High Power UV-C LED

Product Specifications

6060 SMD Packaged LEDs

BOLB Inc.
Livermore, California
V1.84 May 2021

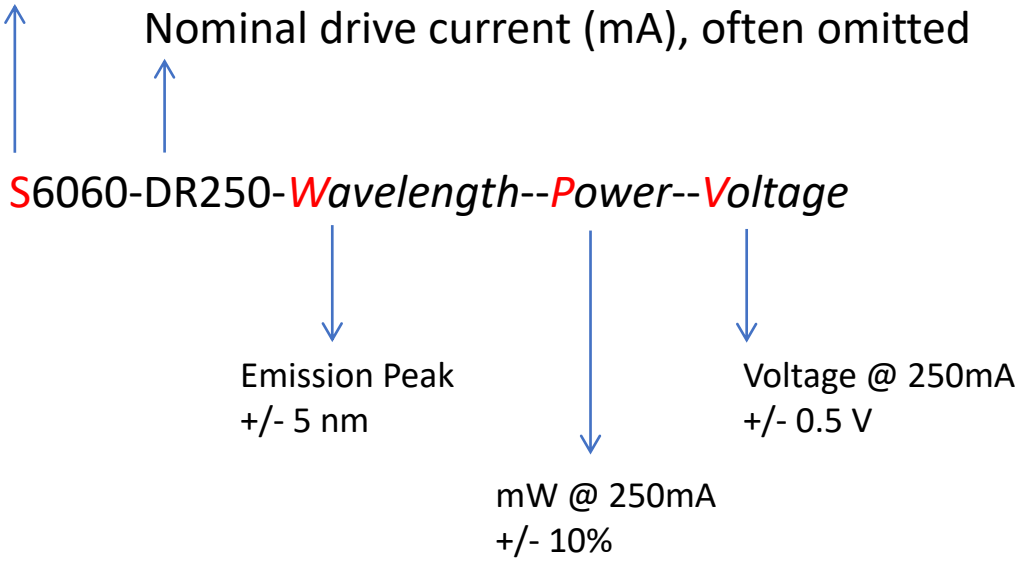
WARNING UV emitted from this product. Avoid eye and skin exposure to unshielded product

AVERTISSEMENT UV émis par ce produit. Éviter l'exposition des yeux et de la peau à un produit non protégé

ADVERTENCIA Emisión de rayos ultravioleta por este producto. Evite la exposición de los ojos y la piel al producto sin protección

警告 この製品から放出される紫外線。シールドされていない製品への目や皮膚の露出を避ける

SMD6060 type package



Example:

S6060-DR250-W275-P100-V6.5
S6060-W275-P100-V6.5

Interpretation:

Surface Mount type 6.0 x 6.0 mm packaged LED
Nominal Drive current = 250 mA
Peak wavelength = 275 +/- 5nm
Power output @ 250mA = 100 mW (+/-10%)
Forward voltage @ 250mA = 6.5V (+/- 0.5V)

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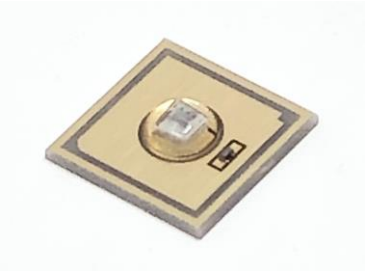
6060 SMD Packaged LED Diagram



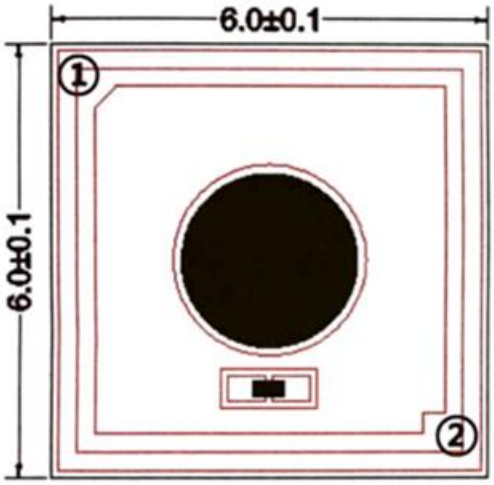
6060 SMD - L

All unit in mm

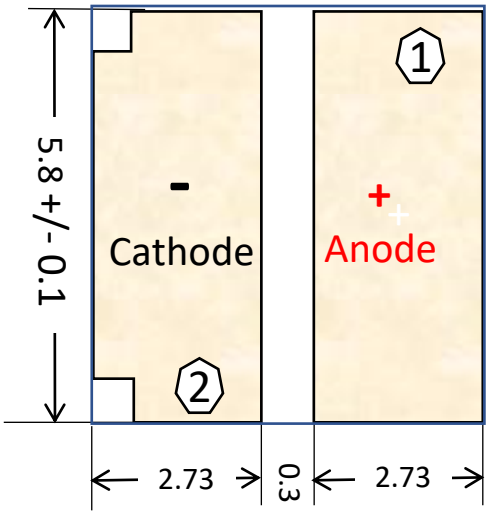
① Anode (+)

