

YL-G1D-3LFEP
3W RGB Power LED
Technical Datasheet
Version: 1.0

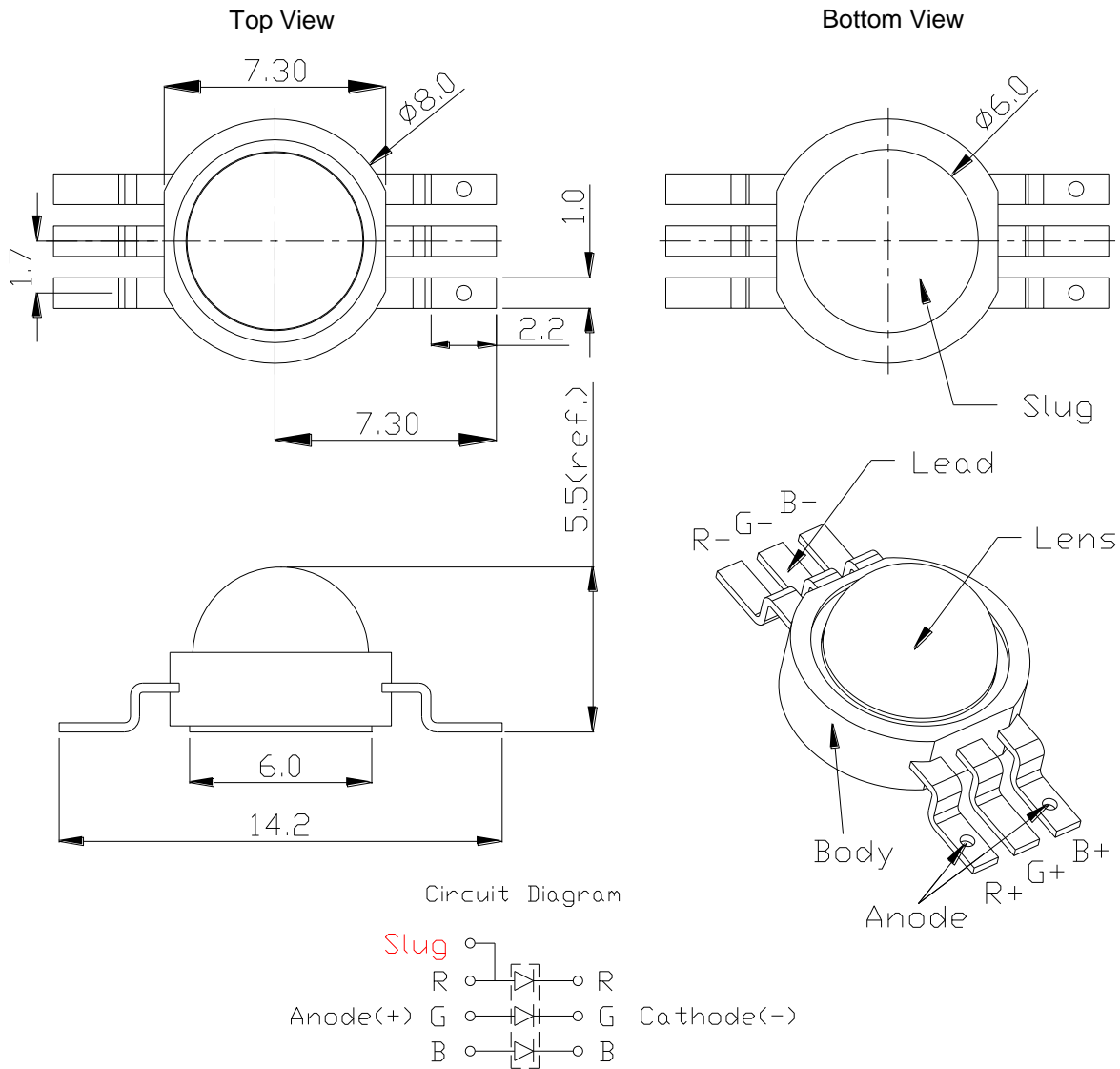
Features

- R, G, B three color in one Package
- High flux per LED
- Good color uniformity
- 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

