ProLight Opto
Technology Corporation

ProLight PM6B-3LFx-A
3W RGB Power LED
Technical Datasheet
Version: 1.1

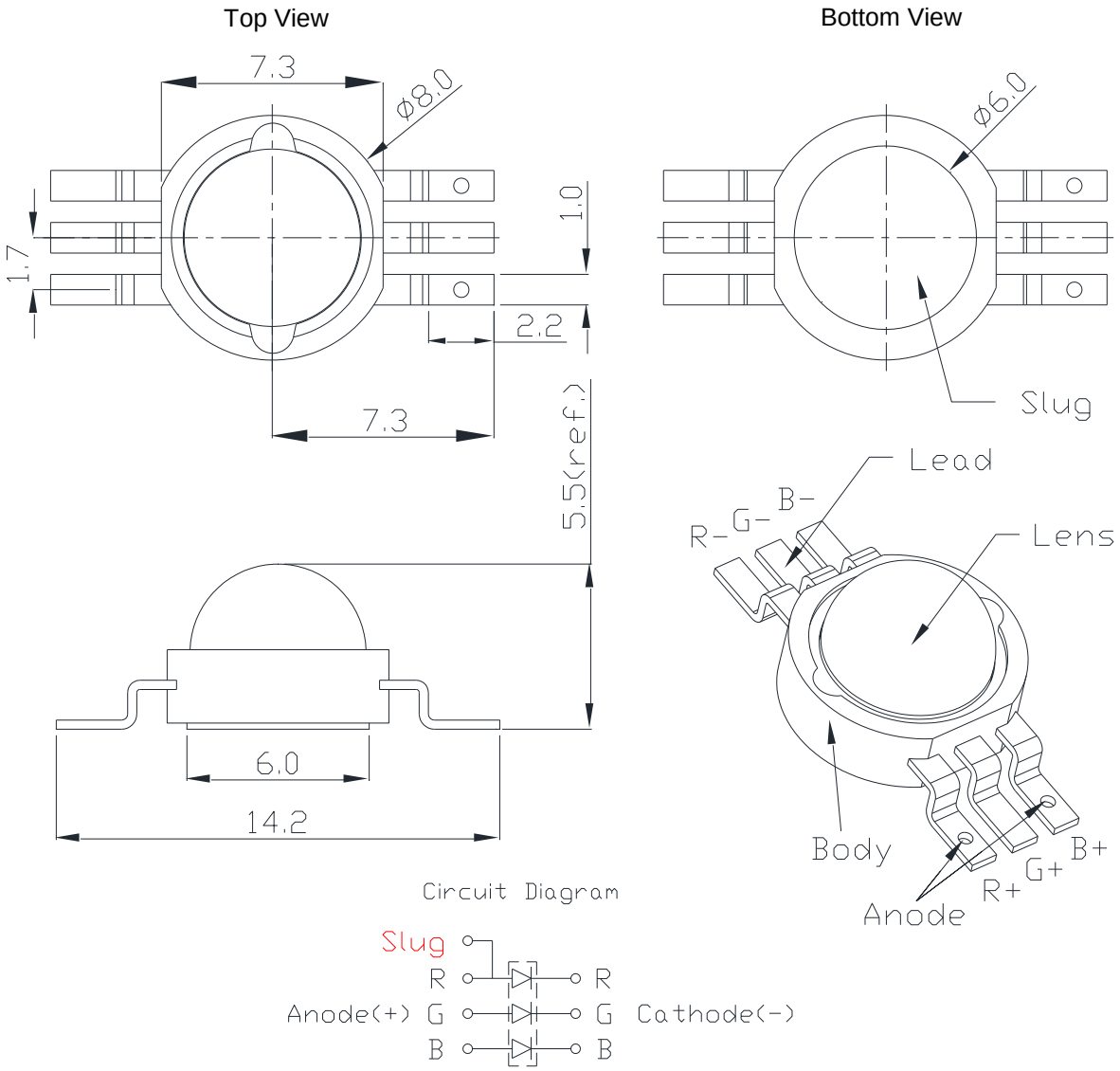
Features

- R, G, B three color in one Package
- High flux per LED
- Good color uniformity
- Low-temp. & lead free reflow soldering
- More energy efficient than incandescent and most halogen lamps
- Low Voltage DC operated
- Instant light (less than 100ns)
- No UV

Typical Applications

- Reading lights (car, bus, aircraft)
- Portable (flashlight, bicycle)
- Uplighters/Downlighters
- Decorative/Entertainment
- Bollards/Security/Garden
- Cove/Undershelf/Task
- Indoor/Outdoor Commercial and Residential Architectural
- Automotive Ext (Stop-Tail-Turn, CHMSL, Mirror Side Repeat)
- LCD backlights