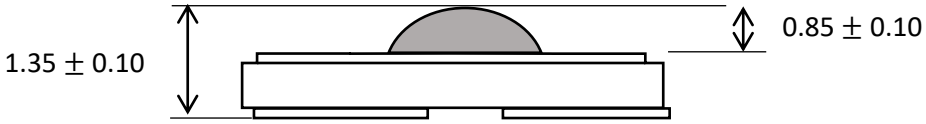
② Cathode (-)

Do not apply pressure to the dome lens on packaged LEDs

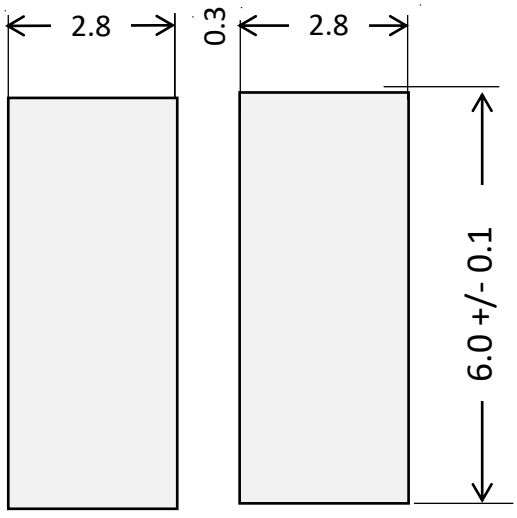


Bottom view

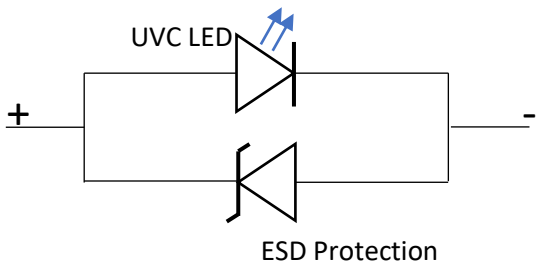




Recommended Solder Pattern on PCB



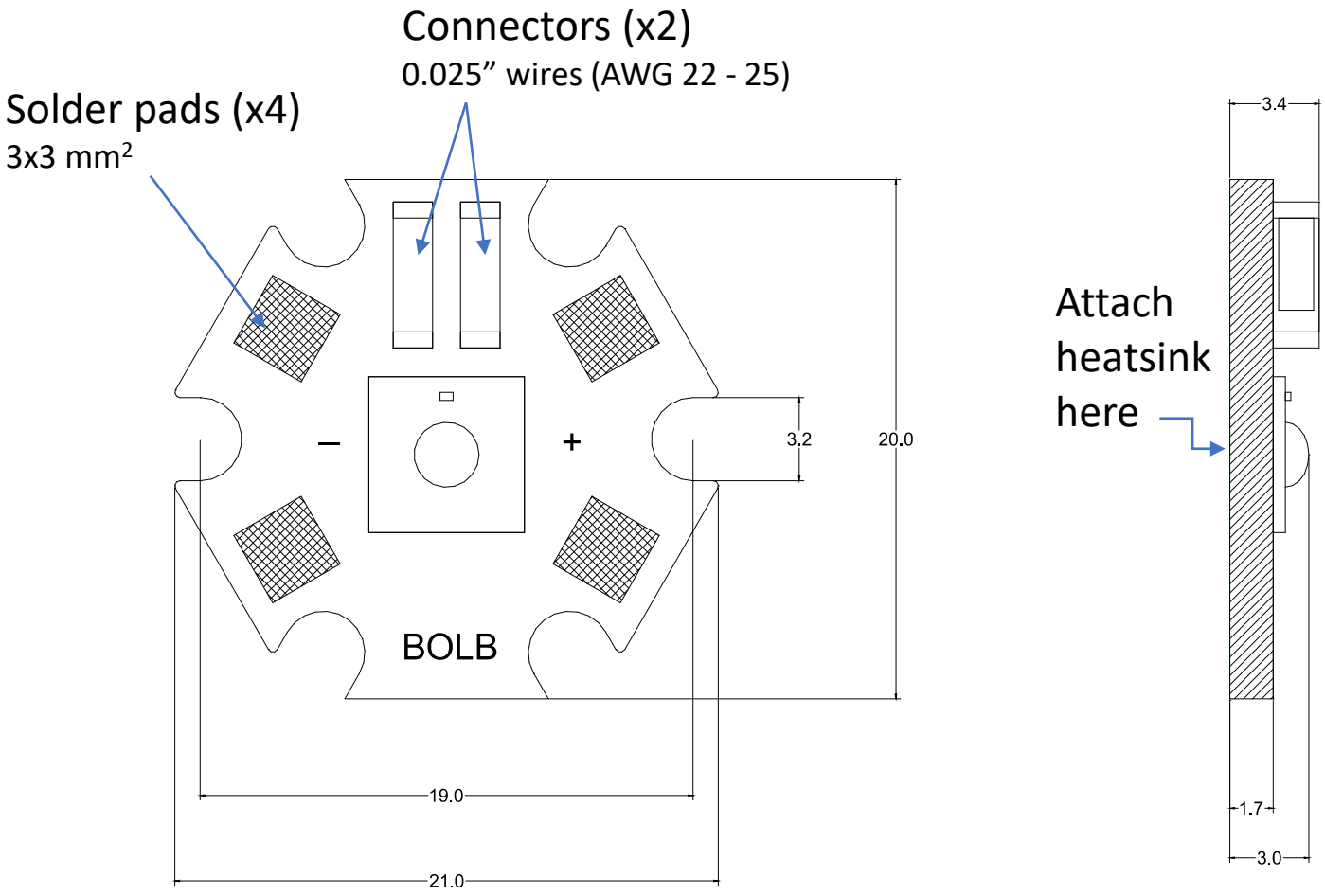
Electrical scheme of SMD



Specifications Subject to Change without notice

SMD LED on Hex MCPCB

All sizes in mm



Product benefits

- Same popular MCPCB format for visible LEDs
- Eliminates reflow soldering
- Plug-n-play with 0.025” wires (AWG 24 or 25)
- Larger contact area for heat extraction
- Nomenclature example:
  Hex-S6060-DR250-W275-P100-V6.5

TABLE 1. Typical Performance at 250mA
(25°C ambient, packaged, Solder point temperature <38°C)

Parameter	Symbol	Unit	Min.	Typ.	Max
Peak Wavelength	λp	nm	268	275	280
Radiant Flux	φe	mW	70	100	130
Forward Voltage	VF	V	5.8	6.5	7.5
Spectrum Half Width	Δλ	nm		10	
View Angle	2θ½	°		150	
Thermal Resistance	RJ-b	℃/W		8	

TABLE 2. Maximum Ratings (25°C ambient, packaged device)

Parameter	Symbol	Limit	Unit
Maximum DC Drive Current	IFM	350	mA
Maximum Pulsed Drive Current	IFMP	500	mA
Maximum Reverse Voltage	VRM	-5	V
Maximum Junction Temperature	Tjmax	75	℃
Operating Temperature Limits	Topr	-20 ~ 60	℃
Storage Temperature	Tstg	-30~ 100 (Humidity <40%)	℃

