LoSa-V60-275

PRELIMINARY SPECIFICATIONS

CONTENTS

1. Description

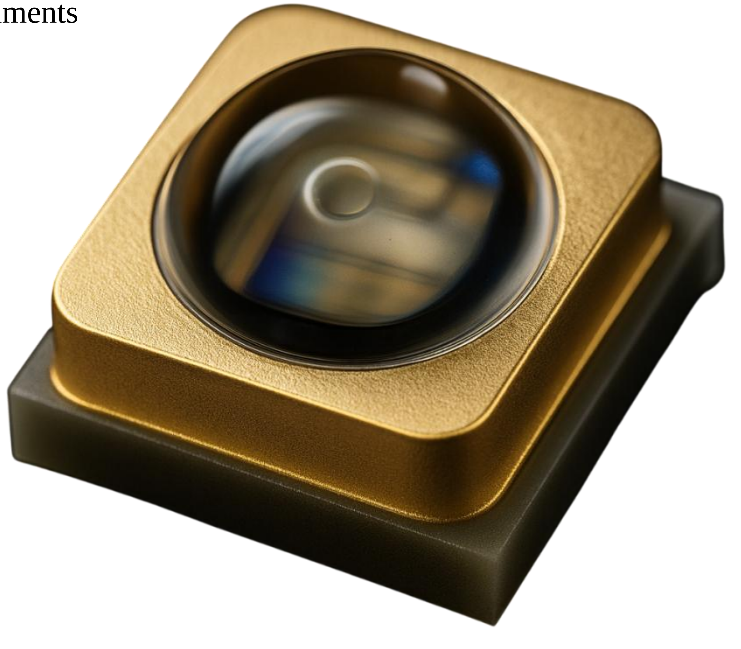
ELPHOTON's LoSa-V60-275 is a precision-engineered deep-UV LED package optimized for reliability and optical efficiency. With a peak wavelength of 270–280 nm and a narrow 60° viewing angle, the device delivers concentrated UV output for demanding applications. The package is built on an AlN substrate for excellent thermal management, enabling stable performance under continuous operation. LoSa-V60-275 is well suited for precision curing systems, water/air/surface treatment, sterilization, sensing, and spectroscopy where uniformity and durability matter.