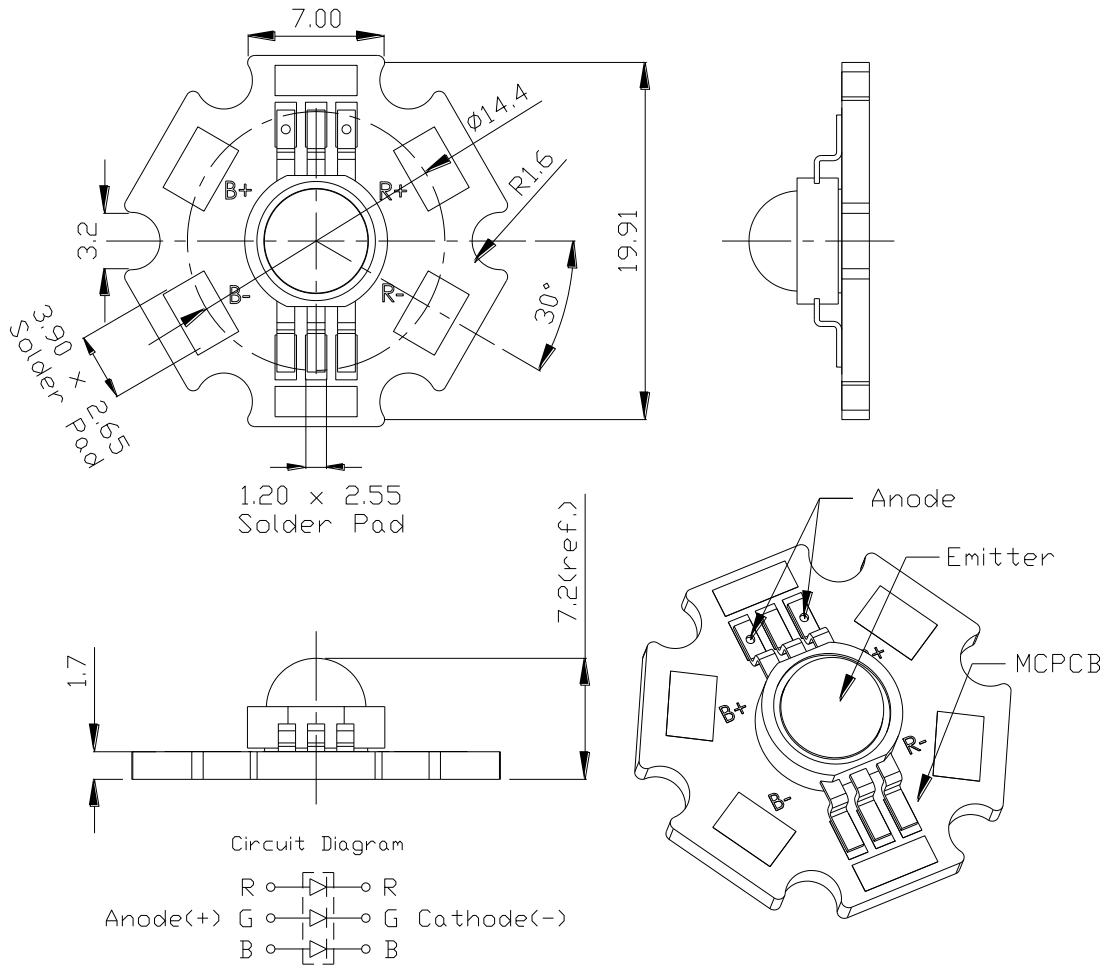


Notes:

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 $\pm 0.20\text{mm}$.
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 $\pm 0.20\text{mm}$.
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 | | Lumious Flux Φ_V (lm) | |
|-------------------|-------|--------------|--------------|----------------------------|---------|
| | | Emitter | Star | Minimum | Typical |
| Lambertian | Red | | | 47 | 55 |
| | Green | YL-G1D-3LFEP | YL-G1D-3LFSP | 82 | 96 |
| | Blue | | | 16 | 19 |

- YesLED maintains a tolerance of $\pm 10\%$ 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 | 525 nm | 530 nm | 535 nm | 180 | 130 |
| Blue | 455 nm | 458 nm | 460 nm | 180 | 130 |

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

Electrical Characteristics at 350mA, T_J = 25°C

| Color | Forward Voltage V _F (V) | | |
|-------|------------------------------------|------|------|
| | Min. | Typ. | Max. |
| Red | 1.9 | 2.2 | 2.7 |
| Green | 2.8 | 3.4 | 3.6 |
| Blue | 2.8 | 3.4 | 3.6 |

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

Absolute Maximum Ratings

| Parameter | Red/Green/Blue |
|--|---|
| DC Forward Current (mA) | 350 |
| Peak Pulsed Forward Current (mA) | 500 (less than 1/10 duty cycle@1KHz) |
| Average Forward Current (mA) | 350 |
| 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 260°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 | 23 | 36 |
| Green | 0 | 32 | 50 |
| Blue | 0 | 7.5 | 12 |

- YesLED maintains a tolerance of $\pm 10\%$ 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 | 2 | 525 | 535 |
| Blue | A | 455 | 460 |

- YesLED maintains a tolerance of $\pm 1\text{nm}$ 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

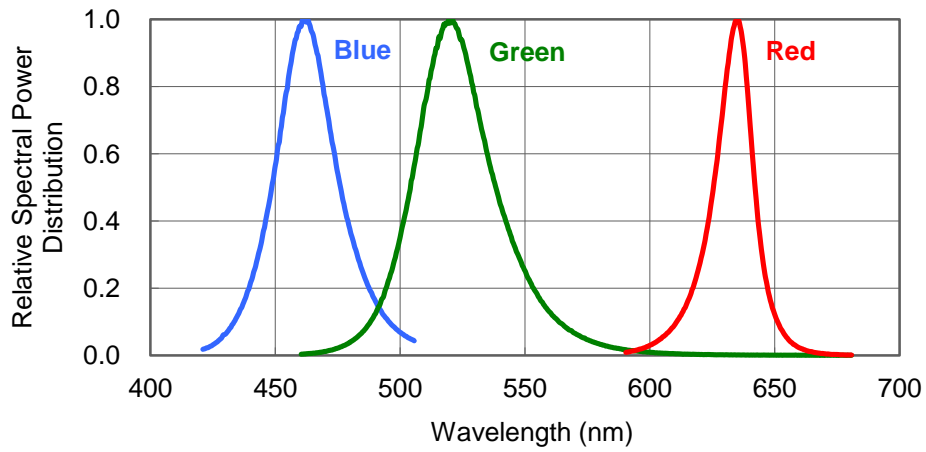
| Color | Bin Code | Minimum Voltage (V) | Maximum Voltage (V) |
|-------|----------|---------------------|---------------------|
| Red | D | 1.9 | 2.3 |
| | E | 2.3 | 2.7 |
| Green | D | 2.8 | 3.2 |
| | E | 3.2 | 3.6 |
| Blue | D | 2.8 | 3.2 |
| | E | 3.2 | 3.6 |

- YesLED maintains a tolerance of $\pm 0.1\text{V}$ 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.

