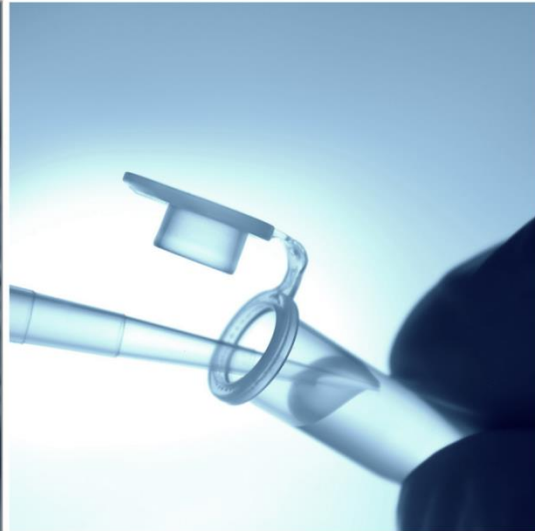
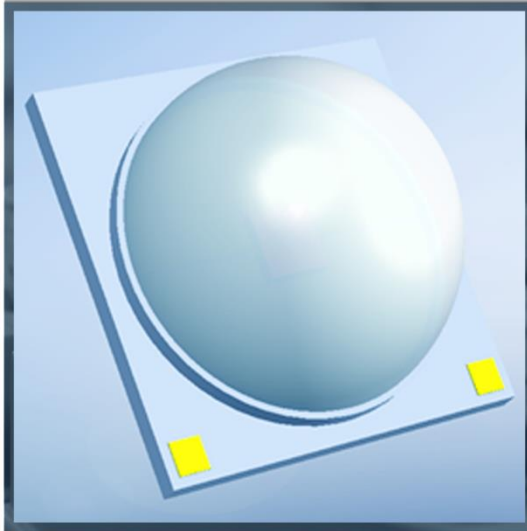


High Power UV-C LED S3535-DR100-265nm-FL LEDs Specifications

BOLB Inc.
Livermore, California
V1.1 July 2024



UV-B EMITTER RISK GROUP 3

WARNING UV EMITTED FROM THIS PRODUCT
AVOID EYE AND SKIN EXPOSURE TO UNSHEIELDED 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

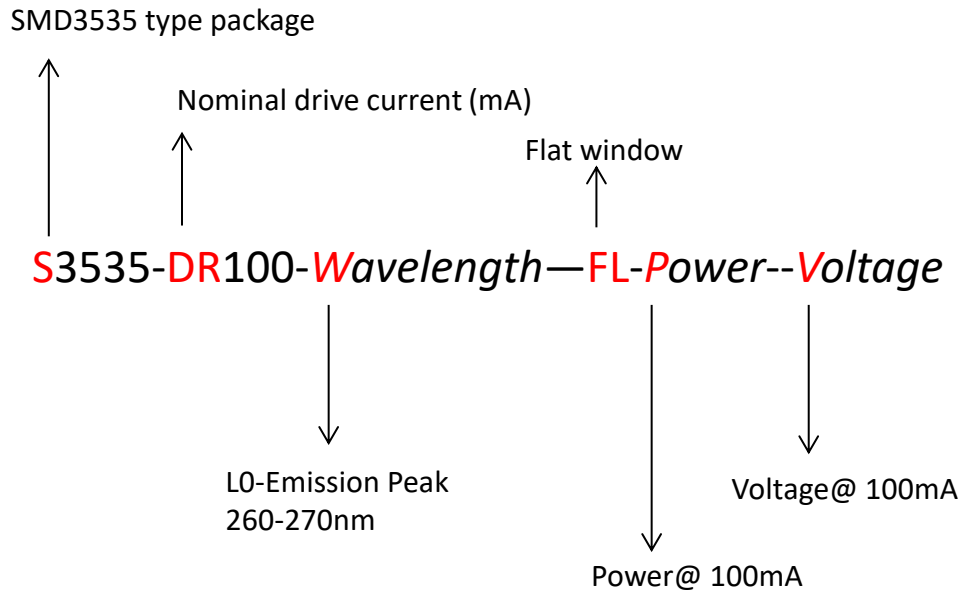


CAUTION – RISK OF PERSONAL INJURY. THIS LED PACKAGE IS NOT INTENDED FOR GENERAL ILLUMINATION AND MAY REQUIRE THE USE OF SPECIAL SAFEGUARDS. INSTALL AND USE ONLY IN STRICT ACCORDANCE WITH THE PRODUCT AND PACKAGING MARKINGS