◆ Features

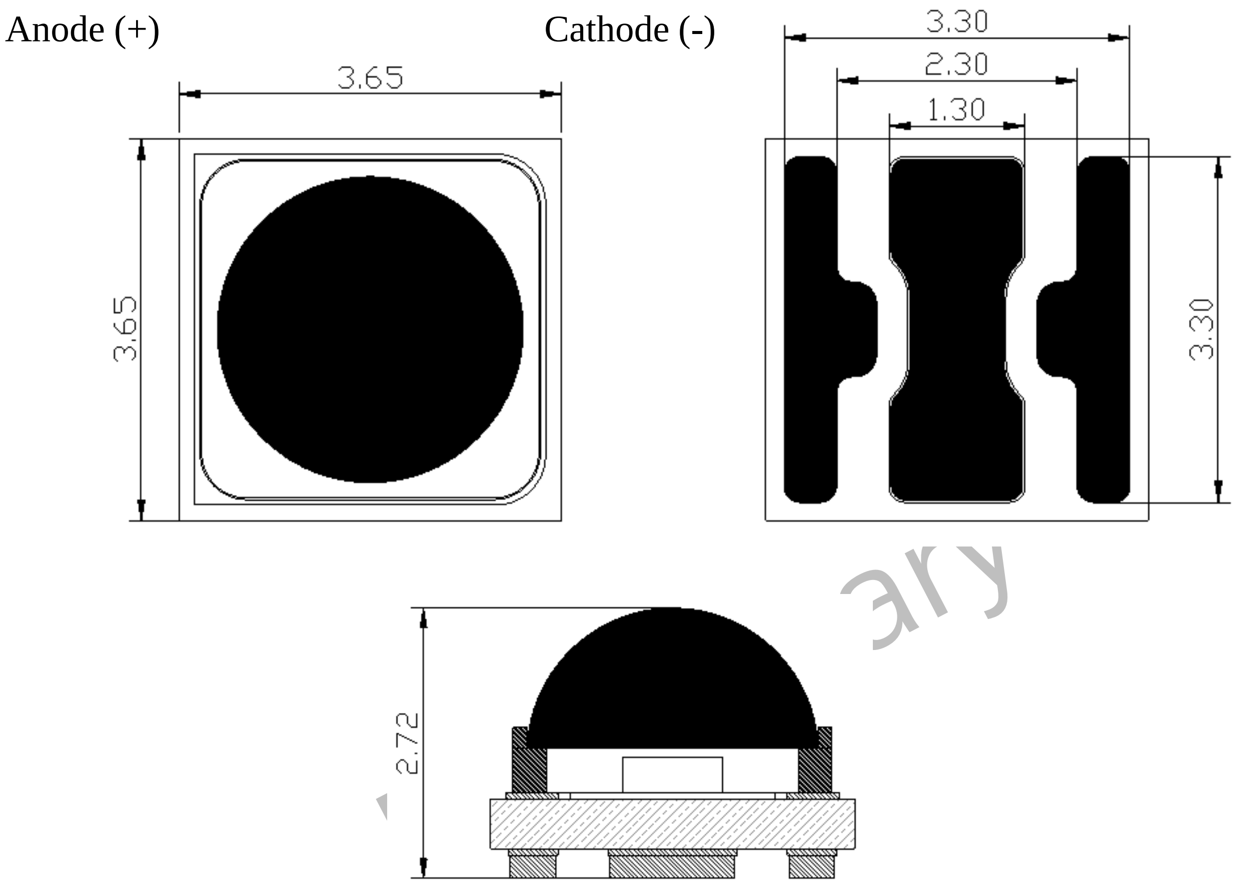
- Lighting Color(Peak Wavelength): 270-280 nm
- Surface Mount Type LED Package: 3.65 × 3.65 × 2.70 (L × W × H) [Unit: mm]
- View angle (2Θ1/2=60°)
- RoHS compliant; Pb-free
- ESD Protection up to 2KV
- Pb-free reflow compatible (details in "Soldering Conditions")

◆ Applications

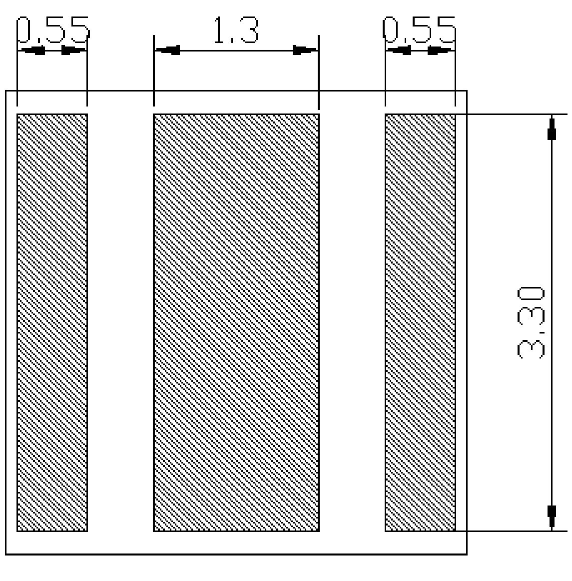
- Precision curing systems; water/air/surface disinfection and sterilization
- Fluorescence spectroscopy
- Sensor light / UV sensing
- Medical spectroscopy and analytical instruments