UVC LED: Electro-optical parameters at 250mA

FIG 1. Forward Current vs. Forward Voltage

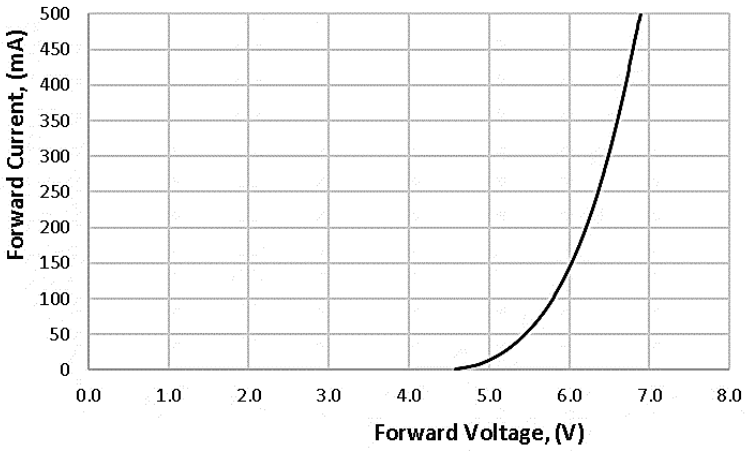


FIG 2. Relative Radiant Flux vs. Forward Current

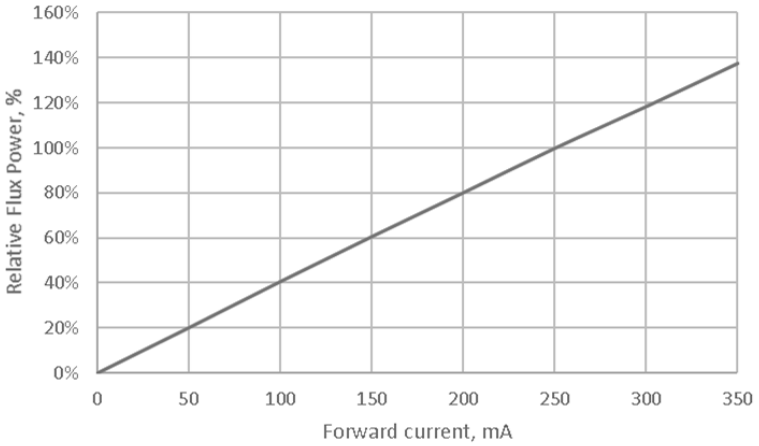


FIG 3. Peak Wavelength vs. Forward Current

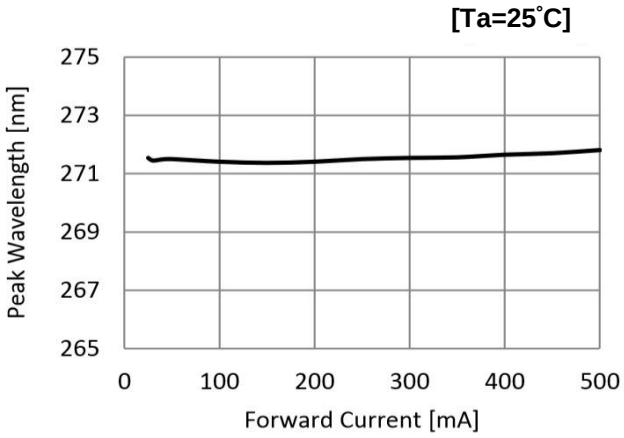


FIG 4. Typical Spectrum

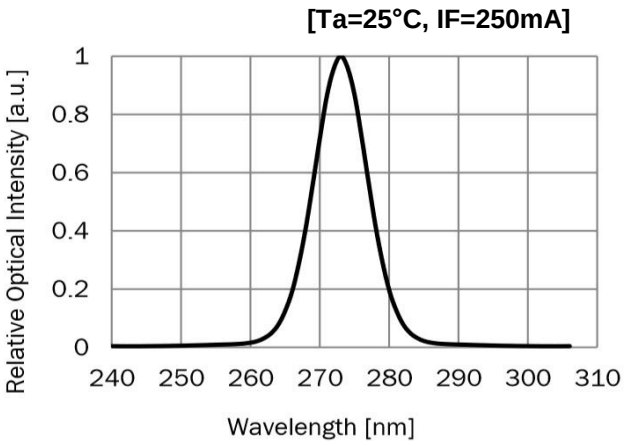