Emitter Mechanical Dimensions

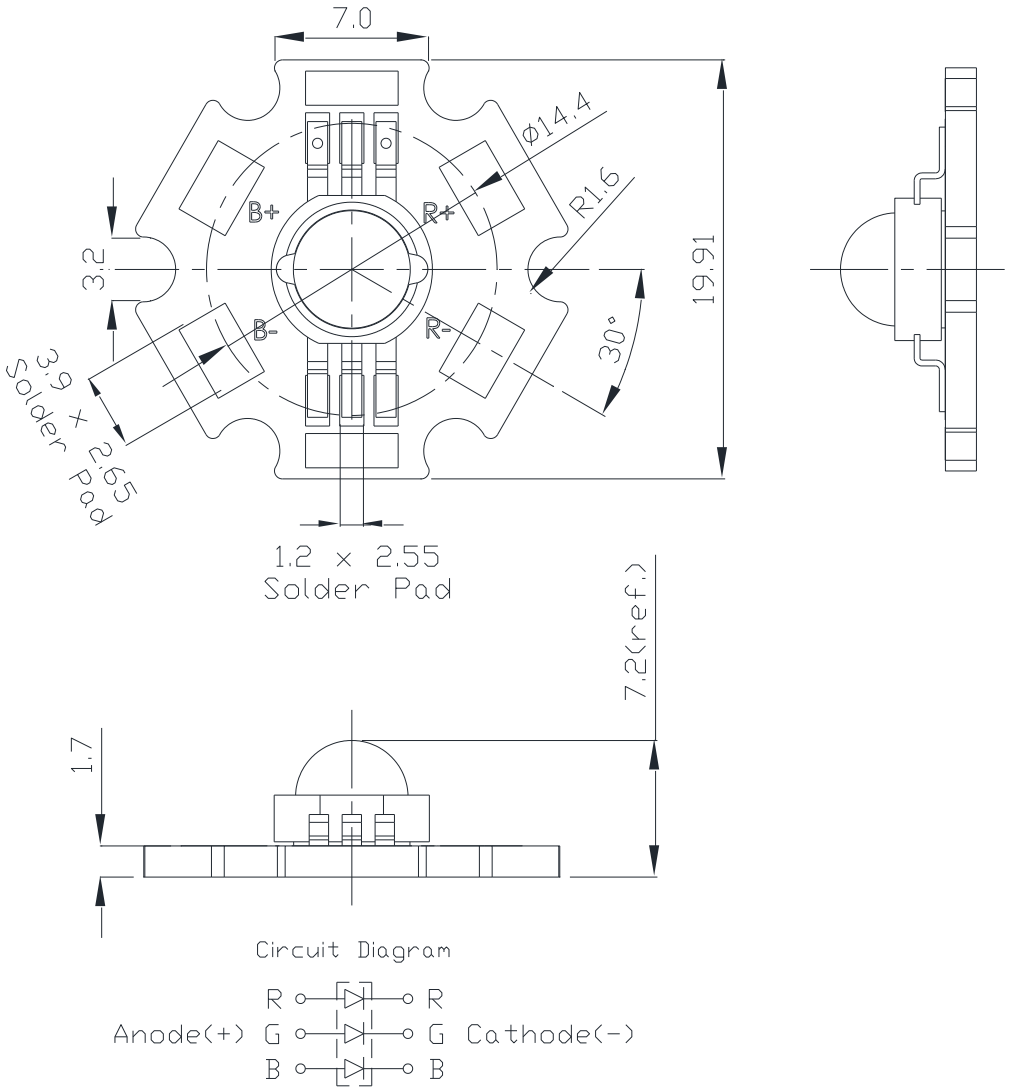


Notes:

1. The Anode side of the device is denoted by a hole in the lead frame.
2. Electrical insulation between the case and the board is required. Do not electrically connect either the anode or cathode to the slug.
3. Drawing not to scale.
4. All dimensions are in millimeters.
5. Unless otherwise indicated, tolerances are ± 0.20mm.
6. Please do not bend the leads of the LED, otherwise it will damage the LED.
7. **Please do not use a force of over 3kgf impact or pressure on the lens of the LED, otherwise it will cause a catastrophic failure.**

*The appearance and specifications of the product may be modified for improvement without notice.

Star Mechanical Dimensions



Notes:

1. Slots in aluminum-core PCB for M3 or #4 mounting screw.
2. Electrical interconnection pads labeled on the aluminum-core PCB with "+" and "-" to denote positive and negative, respectively. All positive pads are interconnected, as are all negative pads, allowing for flexibility in array interconnection.
3. Drawing not to scale.
4. All dimensions are in millimeters.
5. Unless otherwise indicated, tolerances are ± 0.20mm.
6. **Please do not use a force of over 3kgf impact or pressure on the lens of the LED, otherwise it will cause a catastrophic failure**.

*The appearance and specifications of the product may be modified for improvement without notice.

