

LUXEON MultiColor Module 0.5W

RGB 3-in-1 versatile package

The LUXEON MultiColor Module 0.5W is a compact 3-in-1 package that offers flexibility and versatility. With the ability to control individually or all at the same time the color control is precise.



FEATURES AND BENEFITS

RGB 3-in-1 module

3.5mm x 3.5mm

Individually control each channel

IPX8 water resistant rating

PRIMARY APPLICATIONS

Panel Lights

– Display Wall

Linear

Wall Wash

Landscape Lighting

Table of Contents

General Product Information	2
Product Test Conditions	2
Part Number Nomenclature	2
Lumen Maintenance	2
Environmental Compliance	2
Performance Characteristics	3
Product Selection Guide	3
Optical Characteristics	3
Electrical and Thermal Characteristics	3
Absolute Maximum Ratings	4
Characteristic Curves	5
Spectral Power Distribution Characteristics	5
Light Output Characteristics	5
Forward Current Characteristics	6
Radiation Pattern Characteristics	7
Product Bin and Labeling Definitions	8
Decoding Product Bin Labeling	8
Intensity Bins	9
Dominant Wavelength Bins	9
Forward Voltage Bins	9
Mechanical Dimensions	10
Reflow Soldering Guidelines	11
JEDEC Moisture Sensitivity	11
Waterproof Test	11
Solder Pad Design	12

General Product Information

Product Test Conditions

LUXEON MultiColor Module 0.5W LEDs are tested and binned with a 20ms monopulse of 20mA at a junction temperature, T_j , of 25°C.

Part Number Nomenclature

The part number for the LUXEON MultiColor Module 0.5W follows the convention below::

L 1 M C - **A A A** 0 0 3 5 0 0 0 M P 0

Where:

A A A – designates color (R=Red, G=Green, B=Blue)

Therefore, the following part number is used for the Red, Green, Blue LUXEON MultiColor Module LED:

L 1 M C - **R G B** 0 0 3 5 0 0 0 M P 0

Lumen Maintenance

Please contact your local Sales Representative or Lumileds Technical Solutions Manager for more information about the long-term performance of this product.

Environmental Compliance

Lumileds LLC is committed to providing environmentally friendly products to the solid-state lighting market. LUXEON MultiColor Module 0.5W is compliant to the European Union directives on the restriction of hazardous substances in electronic equipment, namely the RoHS Directive 2011/65/EU and REACH Regulation (EC) 1907/2006. Lumileds LLC will not intentionally add the following restricted materials to its products: lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB) or polybrominated diphenyl ethers (PBDE).

Performance Characteristics

Product Selection Guide

Table 1. Product performance of LUXEON MultiColor Module 0.5W at 20mA, $T_j=25^\circ\text{C}$.

COLOR	DOMINANT WAVELENGTH ^[1] (nm)		INTENSITY ^[2] (mcd)		PART NUMBER
	MINIMUM	MAXIMUM	MINIMUM	TYPICAL	
Red	619	625	850	1000	L1MC-RGB0035000MP0
Green	520	535	1800	2300	
Blue	465	478	360	500	

Notes for Table 1:

1. Lumileds maintains a tolerance of $\pm 1\text{nm}$ on dominant wavelength measurements.
2. Lumileds maintains a tolerance of $\pm 10\%$ on luminous intensity measurements.

Optical Characteristics

Table 2. Optical characteristics for LUXEON MultiColor Module 0.5W at 20mA, $T_j=25^\circ\text{C}$.

COLOR	PART NUMBER	TYPICAL SPECTRAL HALF-WIDTH ^[1] (nm)	TYPICAL TEMPERATURE COEFFICIENT OF DOMINANT WAVELENGTH (nm/ $^\circ\text{C}$)	TYPICAL VIEWING ANGLE ^[2]
Red	L1MC-RGB0035000MP0	15	0.04	102°
Green		25	0.04	102°
Blue		18	0.04	102°

Notes for Table 2:

1. Spectral half-width is the spectral bandwidth at 50% of the peak intensity.
2. Viewing angle is the off axis angle from the LED centerline where the luminous intensity is $\frac{1}{2}$ of the peak value.

Electrical and Thermal Characteristics

Table 3. Electrical and thermal characteristics for LUXEON MultiColor Module 0.5W at 20mA, $T_j=25^\circ\text{C}$.

