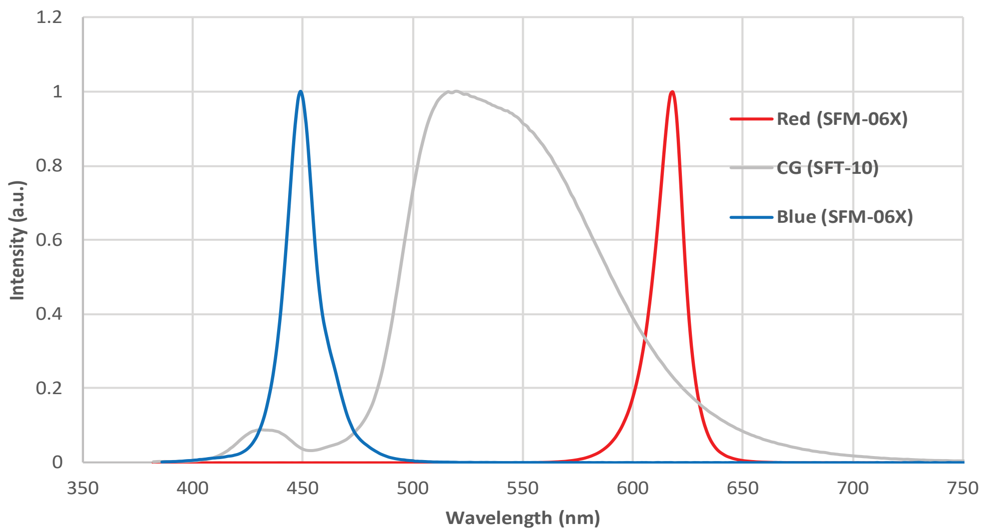
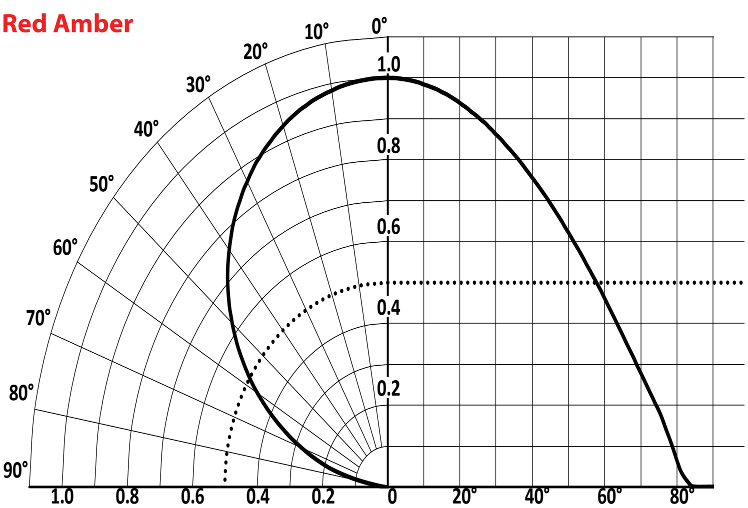
SFT-Series Optical Spectrum (Typical) [1]

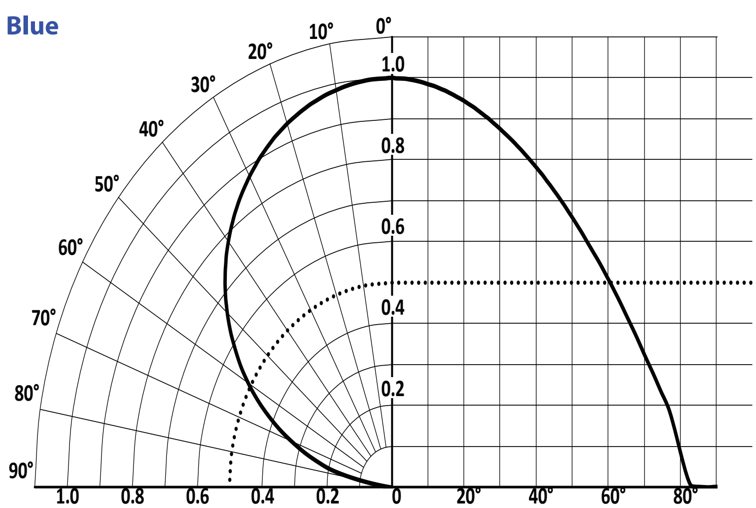


Angular Intensity Distribution (Typical) [1]