Flux Characteristics at 350mA, T_J = 25°C

Radiation Pattern	Color	Part Number		Luminous Flux Φ_V (lm)	
		Emitter	Star	Minimum	Typical
Lambertian	Red	PM6B-3LFE-A	PM6B-3LFS-A	50	58
	Green			100	120
	Blue			18	22

- ProLight maintains a tolerance of ± 7% on flux and power measurements.
- Please do not drive at rated current more than 1 second without proper heat sink.

Optical Characteristics at 350mA, T_J = 25°C

Color	Dominant Wavelength λ_D			Total included Angle (degrees) $\theta_{0.90V}$	Viewing Angle (degrees) $2\,\theta_{1/2}$
	Min.	Typ.	Max.		
Red	620 nm	623 nm	630 nm	180	130
Green	520 nm	525 nm	530 nm	180	130
Blue	457 nm	460 nm	463 nm	180	130

- ProLight maintains a tolerance of ± 1nm for dominant wavelength measurements.

Electrical Characteristics at 350mA, T_J = 25°C

Color	Forward Voltage V_F (V)		
	Min.	Typ.	Max.
Red	1.90	2.15	2.50
Green	2.80	3.00	3.40
Blue	2.80	3.10	3.40

- ProLight maintains a tolerance of ± 0.1V for Voltage measurements.

Absolute Maximum Ratings

Parameter	Red/Green/Blue
DC Forward Current (mA)	500
Peak Pulsed Forward Current (mA)	700 (less than 1/10 duty cycle@1KHz)
ESD Sensitivity (HBM per MIL-STD-883E Method 3015.7	> ±500V
LED Junction Temperature	120°C
Operating Board Temperature at Maximum DC Forward Current	-40°C - 105°C
Storage Temperature	-40°C - 120°C
Soldering Temperature	JEDEC 020c 240°C
Allowable Reflow Cycles	3
Reverse Voltage	Not designed to be driven in reverse bias

Photometric Luminous Flux Bin Structure

Color	Bin Code	Minimum Photometric Flux (lm)	Maximum Photometric Flux (lm)
Red	0	50	78
Green	0	100	155
Blue	0	18	28

- ProLight maintains a tolerance of ± 10% on flux and power measurements.
- The flux bin of the product may be modified for improvement without notice.

Dominant Wavelength Bin Structure

Color	Bin Code	Minimum Dominant Wavelength (nm)	Maximum Dominant Wavelength (nm)
Red	4	620	630
Green	1	520	530
Blue	1	457	463

- ProLight maintains a tolerance of ± 1nm for dominant wavelength measurements.

Note: Although several bins are outlined, product availability in a particular bin varies by production run and by product performance. Not all bins are available in all colors.

Forward Voltage Bin Structure

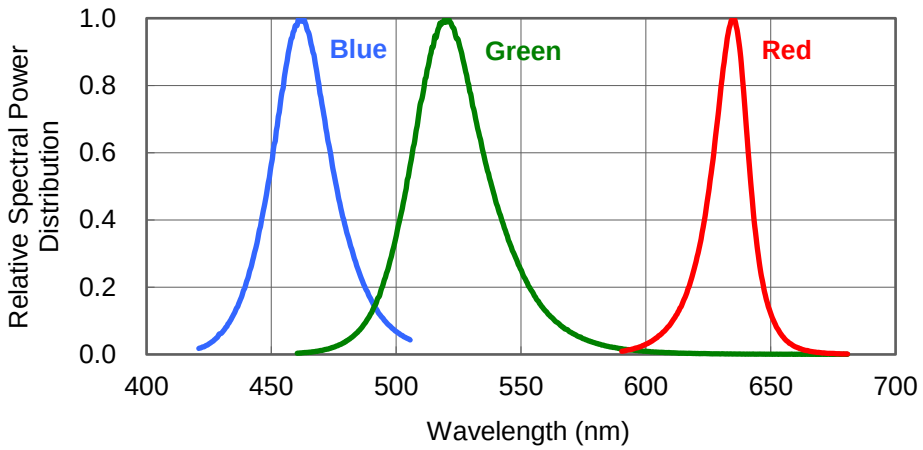
Color	Bin Code	Minimum Voltage (V)	Maximum Voltage (V)
Red	A	1.9	2.2
	B	2.2	2.5
Green	A	2.8	3.1
	B	3.1	3.4
Blue	A	2.8	3.1
	B	3.1	3.4

- ProLight maintains a tolerance of ± 0.1V for Voltage measurements.

Note: Although several bins are outlined, product availability in a particular bin varies by production run and by product performance. Not all bins are available in all colors.