COLOR	PART NUMBER	FORWARD VOLTAGE ^[1] (V_f)			TYPICAL TEMPERATURE COEFFICIENT OF FORWARD VOLTAGE ^[2] (mV/ $^\circ\text{C}$)	TYPICAL THERMAL RESISTANCE—JUNCTION TO SOLDER PAD ($^\circ\text{C}/\text{W}$)
		MINIMUM	TYPICAL	MAXIMUM		
Red	L1MC-RGB0035000MP0	1.70	2.10	2.50	-1.6	75
Green		2.60	2.80	3.40	-2.4	120
Blue		2.60	3.00	3.40	-2.6	85

Notes for Table 3:

1. Lumileds maintains a tolerance of $\pm 0.1\text{V}$ on forward voltage measurements.
2. Measured between 25°C and 85°C .

Absolute Maximum Ratings

Table 4. Absolute maximum ratings for LUXEON MultiColor Module 0.5W.

PARAMETER	RED	GREEN AND BLUE
DC Forward Current ^[1, 2]	50mA	35mA
Peak Pulsed Forward Current ^[1, 3]	200mA	100mA
LED Junction Temperature ^[1] (DC & Pulse)	115°C	115°C
ESD Sensitivity (ANSI/ESDA/JEDEC JS-001-2012)	Class 2	
LED Storage Temperature	-40°C to 100°C	
Soldering Temperature	JEDEC 020c 250°C	
Allowable Reflow Cycles	3	
Reverse Voltage ($V_{reverse}$)	LUXEON MultiColor Module 0.5W LEDs are not designed to be driven in reverse bias	

Notes for Table 4:

1. Proper current derating must be observed to maintain the junction temperature below the maximum allowable junction temperature.
2. Single-color light.
3. At 0.01ms pulse on time test with a pulse period of 0.1ms.

Characteristic Curves

Spectral Power Distribution Characteristics

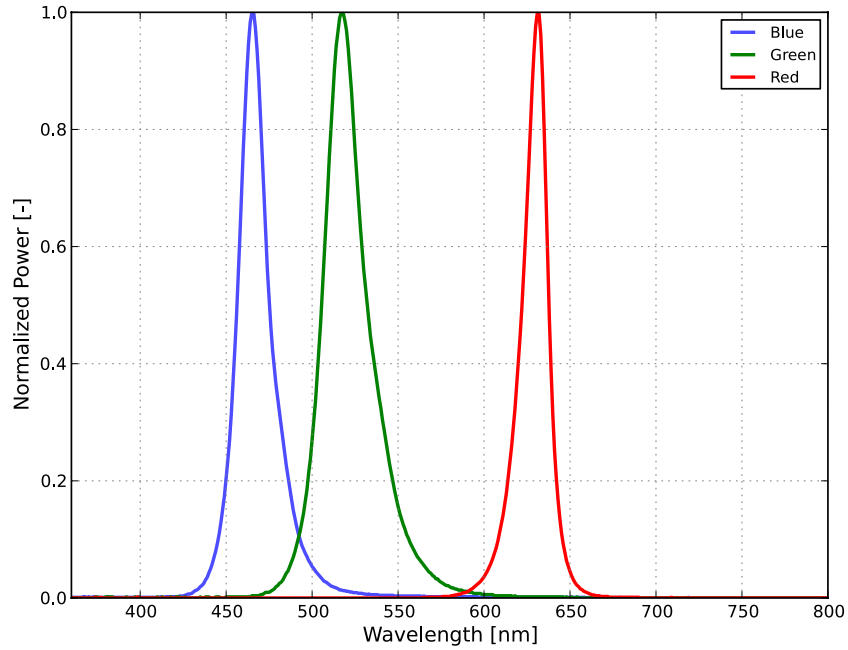


Figure 1. Typical normalized power vs. wavelength for LUXEON MultiColor Module 0.5W at 20mA, $T_j=25^{\circ}\text{C}$.