Fig 5. Forward Voltage vs Ambient Temperature

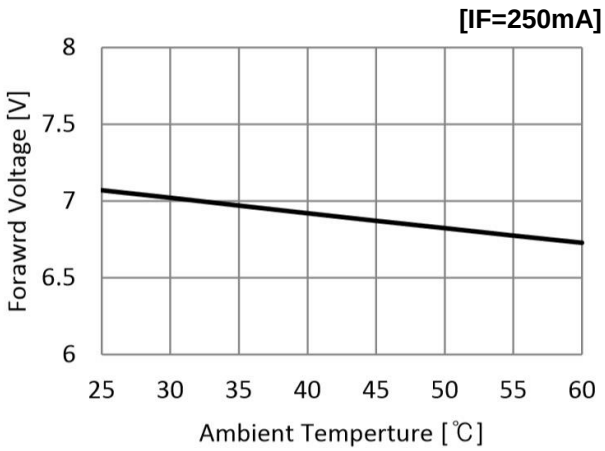


Fig 6. Relative Radiant Flux vs Ambient Temperature

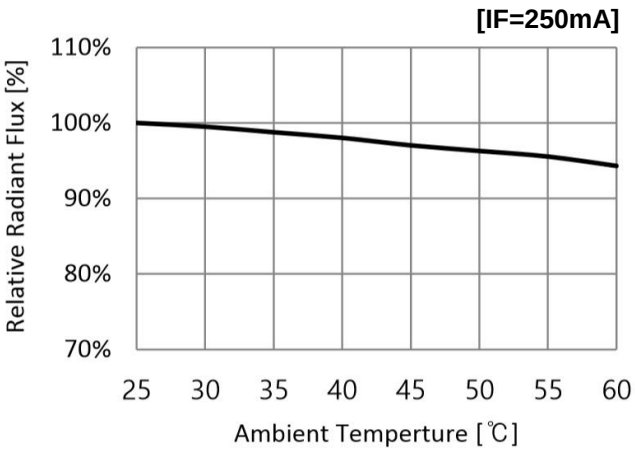


Fig 7. Far-field Emission Pattern （Relative Intensity vs. Emission Angle)

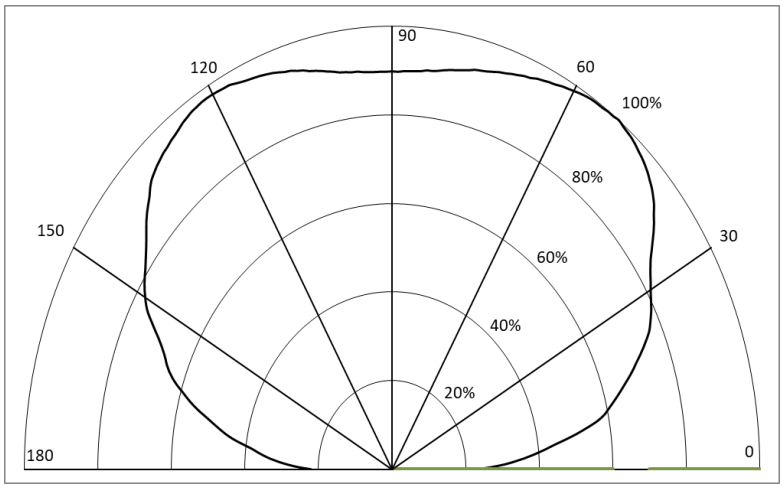


Diagram for Hemispherical Lens LED Only

TABLE 3. Device lifetime (forward current =250mA, Tj < 35°C)