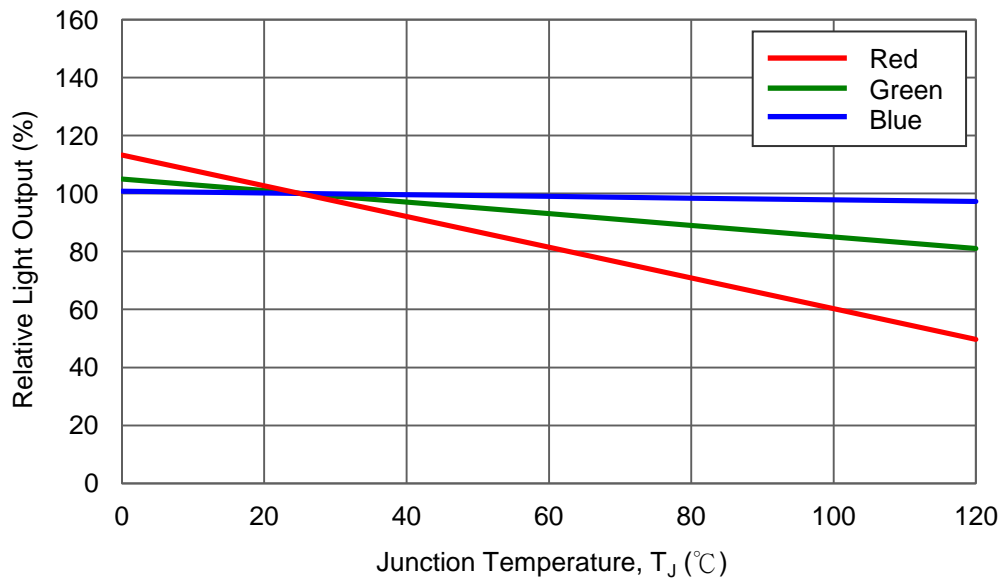
Color Spectrum, $T_J = 25^\circ\text{C}$

1. Blue 、 Green 、 Red



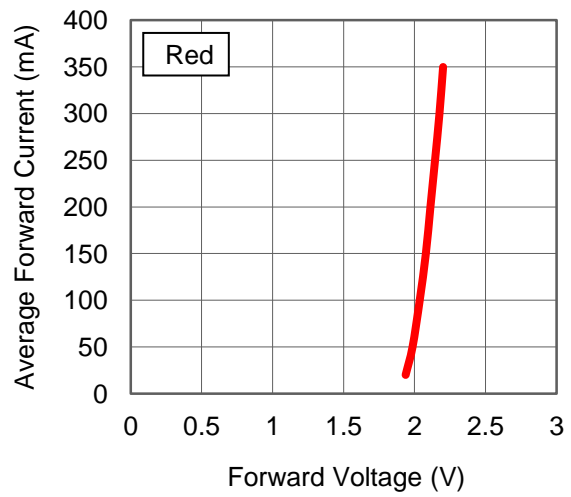
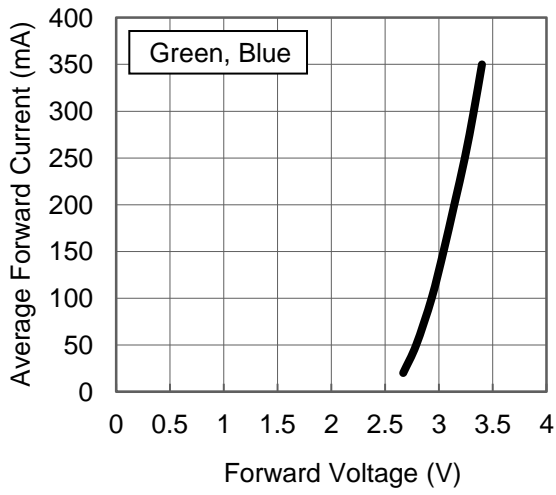
Light Output Characteristics