Light Output Characteristics

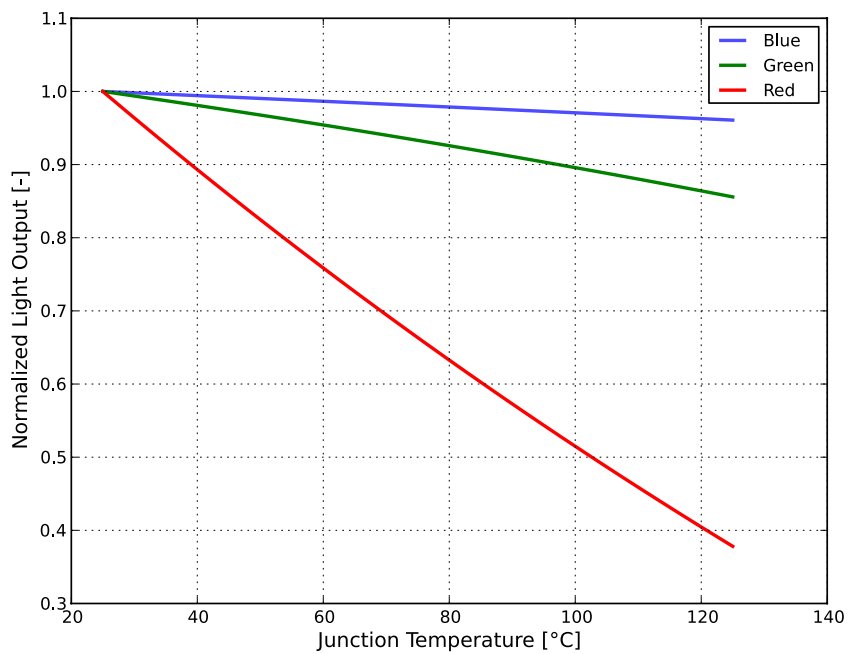


Figure 2. Typical normalized light output vs. junction temperature for LUXEON MultiColor Module 0.5W at 20mA.

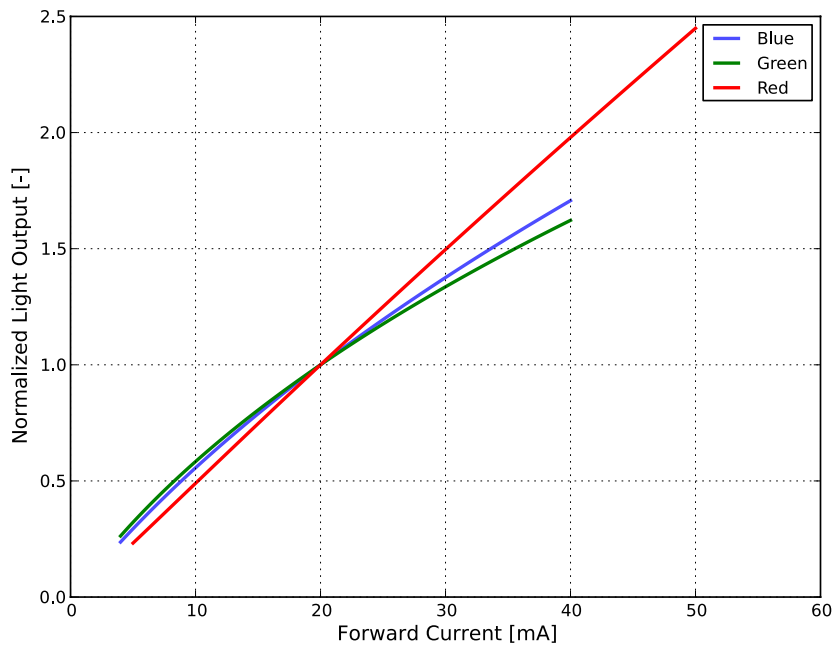


Figure 3. Typical normalized light output vs. forward current for LUXEON MultiColor Module 0.5W at $T_j=25^\circ\text{C}$.