Parameter	Symbol	Unit	Typ.
70% Power Lifetime	L70	hours	3000*
50% Power Lifetime	L50	hours	5000*

*Values based on standard Bolb test conditions 25°C +/- 2°C solder-point temperature
*Subject to change: please inquire about latest update

Additional Testing and Certifications:

- Moisture Sensitivity Test: MSL Rating 5/5A
- BOLB LEDs are RoHS and REACH compliant

TABLE 3. Bin Structures

Note: * Dominant bin color coded purple

[Ta =25℃, I_F = 250㎃]

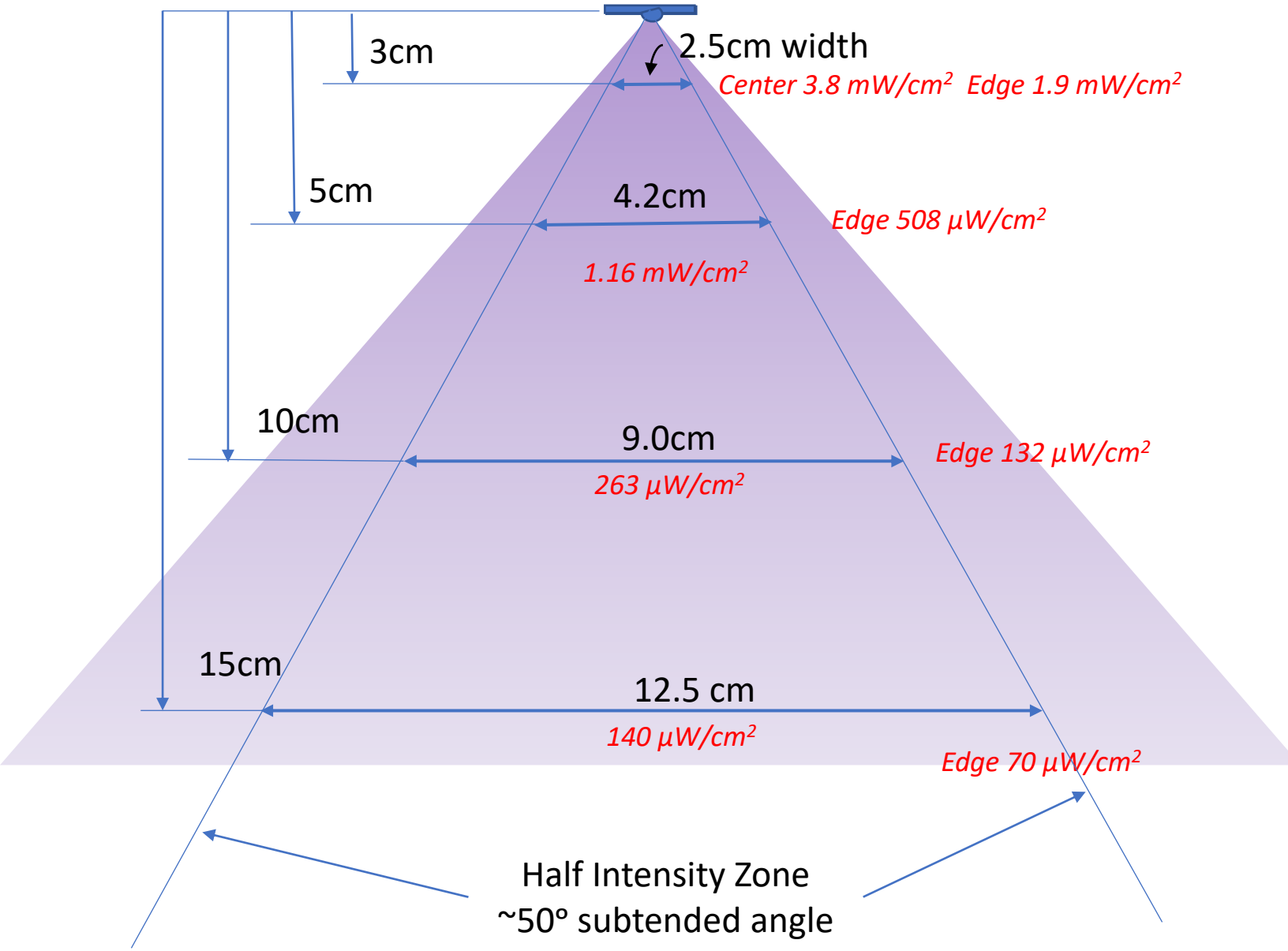
Designate	Information	Code	Min	Typ.	Max.
W	Peak Wavelength	270	268	270	273
		275*	273	275	278
P	Radiant Flux (Φ_e)				
		80	70	80	90
		100*	90	100	110
		120	110	120	130
V	Forward Voltage (V)	5.5	5.0	5.5	6.0
		6.5*	6.0	6.5	7.0
		7.5	7.0	7.5	8.0