Relative Light Output vs. Junction Temperature at 350mA

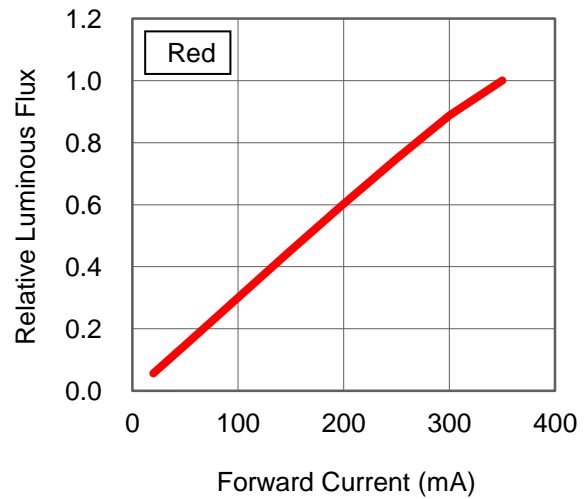
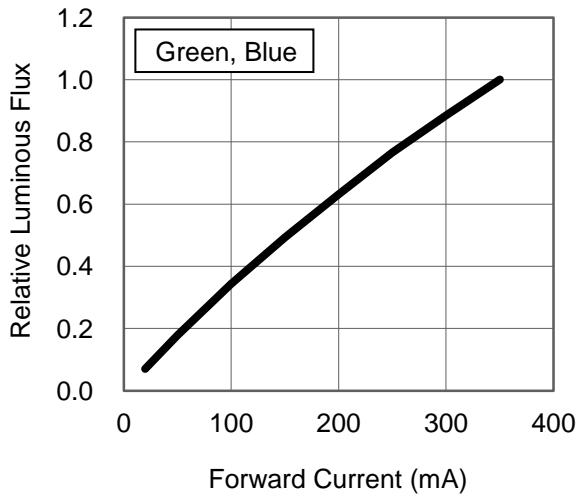