Red Amber



Blue



Note 1: Data is recorded using standard test conditions and tolerances as described on page 3.

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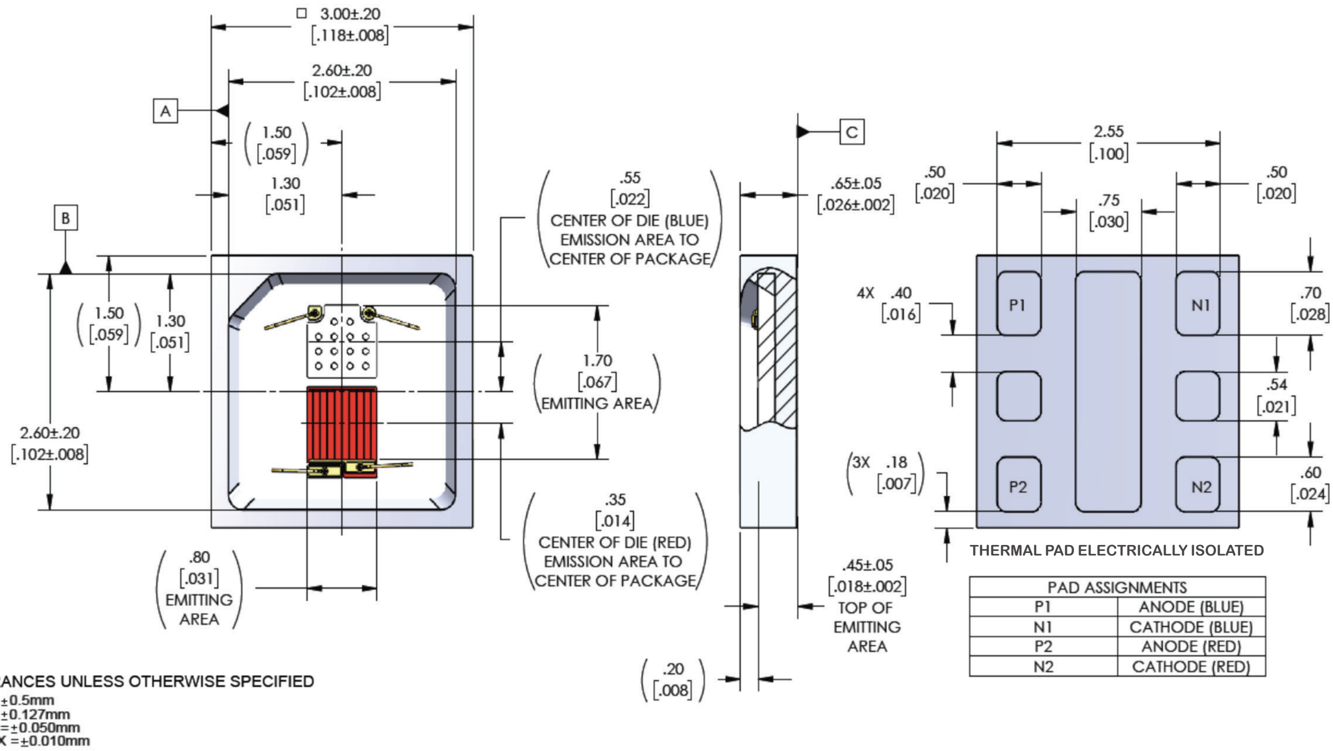
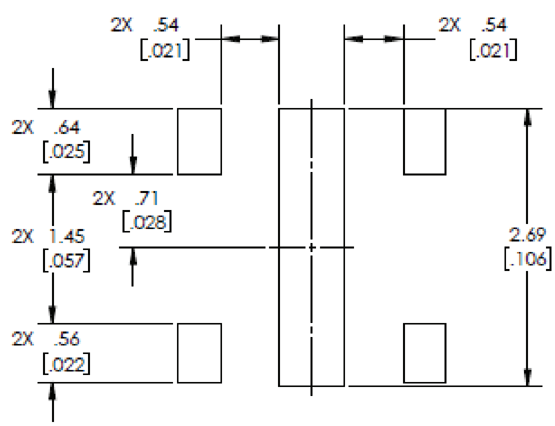
Mechanical Dimensions