Note:

Bin Code (W-P-V): Peak Wavelength = W ; Radiant Flux = P ; Forward Voltage = V

100 mW UVC SMD6060

Short Distance Intensity Data				
Distance (cm)	0.5	1	1.5	2
Intensity (mW/cm²)	120	30	23	10.5



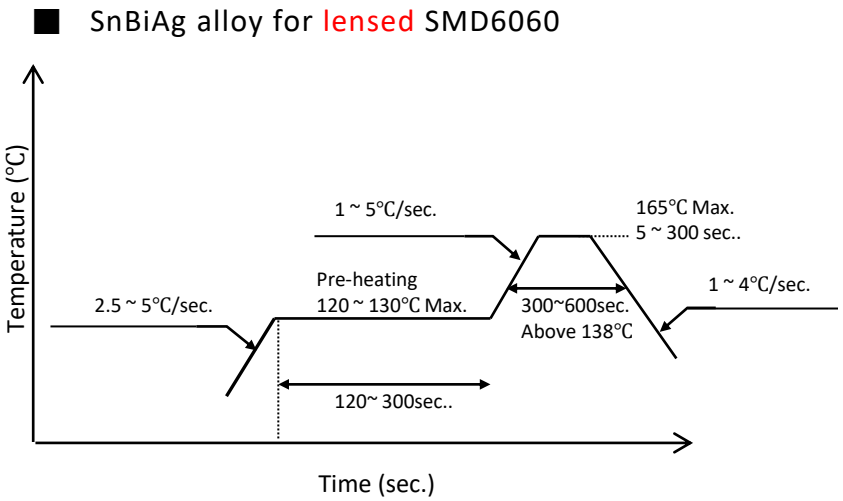
Intensity Distribution of SMD6060 long distance

Long Distance SMD6060 Intensity Distribution

Intensity Linearly Scales with LED Output Power

Intensity (μW/cm²)		lateral distance (cm)		
	vertical distance (cm)	0	20	50
SMD6060 100mW	**20**	78	21.6	5.0
	40	18.5	14.2	5.0
	60	8.4	7.5	4.5
	80	4.4	4.1	3.0
	100	3.8	3.0	2.3
	120	2.0	1.9	1.4

FIG 8. Solder reflow temperature profile



Reflow Soldering Instructions	
	SnBiAg alloy (Melting Temperature=138℃)
Pre-Heating	120 ~ 130℃
Pre-Heat Time	120sec. ~ 300sec. Max.
Peak Temperature	165℃ Max.
Time at Peak Temperature	10 sec recommended 300 sec. Max. for large arrays

- Recommended solder composition: SnBiAg alloy or 174-T4 soldering paste)
- Recommended stencil thickness is 60~80um
- Recommended stencil solder paste area is 60~80%
- Forming gas (5%-7%H_2 in N_2) ambient recommended for best results
- After reflow soldering, Rapid cooling should be avoided
- When soldering, do not use a none calibrated hot plate. A convection type reflow oven is preferred. (Fig 8.)

Must not use heat gun (blower) for soldering

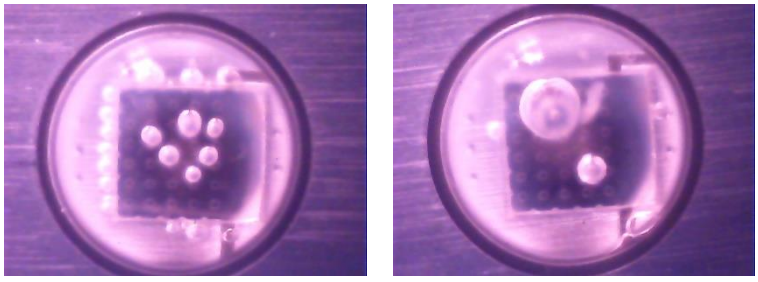


FIG 9. Examples of bubble formation due to failure to follow the above instructions.

ESD Protection

Workplace setup should follow the recommendations given in JEDEC standard document JESD625B “Requirements for Handling Electrostatic-Discharge-Sensitive (ESDS) Devices” or IEC 61340-5-1,2 and 3. The operators should be properly trained to handle UVC flipchips according the guidelines listed below:

• Always wear conductive wrist straps that is continuously monitored when working or handling assembled boards containing unprotected chips.