Forward Current Characteristics

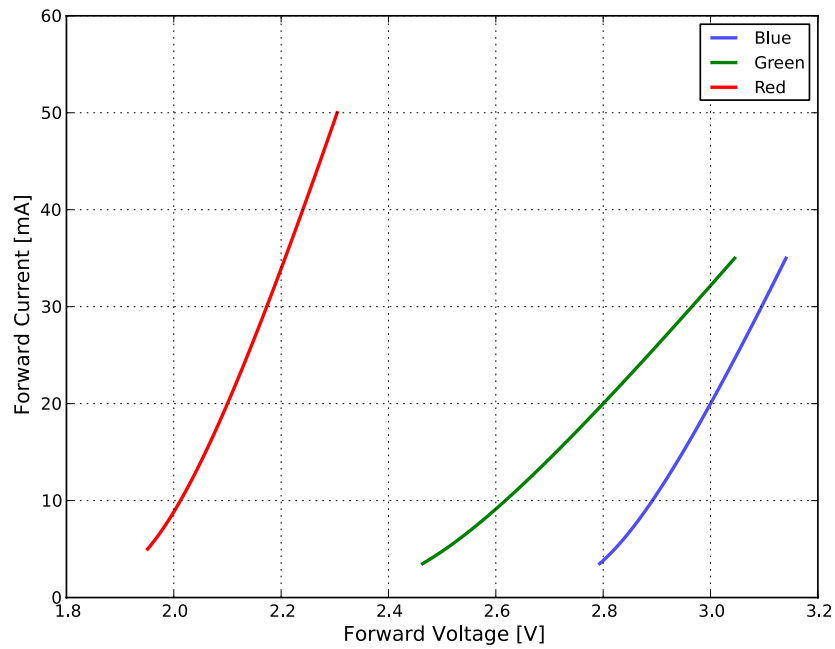


Figure 4. Typical forward current vs. forward voltage for LUXEON MultiColor Module 0.5W at $T_j=25^\circ\text{C}$.

Radiation Pattern Characteristics

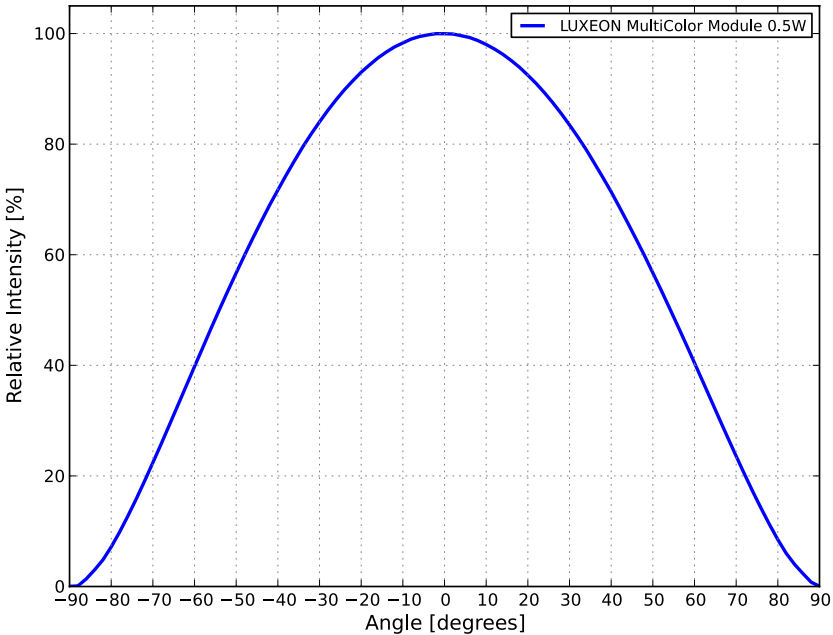


Figure 5. Typical radiation pattern for LUXEON MultiColor Module 0.5W at 20mA, T_j=25°C.

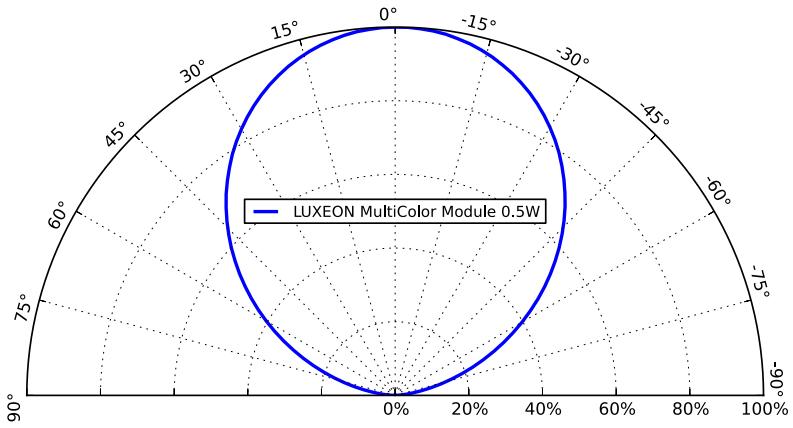


Figure 6. Typical polar radiation pattern for LUXEON MultiColor Module 0.5W at 20mA, T_j=25°C.