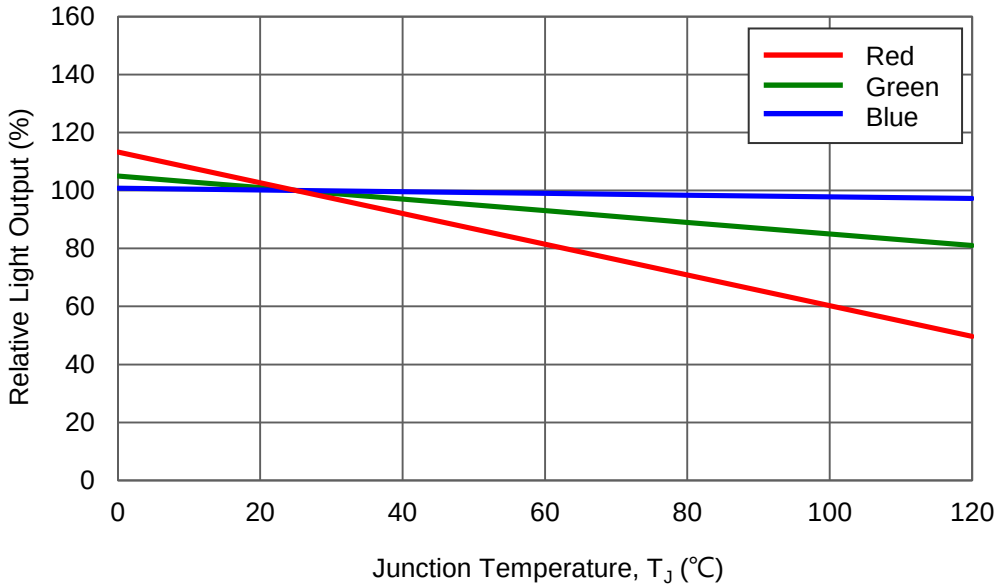
Color Spectrum, T_J = 25°C

1. Blue、Green、Red



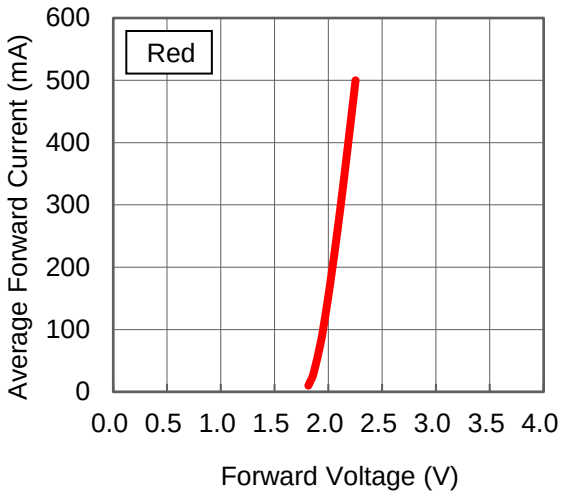
Light Output Characteristics

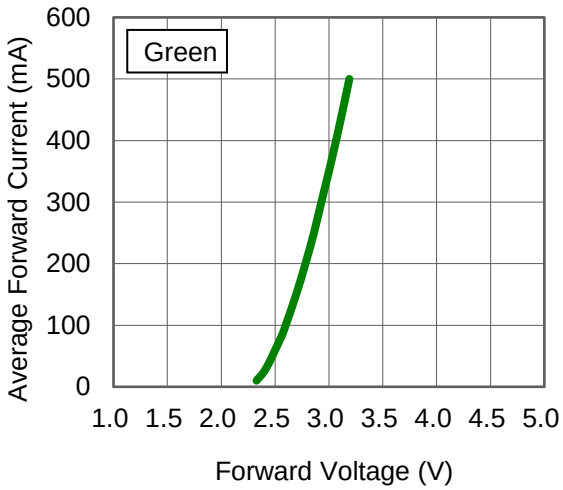
Relative Light Output vs. Junction Temperature at 350mA