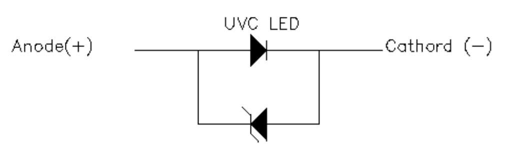
2. Outline Dimensions



Recommend Solder Pattern



Electrical Scheme of SMD



* Note

1. All dimensions are in millimeters.
2. Undefined tolerance is ±0.1mm
3. ESD protection

3. Absolute Maximum Rating at Ta = 25℃

Parameter	Symbol	Value			Unit
		Min.	Typ.	Max	
Forward Current	I_F	-	-	500	mA
Power Dissipation	P_D	-	-	3.5	W
Operating Temperature	T_{OPR}	-40	-	+60	℃
Storage Temperature	T_{STG}	-40	-	+100	℃
Junction Temperature	T_j	-	-	90	℃

4. Electro-Optical Characteristics at Ta = 25℃

Parameter	Conditions	Symbol	Min.	Typ.	Max	Unit
Peak Wavelength	I_F=350mA	W_p	270	-	280	nm
Radiant Flux		ϕe	110	-	160	mW
Forward Voltage		VF	5.0	-	6.5	V
Spectrum Half Width		Δλ	-	10	-	nm
View Angle		2θ½	-	60	-	°
Thermal Resistance, Junction – PCB bottom		$Rth_{j\text{-}b}$	-	5.8	-	℃/W

Note
* These values measured by Optical spectrum analyzer and integrating sphere measuring system. And tolerances are followings as below.
* Rth j-b is the thermal resistance from chip junction to PCB bottom
* Reference for thermal resistance: Using 2.5x2.5x1.6cm aluminum MCPCB

1. Peak Wavelength Tolerance ± 3.5nm
2. Radiant Flux Measurement tolerance ±10%
3. Forward Voltage Tolerance ± 3%
4. All characteristics are measured by Elphoton