Product Bin and Labeling Definitions

Decoding Product Bin Labeling

In the manufacturing of semiconductor products, there are variations in performance around the average values given in the technical datasheet. For this reason, Lumileds bins LED components for luminous flux, intensity, radiometric power, color point, peak wavelength, dominant wavelength and forward voltage.

LUXEON MultiColor Module 0.5W LEDs are labeled using a 12-digit alphanumeric CAT code following the format below:

A B C D – Red

E F G H – Green

J K L M – Blue

Where:

A E J – designates intensity for the red, green and blue LED (example: B=440 to 520mcd, S=2200 to 2500mcd)

BC FG KL – designates color, dominant wavelength bin (example: Red 10=619 to 625nm, Green 20=520 to 525nm, Blue 31=468 to 471nm)

D H M – designates forward voltage bin (example: A=1.70 to 2.4V, B=2.60 to 3.40V)

Therefore, a LUXEON MultiColor Module 0.5W LED with a red intensity of 975 to 1150mcd / color 619 to 625nm / forward voltage of 1.70 to 2.50V; green intensity of 2200 to 2500mcd / color 525 to 530nm / forward voltage of 2.60 to 3.40V; blue intensity of 440 to 520mcd / color 468 to 471nm and forward voltage of 2.60 to 3.40V has the following CAT Code:

H 1 0 A – Red

S 2 1 B – Green

B 3 1 B – Blue

Intensity Bins

Table 5 lists the standard intensity bins for LUXEON MultiColor Module 0.5W LEDs. Although several bins are outlined, product availability in a particular bin varies by production run and by product performance.

Table 5. Intensity bin definitions for LUXEON MultiColor Module 0.5W.

BIN	BIN	INTENSITY ⁽¹⁾ (mcd)	
		MINIMUM	MAXIMUM
Red	G	850	975
	H	975	1150
Green	R	1800	2200
	S	2200	2500
	T	2500	3000
Blue	A	360	440
	B	440	520
	C	520	600
	D	600	700

Notes for Table 5:

1. Lumileds maintains a tolerance of $\pm 10\%$ on intensity measurements.

Dominant Wavelength Bins

Table 6. Dominant wavelength bins for LUXEON MultiColor Module 0.5W at 20mA, $T_j=25^\circ\text{C}$.

COLOR	PART NUMBER	BIN	DOMINANT WAVELENGTH ⁽¹⁾ (nm)	
			MINIMUM	MAXIMUM
Red	L1MC-RGB0035000MP0	10	619	625
Green		20	520	525
		21	525	530
		22	530	535
Blue		30	465	468
		31	468	471
		32	471	475
		33	475	478

Notes for Table 6:

1. Lumileds maintains a tolerance of $\pm 1\text{nm}$ on dominant wavelength measurements.

Forward Voltage Bins

Table 7. Forward voltage bin definitions for LUXEON MultiColor Module 0.5W.

COLOR	BIN	FORWARD VOLTAGE ⁽¹⁾ (V_f)	
		MINIMUM	MAXIMUM
Red	A	1.70	2.50
Green	B	2.60	3.40
Blue	B	2.60	3.40

Notes for Table 7:

1. Lumileds maintains a tolerance of $\pm 0.1\text{V}$ on forward voltage measurements.

Mechanical Dimensions

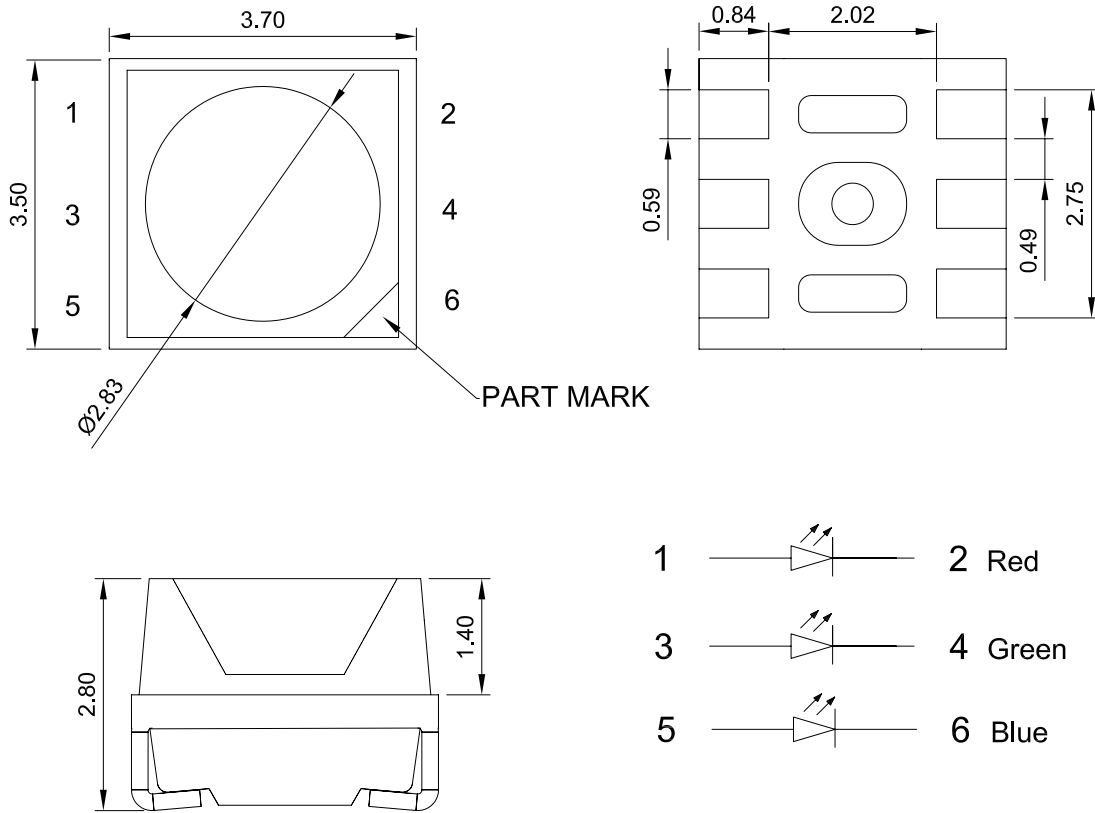


Figure 7. Mechanical dimensions for LUXEON MultiColor Module 0.5W.

Notes for Figure 7:

- 1. Drawings are not to scale.
- 2. All dimensions are in millimeters.

Reflow Soldering Guidelines

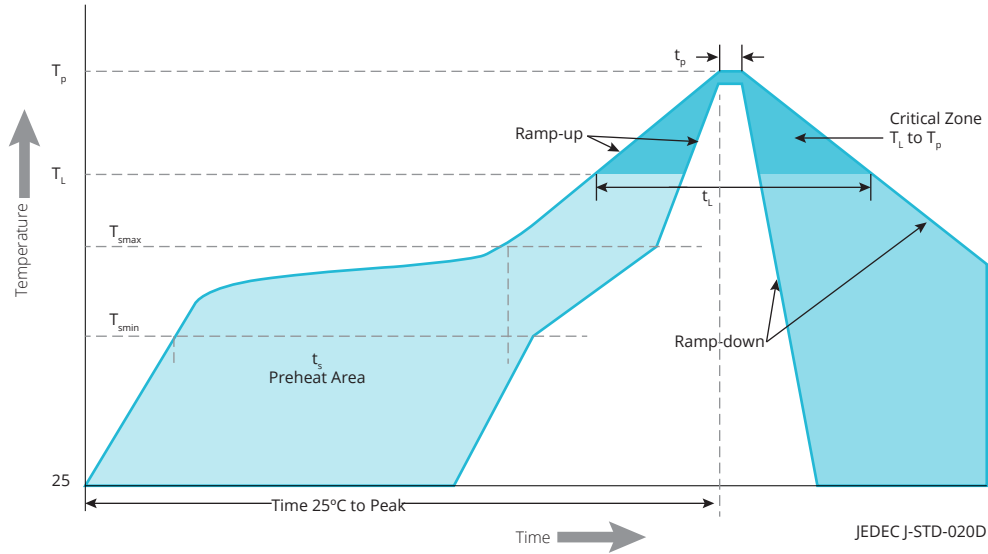


Figure 8. Visualization of the acceptable reflow temperature profile as specified in Table 8.

Table 8. Reflow profile characteristics for LUXEON MultiColor Module 0.5W.