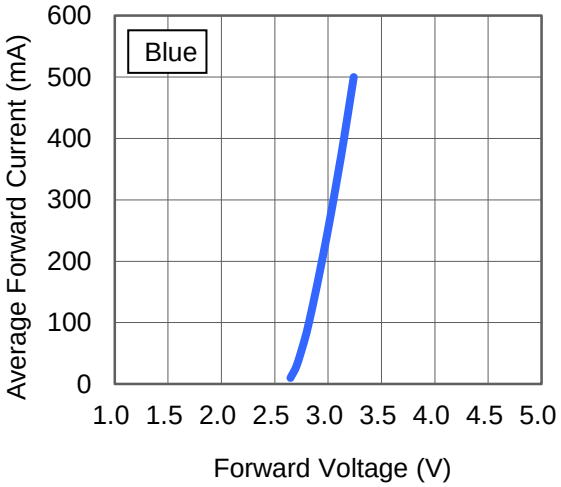


Forward Current Characteristics, $T_J = 25°C$

1. Forward Voltage vs. Forward Current

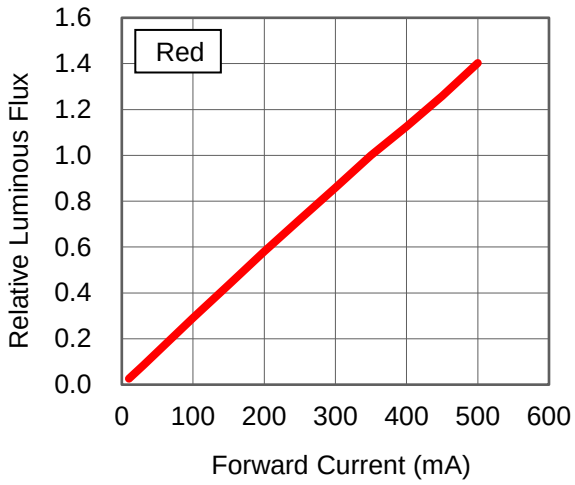


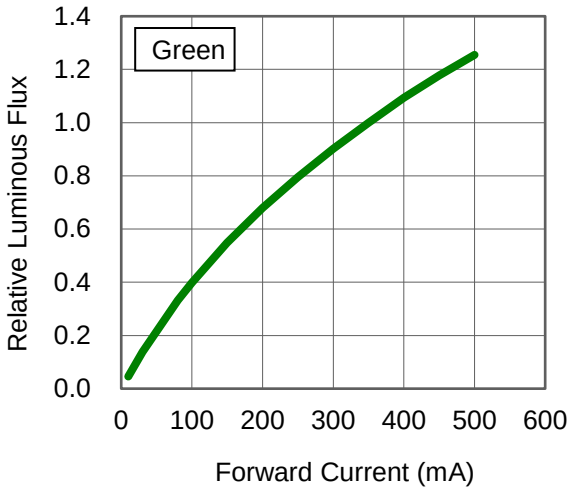


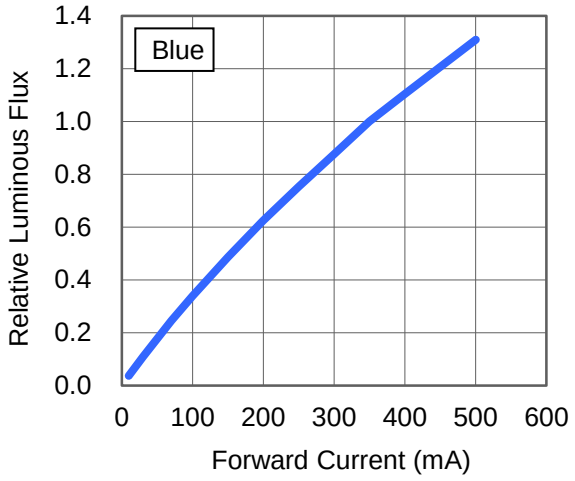


Forward Current Characteristics, $T_J = 25°C$

2. Forward Current vs. Normalized Relative Luminous Flux

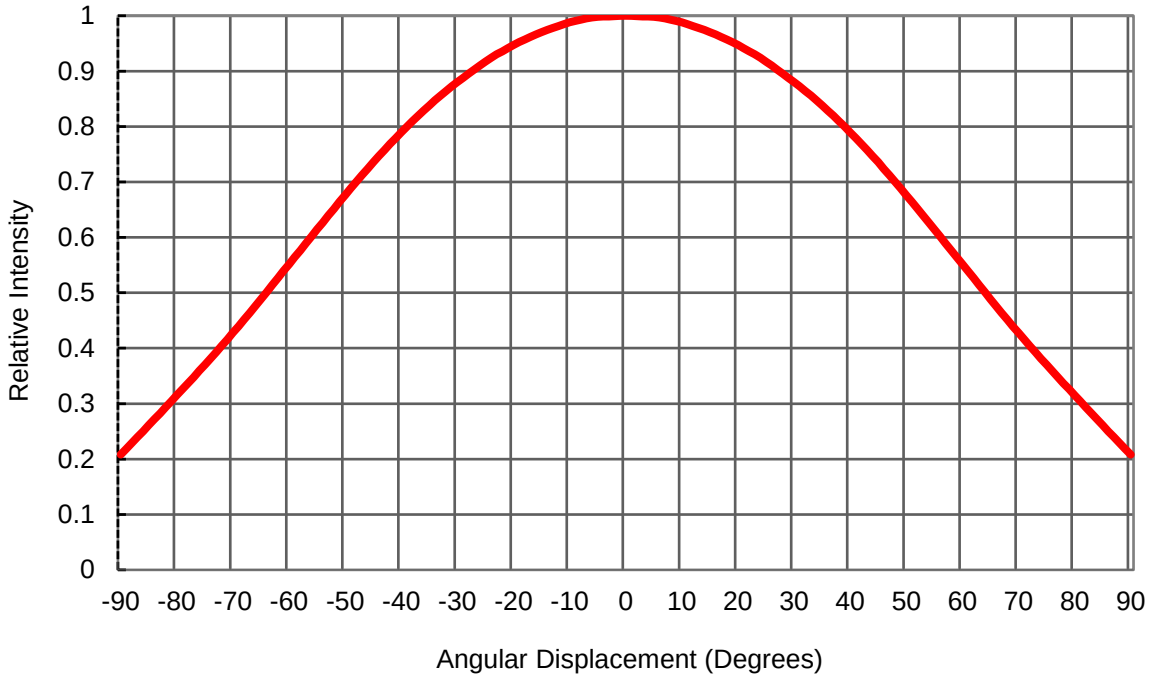






Typical Representative Spatial Radiation Pattern

Lambertian Radiation Pattern



Qualification Reliability Testing

Stress Test	Stress Conditions	Stress Duration	Failure Criteria
Room Temperature Operating Life (RTOL)	25°C, I_F = max DC (Note 1)	1000 hours	Note 2
Wet High Temperature Operating Life (WHTOL)	85°C/60%RH, I_F = max DC (Note 1)	1000 hours	Note 2
Wet High Temperature Storage Life (WHTSL)	85°C/85%RH, non-operating	1000 hours	Note 2
High Temperature Storage Life (HTSL)	110°C, non-operating	1000 hours	Note 2