• Use an ion blower to neutralize the static discharge that may build up on the surface of the UVC flipchips during storage and handling.

• Always keep unused UVC flipchips in the protective ESD storage bag. Depending on the final application, it may be necessary to include additional ESD protection, such as a TVS protection diode on the substrate on which UVC flip chip is reflowed. Bolb Inc. includes a TVS chip inside each LED package.

•Use tweezers to pick up UVC LEDs, teflon coated tweezers would be recommended to avoid scratching UVC LEDs.

•Recommend holding the sidewalls of the LEDs (See Fig 10.)

*Do not apply pressure to the dome lens on packaged LED.

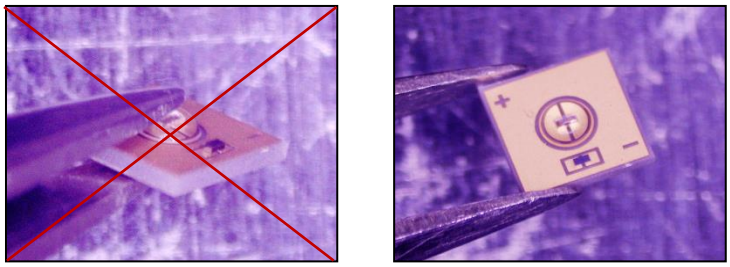
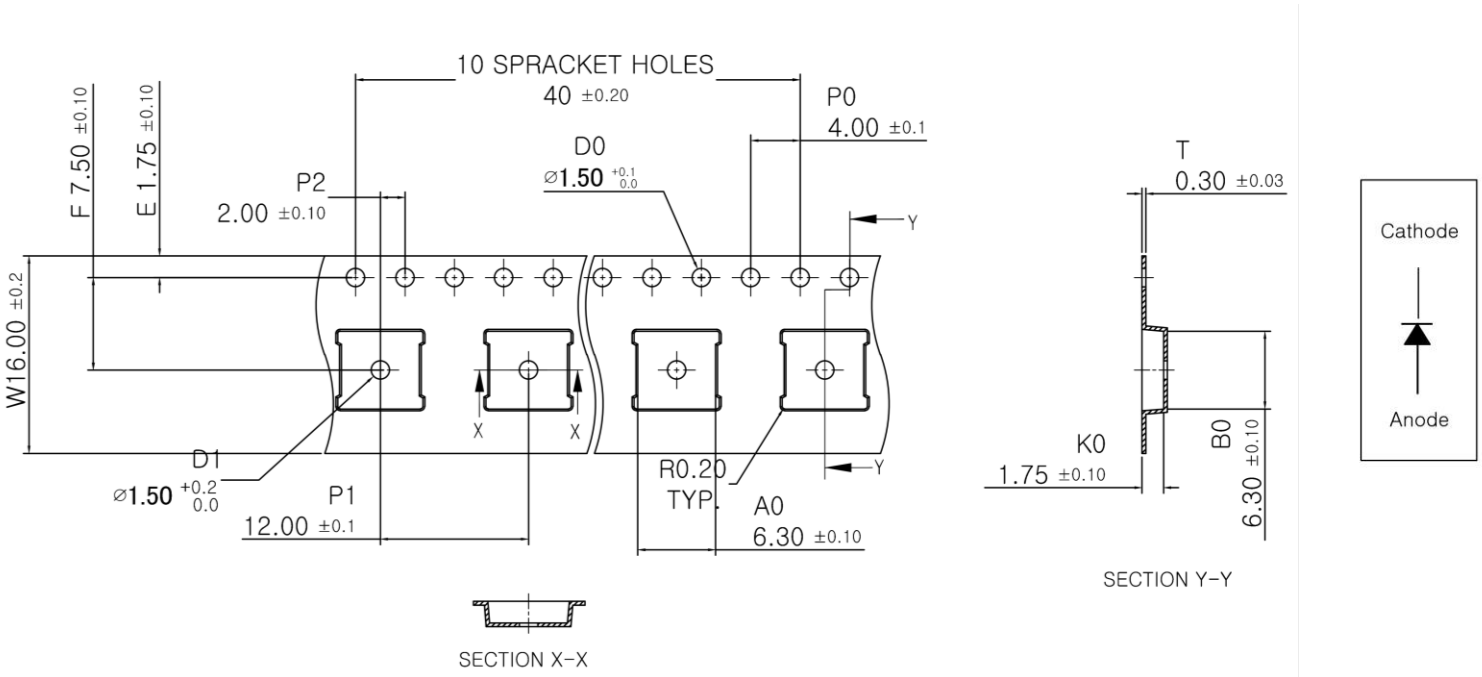
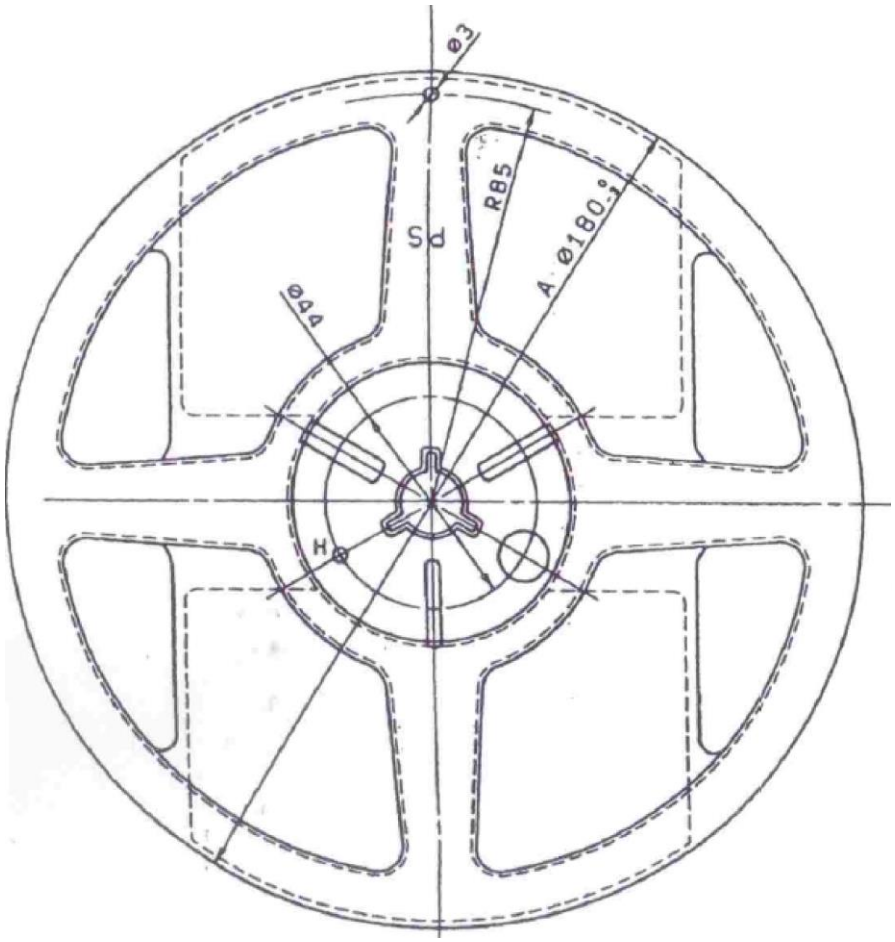