INTEGRATION OF THIS LED PACKAGE INTO LED LIGHT SOURCES (ARRAYS, LAMPS OR LUMINAIRES) OR ADDITION OF REFLECTIVE OR MAGNIFYING OPTICS MAY CHANGE THE EXPECTED PHOTOBIOLOGICAL SAFETY CHARACTERISTICS OF SUCH DEVICES. THE ASSIGNED RISK GROUP CLASSIFICATION OF THIS LED PACKAGE MAY NOT NECESSARILY INDICATE THE RISK GROUP CLASSIFICATION OF THE LED LIGHT SOURCE



1. Identification convention



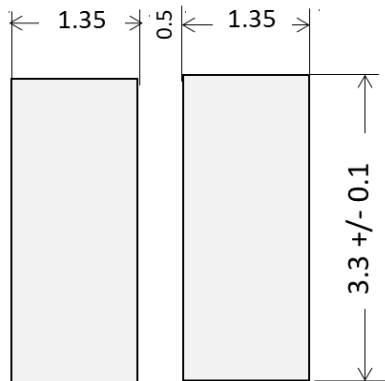
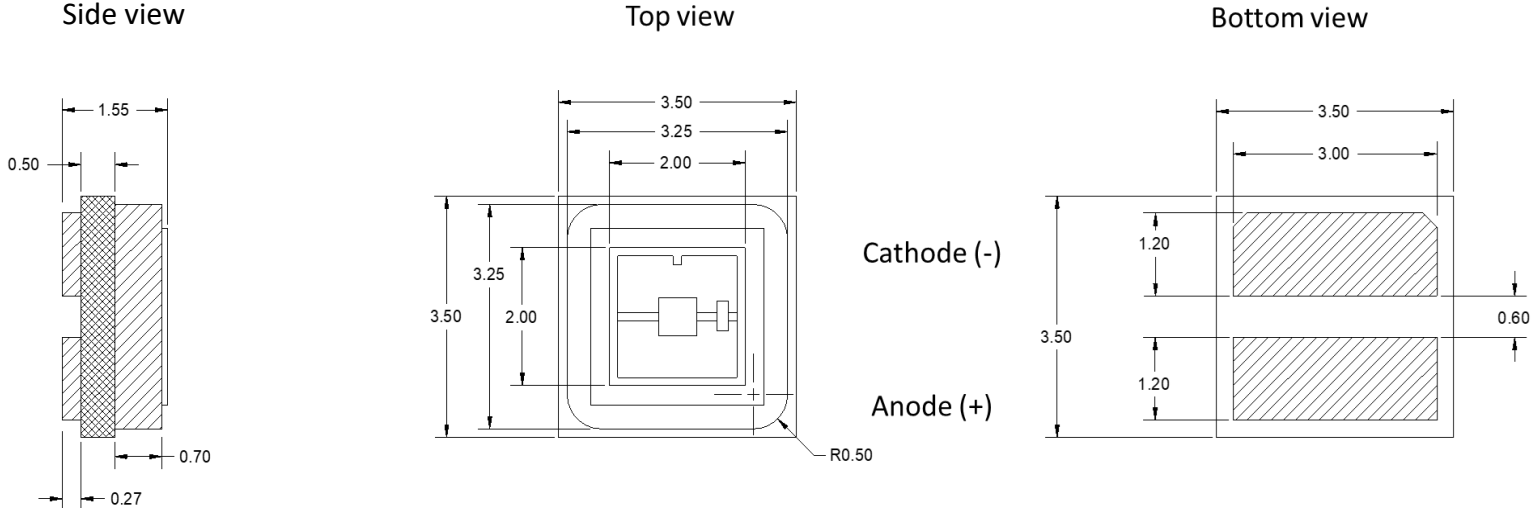
Example:

S3535-DR100-W265-FL-P40-V7.0

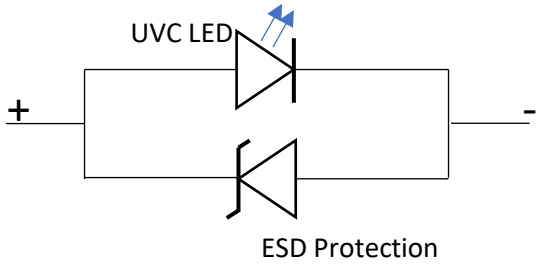
Interpretation:

Surface Mount type 3.5 mm x 3.5 mm packaged LED with flat window
Nominal drive current = 100 mA
Peak wavelength @265mA = 260-270 nm
Power output @ 100mA =35-45 mW for U1 bin
Forward voltage @ 100mA =6.5-7.5 V for V2 bin

2. Outline dimensions



Recommended Solder Pattern on PCB



Electrical scheme of S3535

Specifications subject to change without notice

3. Absolute maximum ratings

Table 1. Absolute maximum ratings

Parameter	Symbol	Min	Typical	Max	Unit
Forward current	I_F	-	100	150	mA
Power dissipation	PD	-	0.7	1.125	W
Operating temperature	T_{opr}	10	-	+60	°C
Storage temperature	T_{stg}	-40	-	+100	°C
Junction temperature	T_j	-	-	80	°C
Electrostatic discharge	ESD	-	-	2000	V

4. Typical optical electrical parameters at $T_a=25^\circ\text{C}$ [7]

Table 2. Typical optical and electrical parameters at 100 mA

Parameter	Condition	Symbol	Min.	Typical	Max	Unit
Peak wavelength [1]	I=100mA	λ_p	260	265	270	nm
Radiant flux [2]		ϕ_e	20	-	45	mW
Forward voltage [3]		V_F	5.5	7.0	7.5	V
Spectrum half width		$\Delta\lambda$	9	10	11	nm
Beam angle [4]		$2\theta_{1/2}$	-	120	-	°
Thermal resistance junction-board [5,6]		$R_{th\ j-b}$	-	10	-	°C/W

Notes:

1. Peak wavelength tolerance $\pm 2\text{nm}$
2. Radiant flux measurement tolerance $\pm 10\%$
3. Forward Voltage Tolerance $\pm 3\%$
4. Beam angle (FWHM) tolerance $\pm 10^\circ$
5. $R_{th\ j-b}$ is the thermal resistance from chip junction to bottom of MCPCB
6. Reference for thermal resistance: Using 25mm x 25mm x 1.6mm aluminum MCPCB
7. All measurements gathered under DC test conditions using suitably sized heat sink