5. Characteristics Diagrams at Ta=25℃

FIG 1. Forward Current vs. Forward Voltage

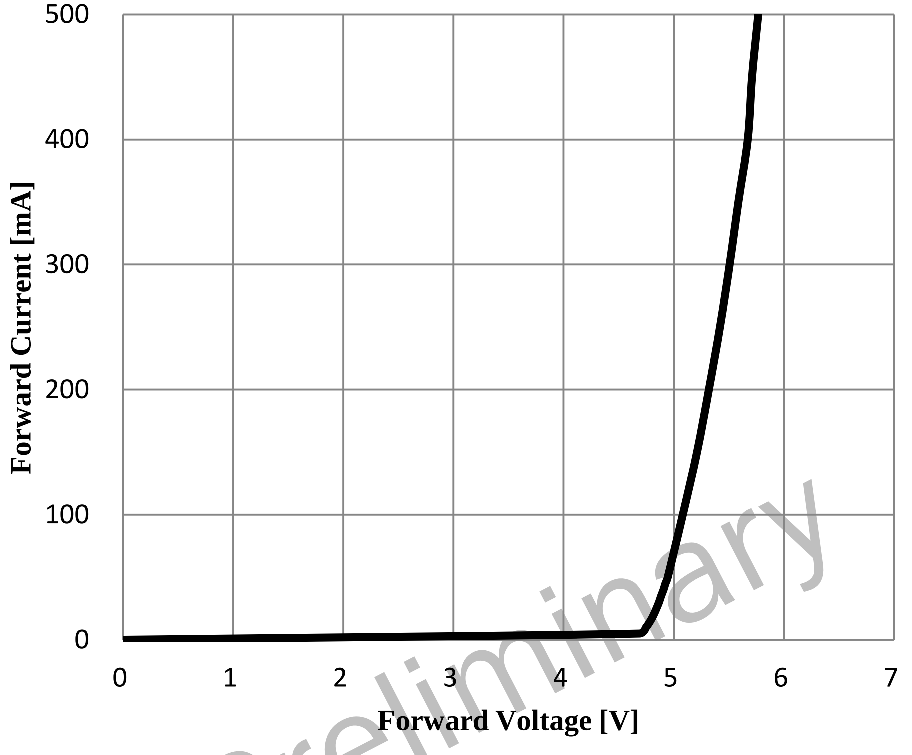
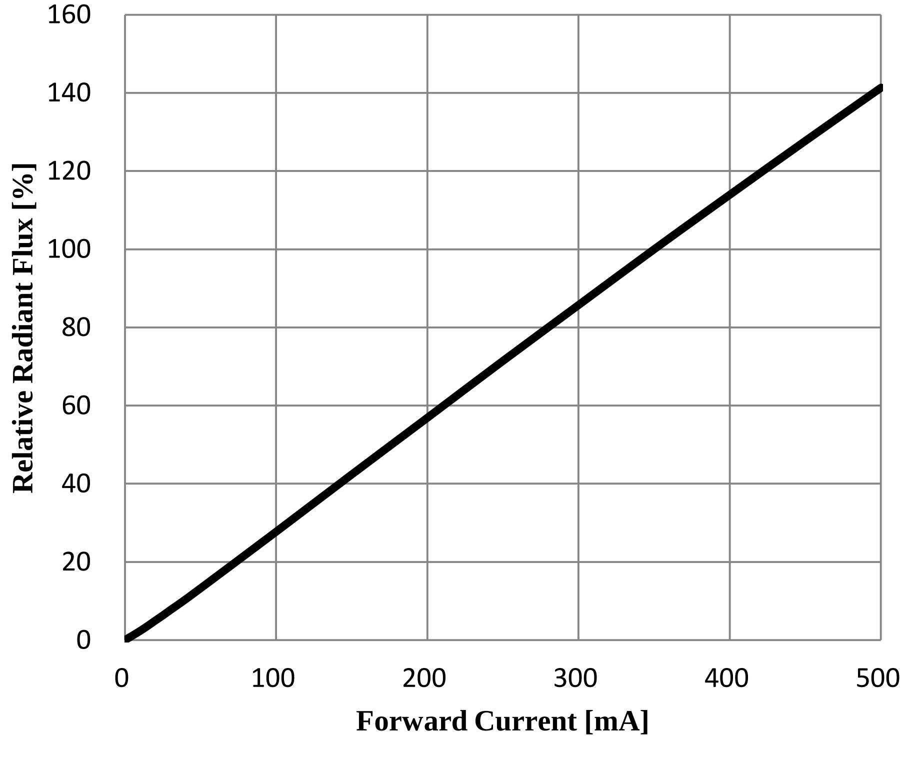