PROFILE FEATURE	LEAD-FREE ASSEMBLY
Preheat Minimum Temperature (T_{smin})	150°C
Preheat Maximum Temperature (T_{smax})	200°C
Preheat Time (t_{smin} to t_{smax})	60 to 120 seconds
Ramp-Up Rate (T_L to T_p)	4°C / second maximum
Liquidous Temperature (T_L)	217°C
Time Maintained Above Temperature T_L (t_L)	60 to 150 seconds
Peak / Classification Temperature (T_p)	250°C
Time Within 5°C of Actual Peak Temperature (t_p)	20 to 40 seconds
Ramp-Down Rate (T_p to T_L)	6°C / second maximum
Time 25°C to Peak Temperature	8 minutes maximum

JEDEC Moisture Sensitivity

Table 9. Moisture sensitivity levels for LUXEON MultiColor Module 0.5W.

LEVEL	FLOOR LIFE		SOAK REQUIREMENTS STANDARD	
	TIME	CONDITIONS	TIME	CONDITIONS
5a	24 hours	≤30°C / 60% RH	48 Hours +2 / -0	30°C / 60% RH

Waterproof Test

Table 10. Waterproof test for LUXEON MultiColor Module 0.5W. ^[1]

STANDARD	CONDITIONS	TIME
IEC 60529:2001	IPX8 immersing in 1m water	24 hours

Notes for Table 10:

1. Waterproof test is conducted on the component level by assembling the module on a PCB, isolating the electrical path by silicone. It is recommended to test the product in the application and insulate for moisture.

Solder Pad Design

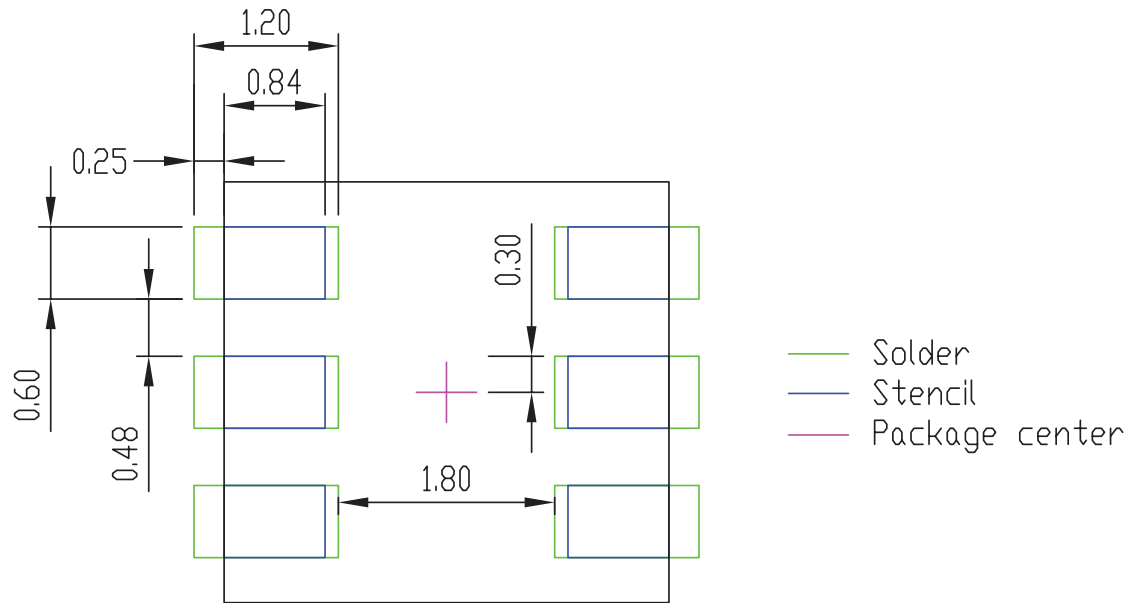


Figure 9. Recommended PCB solder pad layout for LUXEON MultiColor Module 0.5W.

Notes for Figure 9:

1. Drawings are not to scale.
2. All dimensions are in millimeters.
3. Layout is symmetric around package center.
4. All six pads patterns are identical in size.

About Lumileds

Companies developing automotive, mobile, IoT and illumination lighting applications need a partner who can collaborate with them to push the boundaries of light. With over 100 years of inventions and industry firsts, Lumileds is a global lighting solutions company that helps customers around the world deliver differentiated solutions to gain and maintain a competitive edge. As the inventor of Xenon technology, a pioneer in halogen lighting and the leader in high performance LEDs, Lumileds builds innovation, quality and reliability into its technology, products and every customer engagement. Together with its customers, Lumileds is making the world better, safer, more beautiful—with light.

To learn more about our lighting solutions, visit lumileds.com.



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