SFM-06X [Red-Amber / Blue] in J30 Package Configuration



PAD ASSIGNMENTS	
P1	ANODE (BLUE)
N1	CATHODE (BLUE)
P2	ANODE (RED)
N2	CATHODE (RED)

Electrical Pinout / Solder Pad Layout



RECOMMENDED STENCIL PATTERN
* TOLERANCE UNLESS MENTIONED IS ±0.1mm.

Note: Recommended Stencil Pattern
For recommended solder profiles, see page 13

Optimal LED performance is dependent on a proper system design. Please review the Luminus application note, "Design Guidelines for SFT Chipset Assembly." Contact Luminus for more detail.

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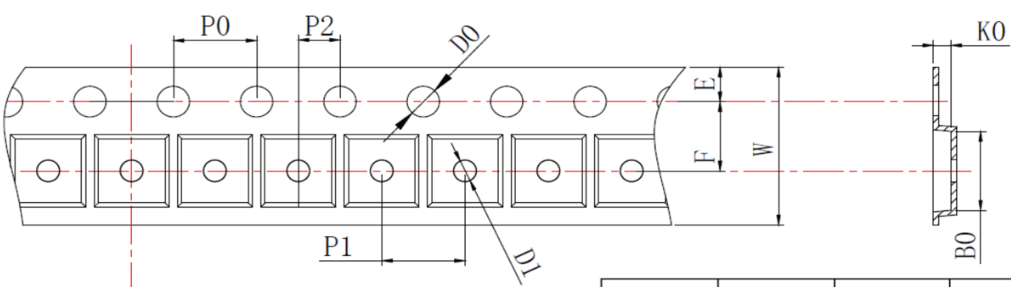
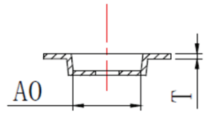
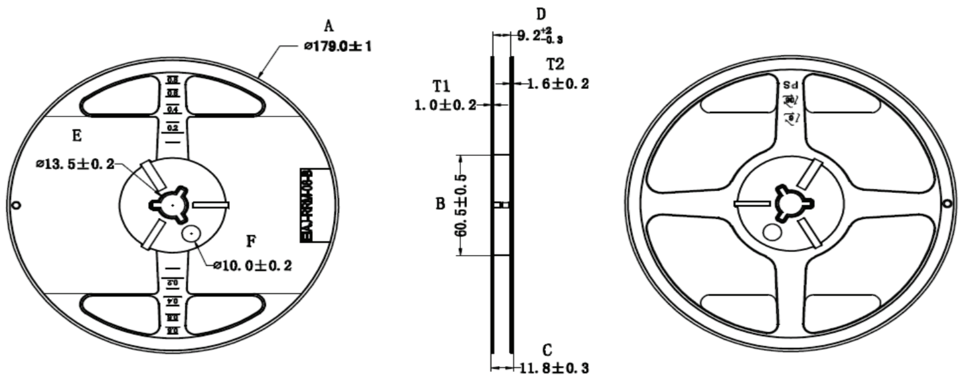
Product Shipping & Labeling Information

All SFM-06X products are package and labeled with their respective bin as outlined in the tables on page 2 & 4. Each reel contains only one flux and one wavelength bin