FIG 2. Relative Radiant Flux vs. Forward Current



5. Characteristics Diagrams at Ta=25°C, IF=350mA

FIG 3. Relative Peak Wavelength vs. Forward Current

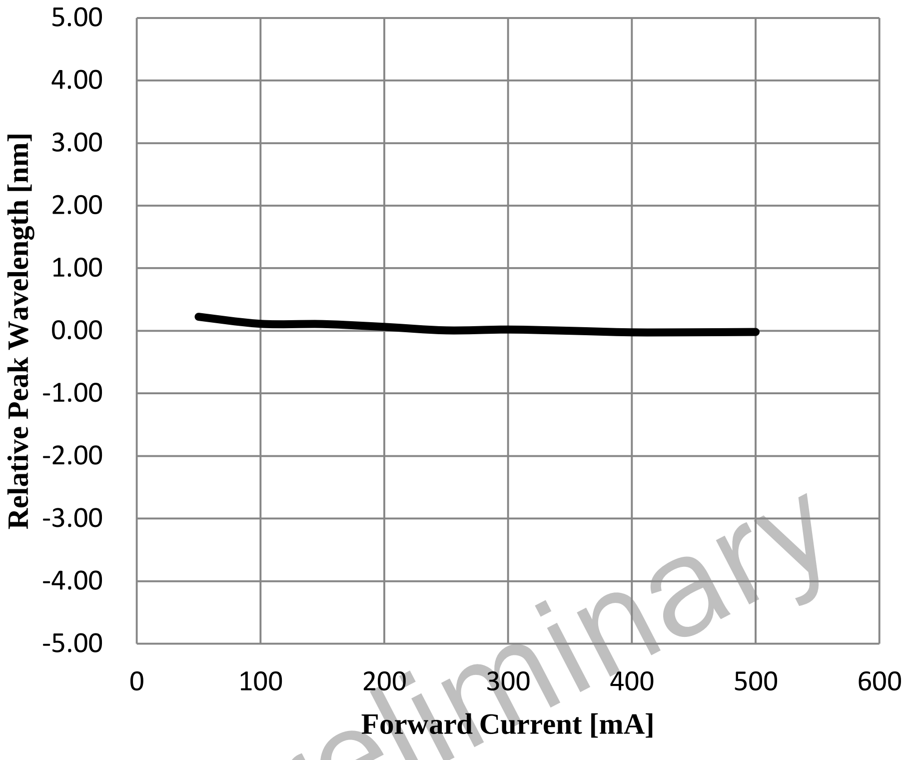
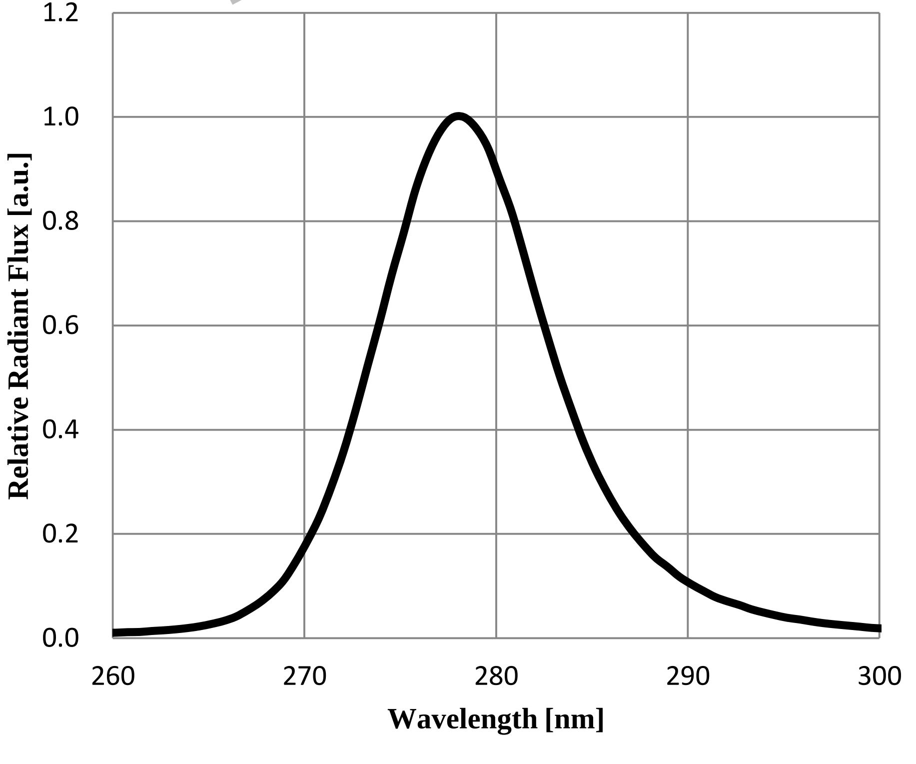