Forward Current Characteristics, $T_J = 25^\circ\text{C}$

1. Forward Voltage vs. Forward Current

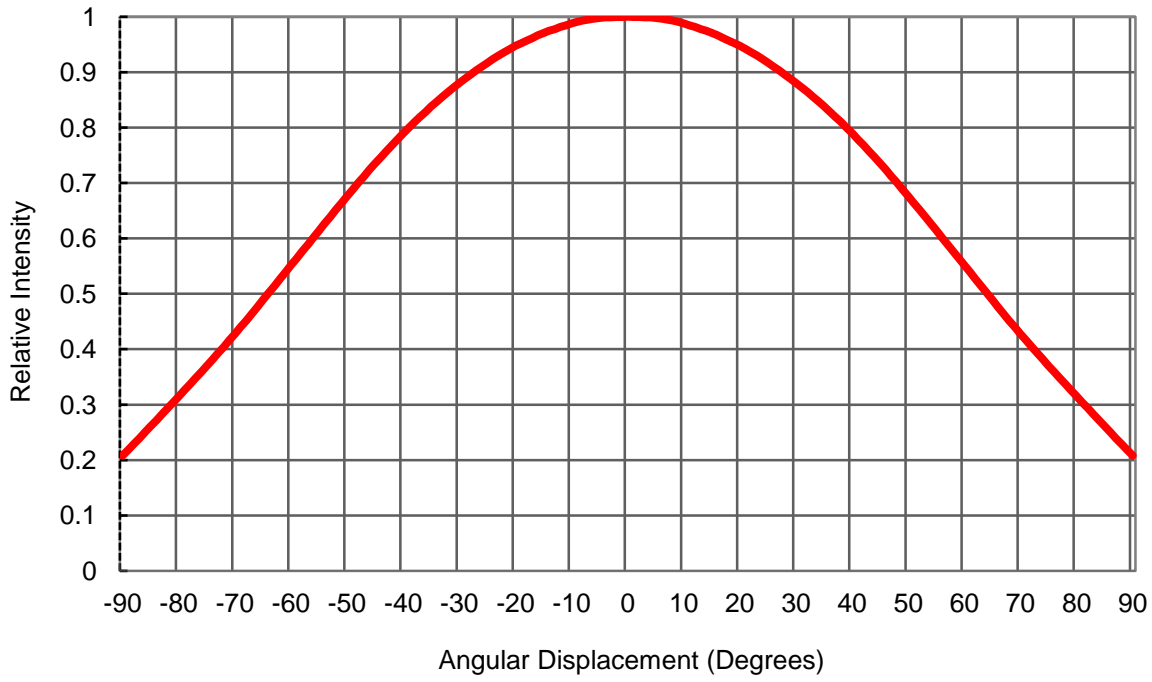


2. Forward Current vs. Normalized Relative Luminous Flux



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, $I_F = \text{max DC}$ (Note 1) | 1000 hours | Note 2 |
| Wet High Temperature Operating Life (WHTOL) | 85°C/60%RH, $I_F = \text{max DC}$ (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 |
| Non-operating Thermal Shock (TMSK) | -40°C to 120°C, 20 min. dwell, <20 sec. 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:

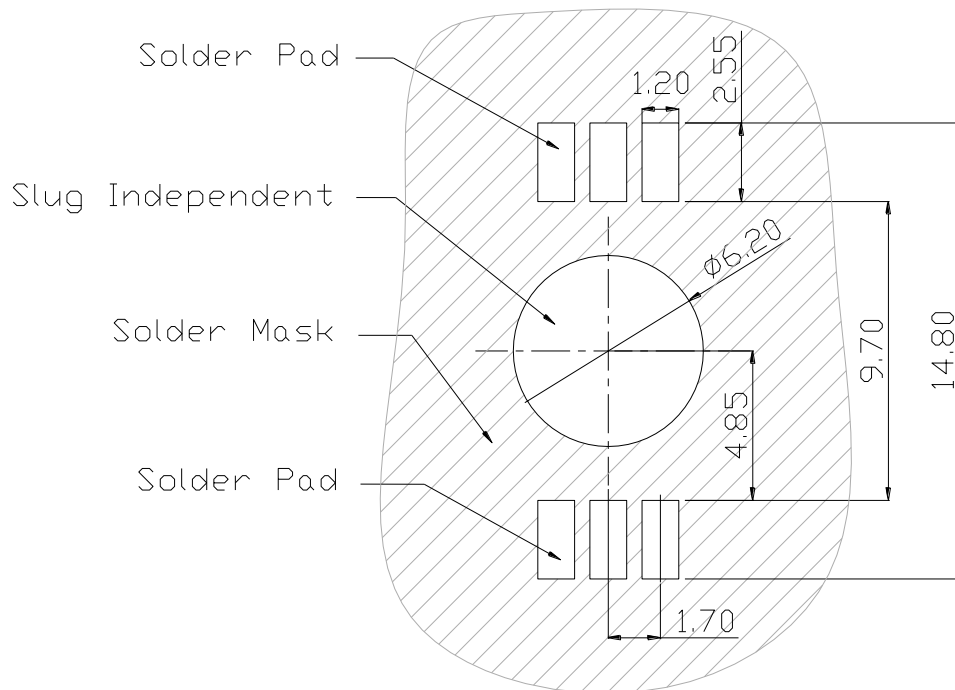
1. Depending on the maximum derating curve.
2. Criteria for judging failure

| Item | Test Condition | Criteria for Judgement | |
|---|-----------------------|------------------------|---------------------|
| | | Min. | Max. |
| Forward Voltage (V_F) | $I_F = \text{max DC}$ | -- | Initial Level x 1.1 |
| Luminous Flux or Radiometric Power (Φ_V) | $I_F = \text{max DC}$ | 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.