FIG 10. incorrect handling (left) and correct handling (right) of UVC LED Package

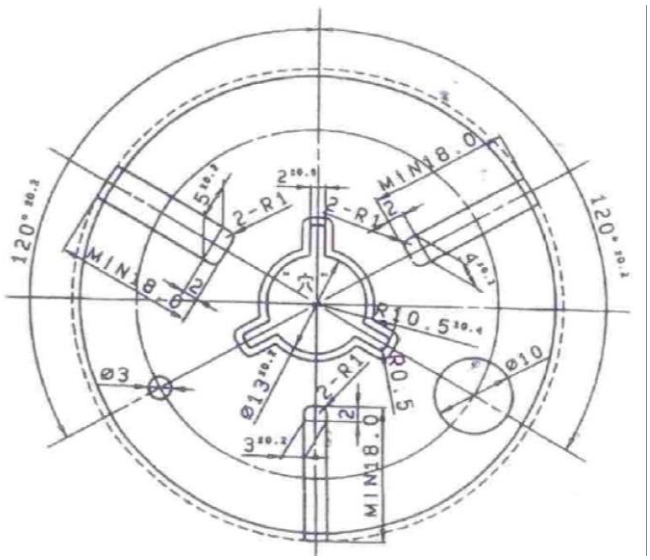
Packing

Carrier Tape & Reel Dimensions (unit = mm)





180mm Reel
Quantity 500 units/reel
Cover tape adhesion <0.7 Newtons
Leader tape > 35 empty pockets
Trailer > 40 empty pockets



General Precautions and UVC Safety

WARNING UV emitted from this product. Avoid eye and skin exposure to unshielded product

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UVC LEDs emit deep ultraviolet radiation, with extremely high intensity near their surface. This allows rapid disinfection but safety precautions must be observed during assembly, testing and field use.

By purchasing the UVC chips (bare dice), packaged LEDs or arrays and from BOLB Inc., the customer agrees to indemnify the manufacturer of any bodily harm as a result of failure to follow the common sense precautions, or warnings and guidelines contained within this Specifications.

It is the buyer's responsibility to properly design products that ensure safety of end users.

All assembly workers, operators and bystanders must wear eye and skin protection when the UVC LEDs are energized. Bare-eye observation (including through microscopes) and bare-hand handling of a UVC LED in operation is PROHIBITED.

UVC light can be easily absorbed, so any oil or other absorbent liquid or solid substance must NOT be allowed to touch the sapphire side of the UVC chip, or the dome lens on a packaged LED.