FIG 4. Spectrum



5. Characteristics Diagrams at IF=350mA

FIG 5. Relative Forward Voltage vs Ambient Temperature

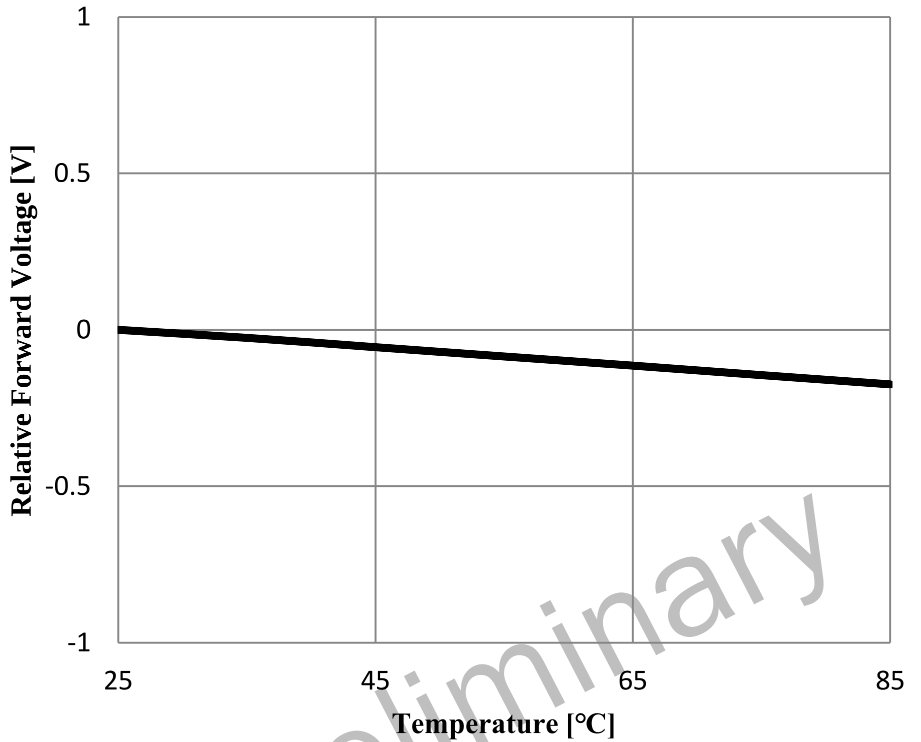
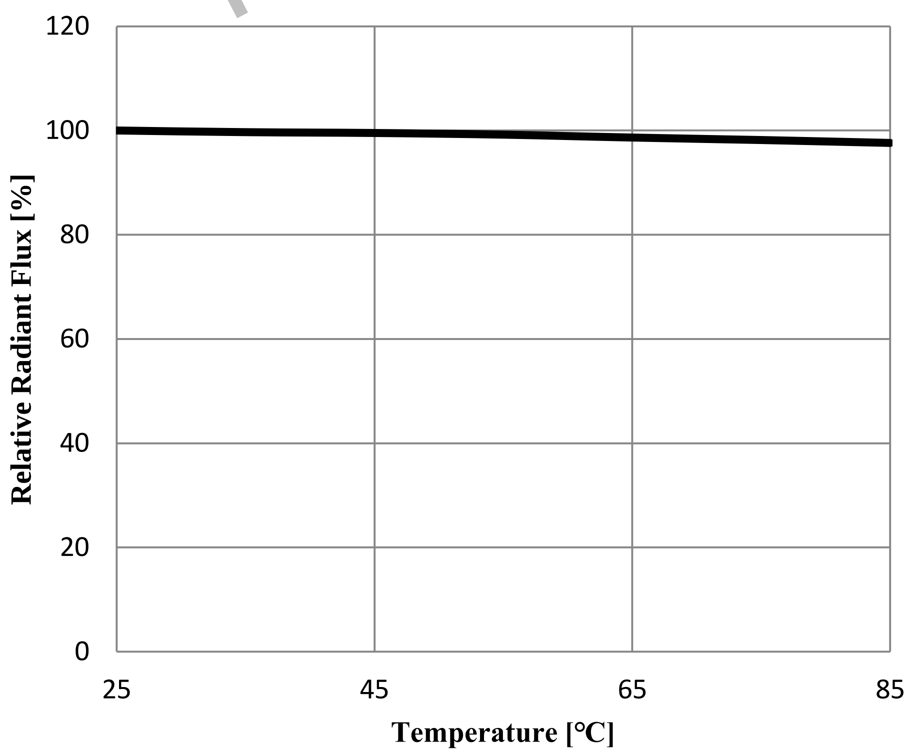