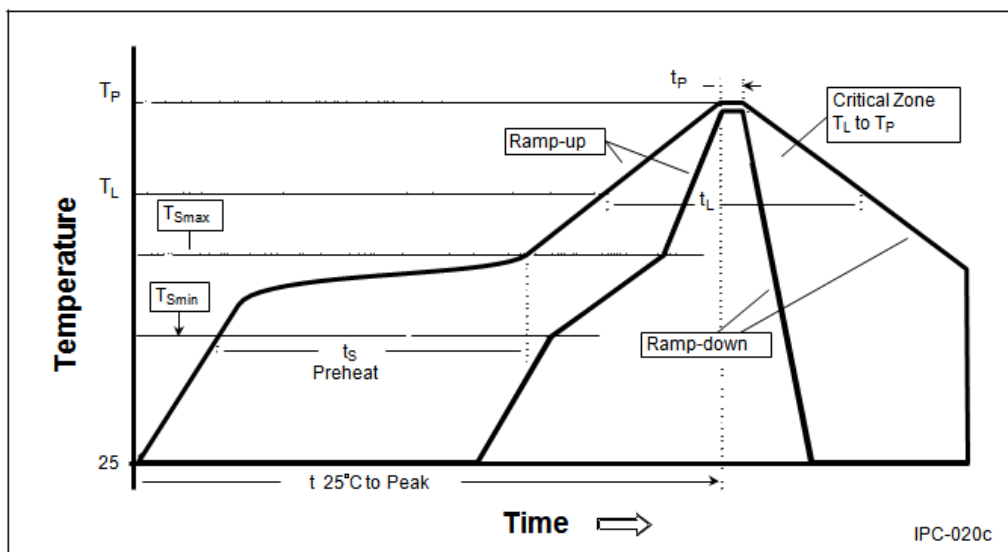
Recommended Solder Pad Design



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

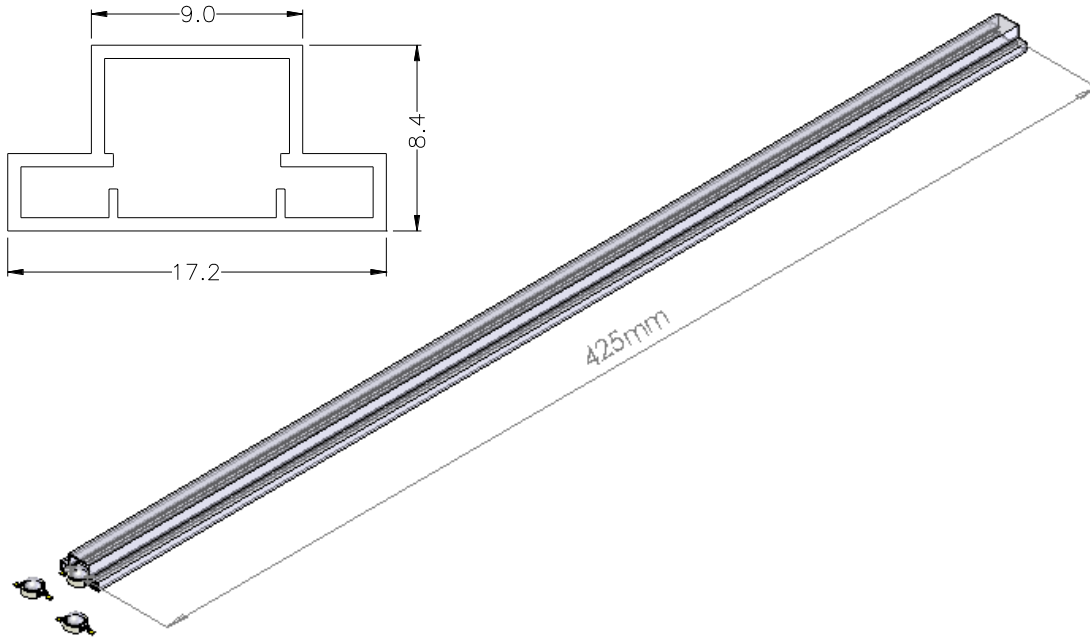
Reflow Soldering Condition

| Profile Feature | Sn-Pb Eutectic Assembly | Pb-Free Assembly |
|--|----------------------------------|----------------------------------|
| Average Ramp-Up Rate (T_{Smax} to T_P) | 3°C / second max. | 3°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 | 150°C 200°C 60-180 seconds |
| Time maintained above: – Temperature (T_L) – Time (t_L) | 183°C 60-150 seconds | 217°C 60-150 seconds |
| Peak/Classification Temperature (T_P) | 240°C | 260°C |
| Time Within 5°C of Actual Peak Temperature (t_P) | 10-30 seconds | 20-40 seconds |
| Ramp-Down Rate | 6°C/second max. | 6°C/second max. |
| Time 25°C to Peak Temperature | 6 minutes max. | 8 minutes max. |

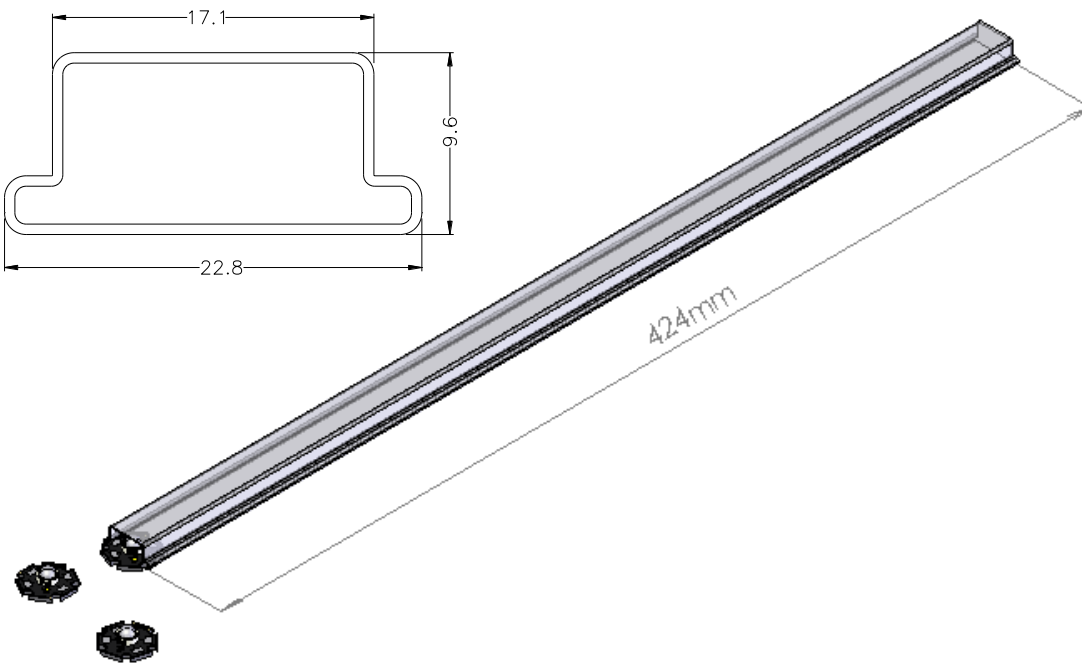


- **We recommend using the M705-S101-S4 solder paste from SMIC (Senju Metal Industry Co., Ltd.) for lead-free soldering.**
- All temperatures refer to topside of the package, measured on the package body surface.
- Repairing should not be done after the LEDs have been soldered. When repairing is unavoidable, a double-head soldering iron should be used. It should be confirmed beforehand whether the characteristics of the 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 dimensions 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 YesLED'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 YesLED'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 not electrically neutral. Therefore, we recommend to isolate the heat sink.
- **We recommend using the M705-S101-S4 solder paste from SMIC (Senju Metal Industry Co., Ltd.) for lead-free soldering.**
- 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 decided 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.