5. Electrical and optical characteristic diagrams at Ta=25°C

Figure 1. Representative IV curve

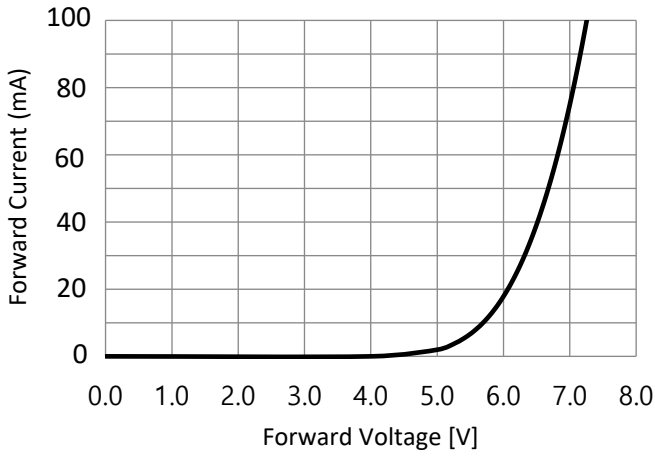


Figure 2. Relative radiant flux vs. forward current

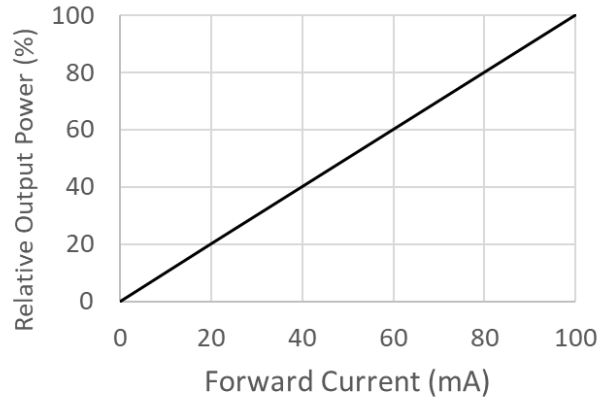


Figure 3. Typical spectrum

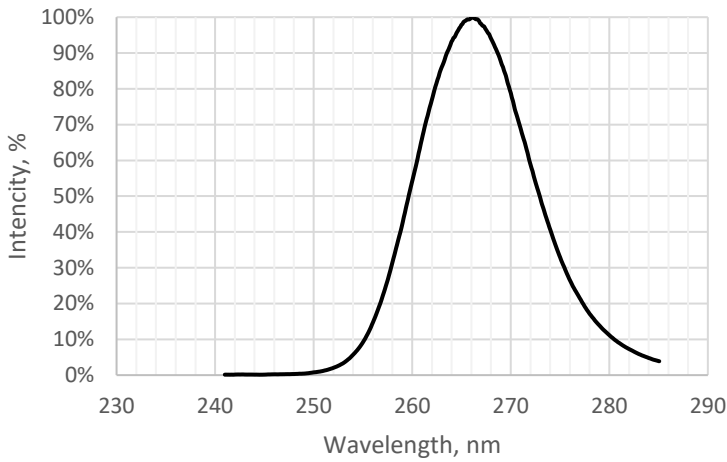


Figure 4. Forward voltage vs solder point temperature

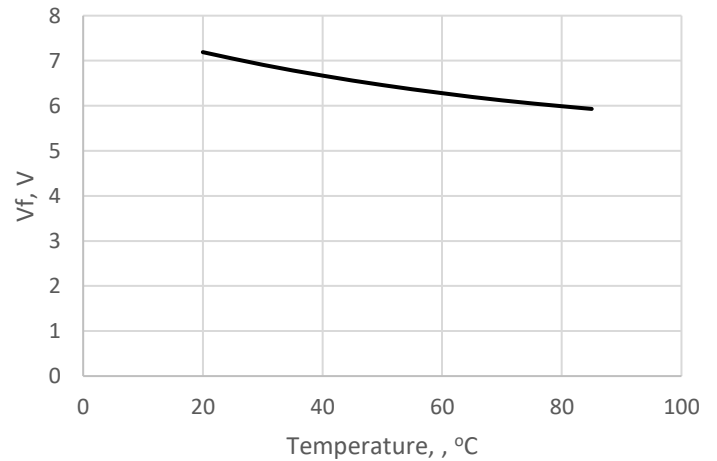


Figure 5. Relative power vs solder point temperature

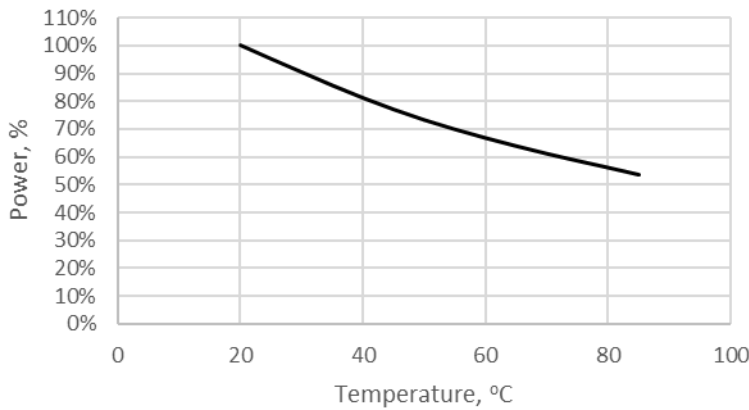
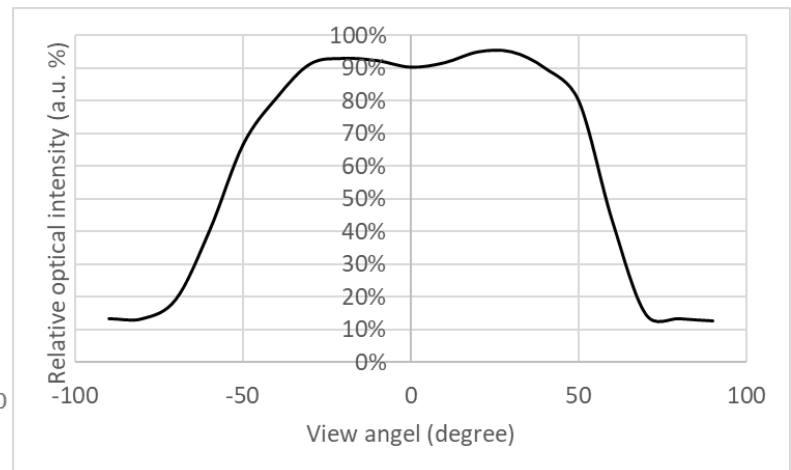


Figure 6. Far-field emission pattern



6. Lifetime at 100mA at Ta=25°C

Table 3. typical lifetime

Parameter	Symbol	Unit	Typical
70% Power Lifetime	L70	hours	10000*
50% Power Lifetime	L50	hours	20000*

*Values based on standard Bolb test conditions 30°C +/- 2°C solder-point temperature subject to change: please inquire about latest update

Additional testing and certifications:

- Moisture sensitivity test: MSL rating 5
- Bolb LEDs are RoHS and REACH compliant
- Bolb LEDs produce zero ozone

7. Binning information

Table 4. Binning information

[Ta =25°C, I_F = 100mA]

Designate	Information	Code	Minimums	Typical	Maximum
W	Peak wavelength (nm)	265 (L0)	260	265	270
P	Radiant Flux (mW)	U1	20	30	35
		U2	35	40	45
V	Forward voltage (V)	V1	5.5	6.0	6.5
		V2	6.5	7.0	7.5

Note:

1. Bin code definitions: Peak wavelength = W ; Radiant flux = P ; Forward voltage = V

8. Solder reflow temperature profile

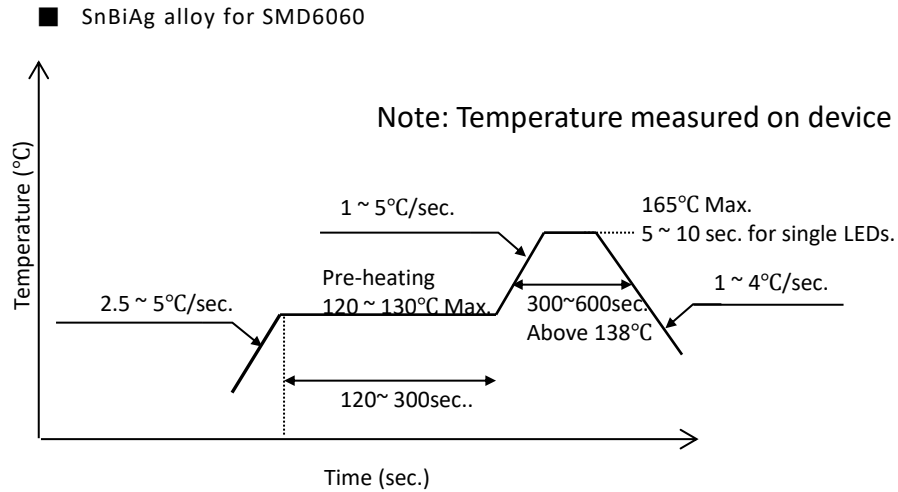


Figure 7. Soldering reflow temperature profile

Table 5. Soldering reflow condition

Reflow Soldering Instructions	
	SnBiAg alloy (melting temperature=138°C)
Pre-Heating	120 ~ 130°C
Pre-Heat Time	120sec. ~ 300sec. Max.
Peak Temperature	165°C Max.
Time at Peak Temperature	10 sec recommended

- Recommended solder composition: SnBiAg alloy or 174-T4 soldering paste)
- Recommended stencil thickness: 60~80µm
- Recommended stencil solder paste area: 60~80%
- For best results, the recommended forming gas is: 5%-7%H₂ in N₂ ambient
- Avoid rapid cooling after reflow soldering
- A convection-type reflow oven is preferred. If this is not an option, use a temperature-calibrated hot plate. DO NOT use heat gun (blower) for soldering.

9. Reliability

Table 6. Test and results

Test	Reference standard	Test conditions	Test duration	Failure criteria #	Units failed/tested
Resistance to Soldering Heat (Reflow Soldering)	JEITA ED-4701 300 301	T _{sld} =165°C, 10sec, 2 reflows		#1	0/10
Thermal Shock (Air to Air)		-40°C to 100°C, 15 mins dwell	1000cycles	#1	0/10
High Temperature Storage	JEITA ED-4701 200 201	T _a =100°C	1000hrs	#1	0/10
Low Temperature Storage	JEITA ED-4701 200 202	T _a =-40°C	1000hrs	#1	0/10
Room Temperature Operating Life		T _a =25°C, I _f =100mA, Test Board: See Notes Below	1000hrs	#1	0/10
High Temperature Operating Life		T _a =60°C, I _f =100mA, Test Board: See Notes Below	1000hrs	#1	0/10
Low Temperature Operating Life		T _a =10°C, I _f =100mA, Test Board: See Notes Below	1000hrs	#1	0/10
Vibration	JEITA ED-4701 400 403	200m/s ² , 100- 2000-1000Hz 4 cycles, 4 min, each X,Y,Z	48 minutes	#1	0/10
Electrostatic Discharges(with TVS)	JEITA ED-4701 300 304	HBM, 2KV,1.5kΩ,100pF 3 pulses, alternately positive or negative	-	#1	0/10

Notes: Aluminum PCB board=1.5mm, R_{θJA}=25°C/w

Table 7. Failure criteria

Criteria #	Items	Condition	Failure Criteria
#1	Forward voltage(Vf)	IF=100mA	>initial value *1.1 <initial value *0.85
	Radiant flux(∅E)	IF=100mA	<initial value *0.7

Table 8. Storage condition

Conditions		Temperature	Humidity	Time
Storage	Before opening aluminum bag	<=30°C	<=90%RH	with 1 year from delivery
	After opening aluminum bag	<=30°C	<=60%RH	<=48hr
Baking		65±5°C		>=24hr

Notes:

1. LED packages may absorb moisture; therefore, you must store the LEDs in moisture-proof bags.
2. To avoid failure, solder the LEDs onto PCBs within 24 hours after opening the moisture-proof bags.
3. If not used within 48 hours, Bolb recommends placing open bags into a nitrogen purge dry box.