Low Temperature Storage Life (LTSL)	-40°C, non-operating	1000 hours	Note 2
Non-operating Temperature Cycle (TMCL)	-40°C to 120°C, 30 min. dwell, <5 min. transfer	200 cycles	Note 2
Mechanical Shock	1500 G, 0.5 msec. pulse, 5 shocks each 6 axis		Note 3
Natural Drop	On concrete from 1.2 m, 3X		Note 3
Variable Vibration Frequency	10-2000-10 Hz, log or linear sweep rate, 20 G about 1 min., 1.5 mm, 3X/axis		Note 3
Solderability	Steam age for 16 hrs., then solder dip at 260°C for 5 sec.		Solder coverage on lead

Notes:

1. Depending on the maximum derating curve.

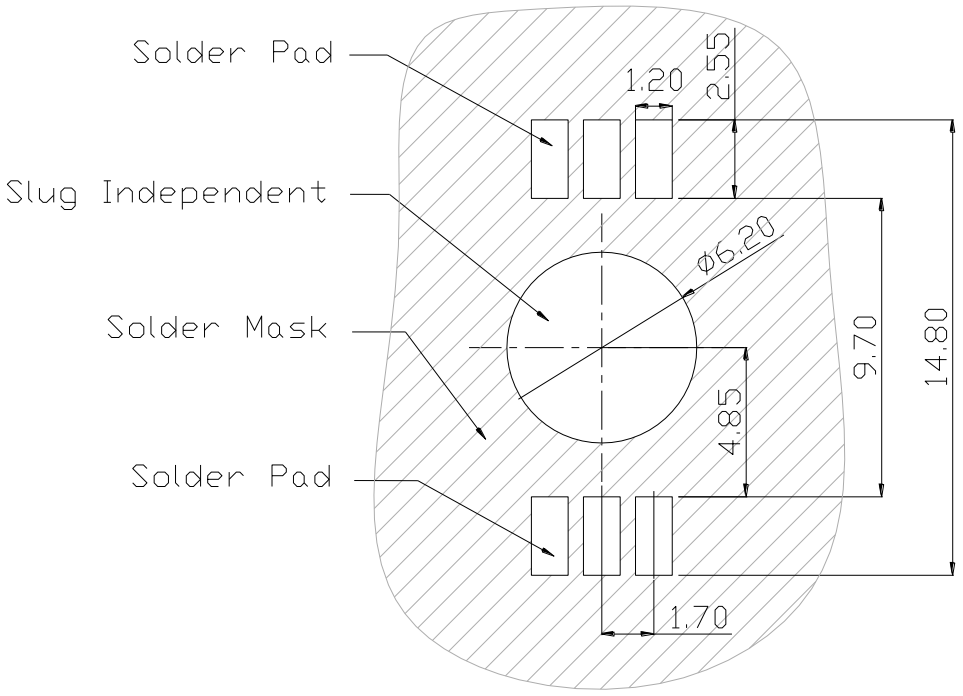
2. Criteria for judging failure

Item	Test Condition	Criteria for Judgement	
		Min.	Max.
Forward Voltage (V_F)	I_F = max DC	--	Initial Level x 1.1
Luminous Flux or Radiometric Power (Φ_V)	I_F = max DC	Initial Level x 0.7	--
Reverse Current (I_R)	V_R = 5V	--	50 μA

* The test is performed after the LED is cooled down to the room temperature.