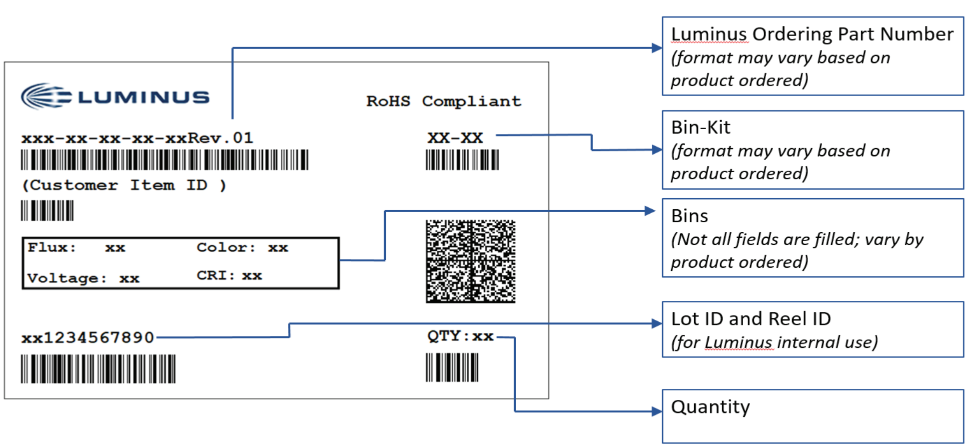


SYMBOL	A0	B0	K0	P0	P1	P2
SPEC	3. 20±0. 10	3. 40±0. 10	0. 85±0. 10	4. 00±0. 10	4. 00±0. 10	2. 00±0. 10
SYMBOL	T	E	F	D0	D1	W
SPEC	0. 20±0. 05	1. 75±0. 10	3. 50±0. 10	1. 55±0. 05	1. 10±0. 05	8. 00±0. 10