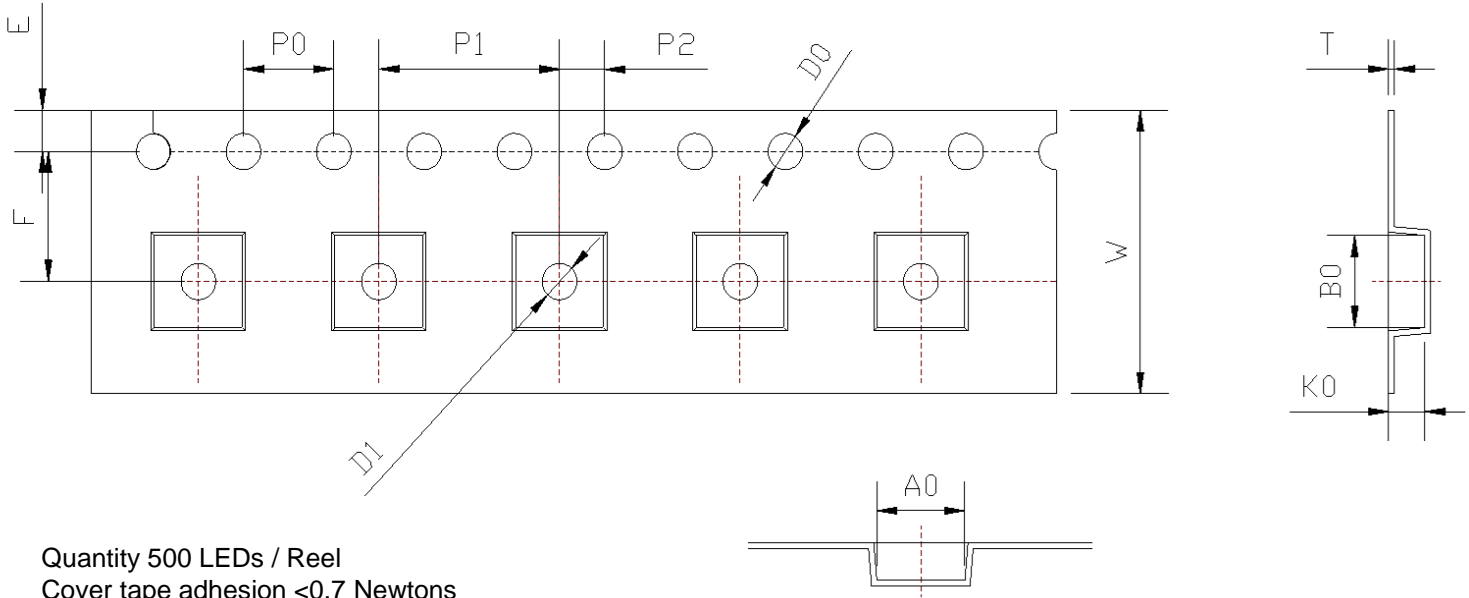
10. Handling procedures: ESD protection

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. In addition, properly train operators to handle UV-B flip chips according to the guidelines listed below:

- Always wear conductive wrist straps when handling Bolb UV-C LEDs—both on or off boards. Continuously monitor the conductive straps to ensure that they start and remain grounded.
- Use an ion blower to neutralize the static discharge that may build up on the surface of the UV-C flip chips during storage and handling.
- Always keep new UV-C flip chips 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 the UV-C flip chip is reflowed. Bolb UV-C LEDs have a TVS chip inside each package.
- Use tweezers to pick up UV-C LEDs. To avoid scratching UV-C LEDs, Bolb recommends using Teflon-coated tweezers.

11. Packing

symbol	AO	BO	KO	PO	P1	P2
Spec	3.90±0.10	3.95±0.10	1.60±0.10	4.00±0.10	8.0±0.10	2.0±0.10
symbol	W	T	E	F	DO	D1
Spec	12.0±0.3	0.25±0.05	1.75±0.10	5.50±0.10	1.50 ^{+0.1} ₋₀	1.50±0.10



Quantity 500 LEDs / Reel
 Cover tape adhesion <0.7 Newtons
 Leader tape > 35 empty pockets
 Trailer >40 empty pockets