3. A failure is an LED that is open or shorted.

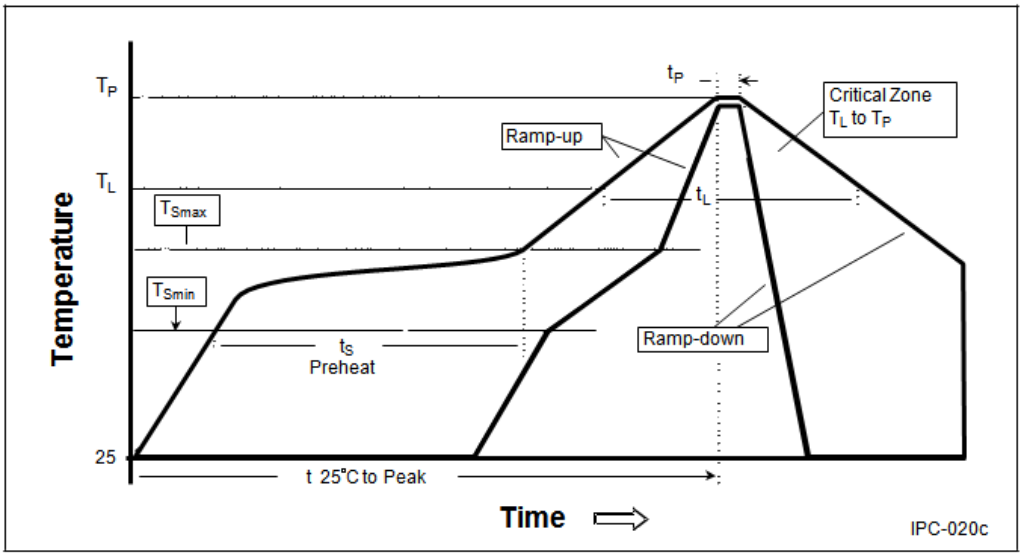
Recommended Solder Pad Design



- All dimensions are in millimeters.
- Electrical isolation is required between Slug and Solder Pad.

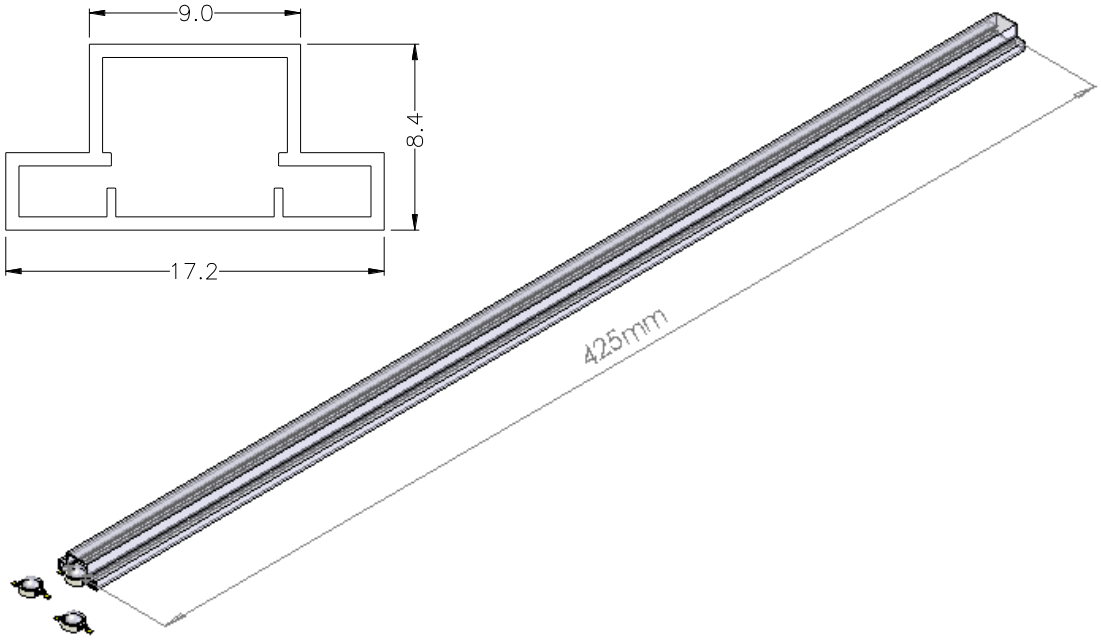
Reflow Soldering Condition

Profile Feature	Sn-Pb Eutectic Assembly	Low-Temp. & Pb-Free Assembly (58Bi-42Sn Eutectic Alloy)
Average Ramp-Up Rate (T_{Smax} to T_P)	3°C / second max.	2°C / second max.
Preheat – Temperature Min (T_{Smin}) – Temperature Max (T_{Smax}) – Time (t_{Smin} to t_{Smax})	 100°C 150°C 60-120 seconds	 90°C 120°C 60-120 seconds
Time maintained above: – Temperature (T_L) – Time (t_L)	 183°C 60-150 seconds	 138°C 20-50 seconds
Peak/Classification Temperature (T_P)	240°C	185°C
Time Within 5°C of Actual Peak Temperature (t_P)	10-30 seconds	10-30 seconds
Ramp-Down Rate	6°C/second max.	3°C/second max.
Time 25°C to Peak Temperature	6 minutes max.	4 minutes max.