A±1	B±0. 5	C±0. 3	$D^{+2}_{-0.3}$	E±0. 2	F±0. 2	T1±0. 2	T2±0. 2
179	60. 5	11. 8	9. 2	13. 5	Ø10	1. 0	1. 6

Label information

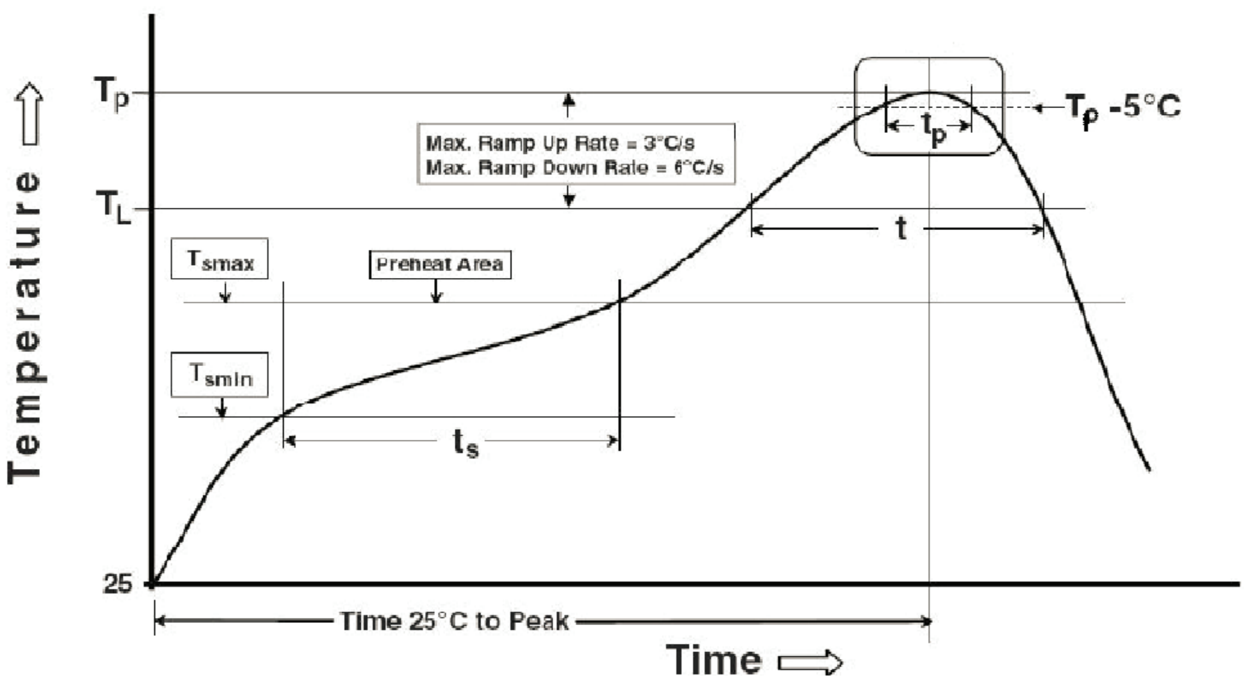


Soldering Profile

Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Preheat & Soak Temperature min (T_{smin}) Temperature max (T_{smax}) Time (T_{smin} to T_{smax}) (t_s)	 100°C 150°C 60-120 seconds	 150°C 200°C 60-120 seconds
Average ramp-up rate (T_{smax} to T_p)	3°C/second max	3°C/second max
Liquidus temperature (T_L) Time at liquidus (t_L)	183°C 60-150 seconds	217°C 60-150 seconds
Peak temperature (T_p)	235°C	260°C
Time (t_p) within 5°C of the peak temperature (T_p)	20 seconds	30 seconds
Average ramp-down rate (T_p to T_{smax})	6°C/second max	6°C/second max
Time 25°C to peak temperature	6 minutes max	8 minutes max
SMT Rework Guideline		
Hotplate Max Temperature	230 °C	
Heating Time	< 60 sec	

Note: These are general guidelines. Consult the solder paste manufacturer's datasheet for guidelines specific to the alloy and flux combination used in your application.

Product complies to MSL Level 1 according to JEDEC J-STD-020E



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Precautions for Use

Storage:

1. Before opening the package

Unopened LEDs bags should be kept at a temperature between 15°C & 40°C and should be used within a year.

2. After opening the package

Opened LED moisture proof packages should be stored between 30 and 60% RH. The LEDs should be soldered within 168 hours (7days) after opening the package.

If unused LEDs remain on a reel, they should be stored in resealable moisture proof packages with new absorbent material (silica gel) and new moisture indicator cards, or better, in a dry box. If the moisture card indicates, or the first article run of the LEDs popcorns, an oven baking treatment should be performed using the following conditions: 60°C for 20 hours.

The LED electrodes and lead frames may incorporate a silver-plated copper alloy. These can be identified by a silver appearance (compared to a gold appearance). This silver surface may be affected by environmental contaminants, particularly sulfur containing compounds, during storage, and at the point of use. Please avoid conditions which may cause the LEDs to become corroded or discolored. Corrosion or discoloration can reduce solderability and/or affect optical characteristics.

Avoid rapid temperature transitions, especially in high humidity environments where condensation can occur.

Static Electricity:

These products are sensitive to static electricity, and care should be taken when handling them. Static electricity or surge voltage will damage the LEDs. It is recommended to wear an anti-electrostatic wristband or anti-electrostatic gloves when handling the LEDs. All devices, equipment and machinery must be properly grounded. It is recommended that measures be taken to isolate LED processing equipment from potential sources of voltage surges.

Reference: APN-002815 Electrical Stress Damage to LEDs and How to Prevent It

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History of Changes

Rev		Description of Change
1	01/22/2021	Initial release
2	03/15/2021	Editorial change
3	05/17/2021	Update Vf Min/Max Update 2D drawing and tolerance Update Reflow Profile and Precaution of Use Characterization thermal charts change from Tj to Tc