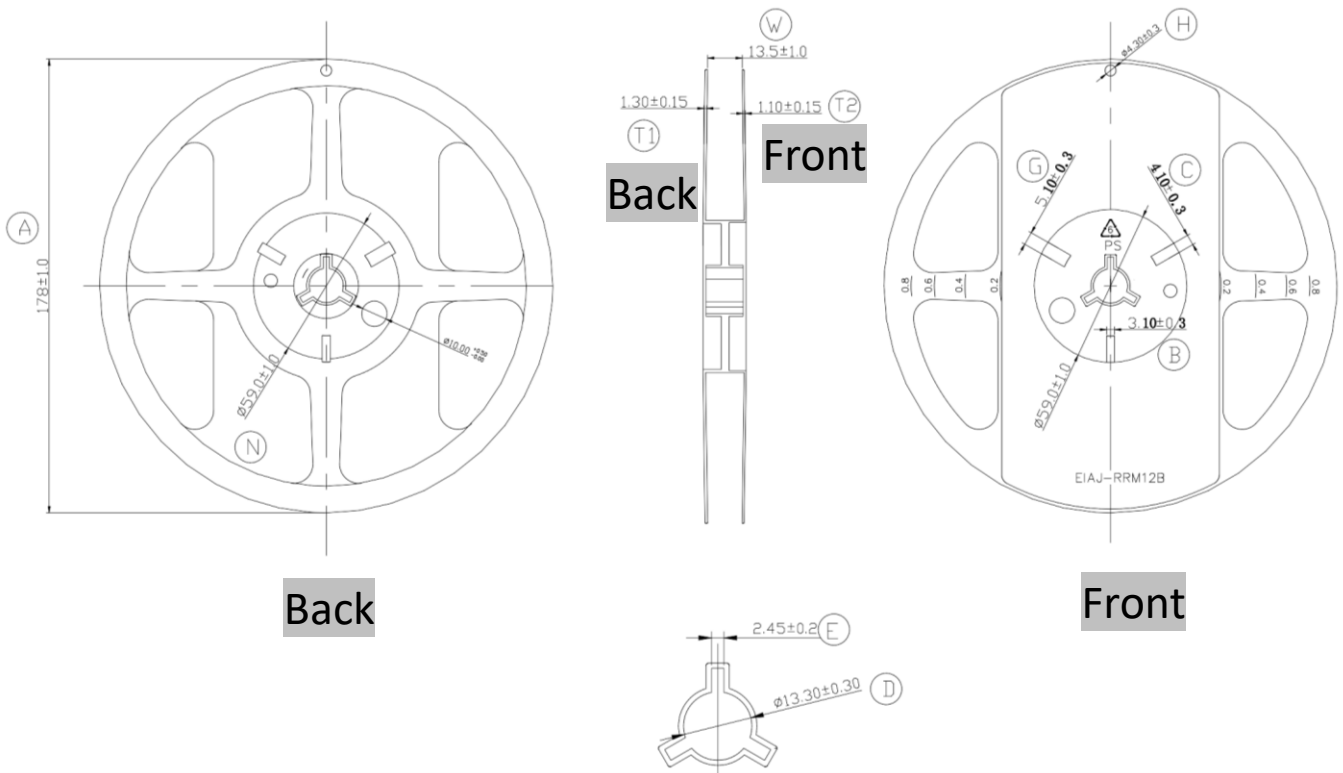


Figure 8. Carrier tape & reel dimensions (unit = mm)

12. General precautions and UV-C safety



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

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UV-B LEDs emit ultraviolet radiation with extremely high intensity near their surface. High irradiance allows rapid disinfection, but users must observe safety precautions during assembly, testing, and field use.

By purchasing the UV-C chips (bare dice), packaged LEDs, or arrays from BOLB Inc., the customer agrees to indemnify the manufacturer of any bodily harm due to failure to follow the common-sense precautions or warnings and guidelines contained within this Specification.

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

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

Because most materials readily absorb UV-C light, any oil or other absorbent liquid or solid substance must NOT be allowed to touch the sapphire side of the UV-C chip or the windows/lens on a packaged LED.