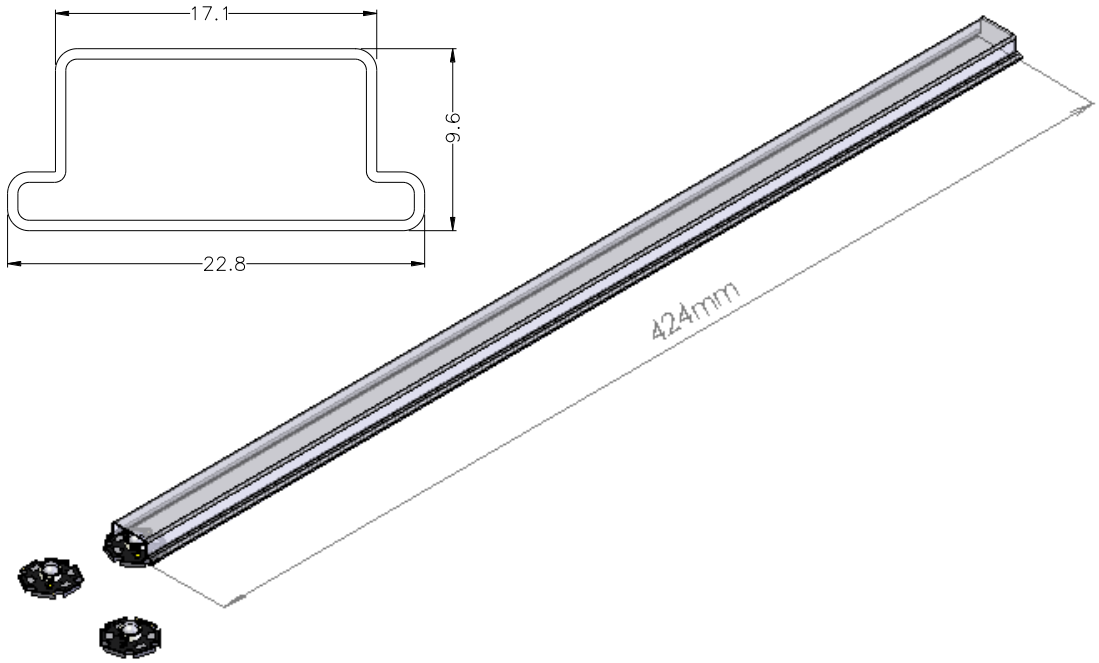


- All temperatures refer to topside of the package, measured on the package body surface.
- Repairing should not be done after the LEDs have been soldered. When repairing is unavoidable, a heat plate should be used. It should be confirmed beforehand whether the characteristics of LEDs will or will not be damaged by repairing.
- Reflow soldering should not be done more than three times.
- When soldering, do not put stress on the LEDs during heating.
- After soldering, do not warp the circuit board.

Emitter Tube Packaging



Star Tube Packaging



Notes:
1. Emitter 50 pieces per tube and Star 20 pieces per tube.
2. Drawing not to scale.
3. All dimensions are in millimeters.
4. All dimendions without tolerances are for reference only.

**Please do not open the moisture barrier bag (MBB) more than one week. This may cause the leads of LED discoloration. We recommend storing ProLight's LEDs in a dry box after opening the MBB. The recommended storage conditions are temperature 5 to 30°C and humidity less than 40% RH.

Precaution for Use

- Storage
  Please do not open the moisture barrier bag (MBB) more than one week. This may cause the leads of LED discoloration. We recommend storing ProLight's LEDs in a dry box after opening the MBB. The recommended storage conditions are temperature 5 to 30°C and humidity less than 40% RH. It is also recommended to return the LEDs to the MBB and to reseal the MBB.
- The slug is is not electrically neutral. Therefore, we recommend to isolate the heat sink.
- Any mechanical force or any excess vibration shall not be accepted to apply during cooling process to normal temperature after soldering.
- Please avoid rapid cooling after soldering.
- Components should not be mounted on warped direction of PCB.
- Repairing should not be done after the LEDs have been soldered. When repairing is unavoidable, a heat plate should be used. It should be confirmed beforehand whether the characteristics of the LEDs will or will not be damaged by repairing.
- This device should not be used in any type of fluid such as water, oil, organic solvent and etc. When cleaning is required, isopropyl alcohol should be used.
- When the LEDs are illuminating, operating current should be decide after considering the package maximum temperature.
- The appearance, specifications and flux bin of the product may be modified for improvement without notice. Please refer to the below website for the latest datasheets.
  http://www.prolightopto.com/

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