FIG 6. Relative Radiant Flux vs Ambient Temperature



5. Characteristics Diagrams at Ta=25°C, IF=350mA

FIG 7. Relative Peak Wavelength vs. Temperature

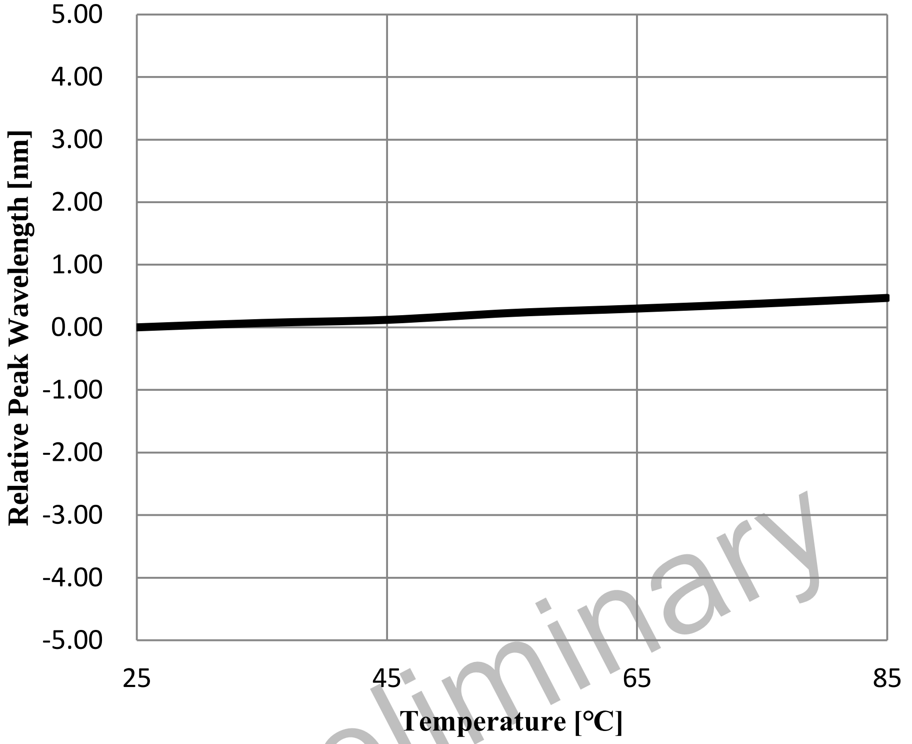
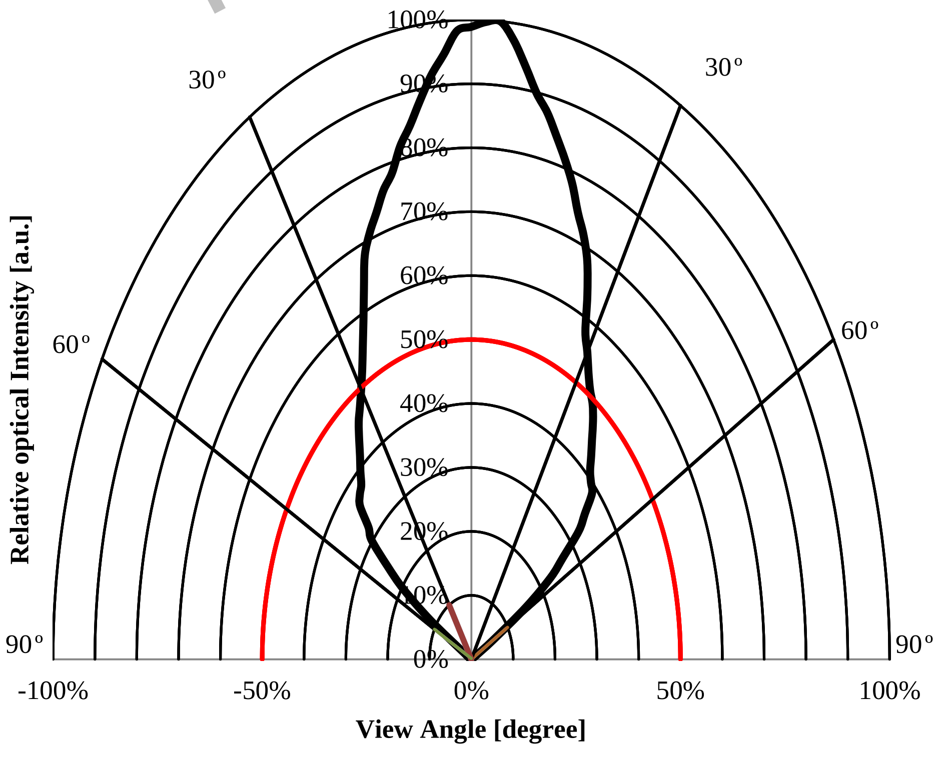


FIG 8. Far-field Emission Pattern



6. Reliability Test Items and Conditions

1) Criteria for Judging the Damage

Parameter	Symbol	Condition	Criteria for Judgement	
			Min.	Max.
Forward Voltage	VF	IF=350mA	-	Initial value*1.1
Radiant Flux	ϕe		Initial value*0.5	-

2) Reliability Tests

Test Item	Test Conditions	Test Time	Sample Q'ty
Room Temperature Operating Life [RTOL]	Ta=25℃, If=350mA	1000hrs	6 pcs
High Temperature Operating Life [HTOL]	Ta=60℃, If=250mA	1000hrs	6 pcs
High Temperature Storage Life [HTSL]	Ta=100℃	1000hrs	6 pcs
Low Temperature Storage Life [LTSL]	Ta=-40℃	1000hrs	6 pcs
ESD	HBM, Voltage =2kV R=1.5kΩ, C=100pF	3 times Positive / negative	6 pcs

Note

- Using 2.5×2.5×1.6cm Aluminum MCPCB.
- 3ea of MCPCBs are mounted on 15×5×2.8cm metal thermal heat sink when reliability test.
- Measurements are performed after allowing the LEDs to return to room temperature.

7. Soldering Conditions : Convection Reflow

1) Solder paste / stencil

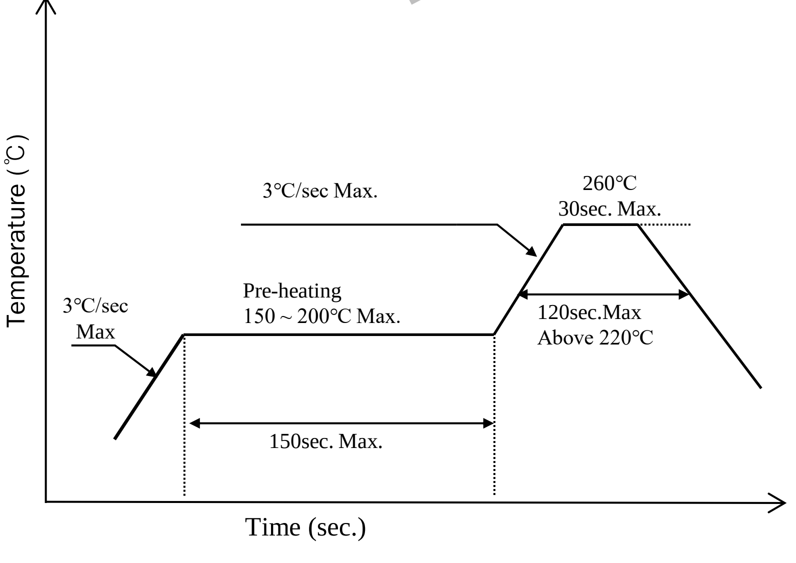
- Use Pb-free SnAgCu (SAC) solder paste (e.g., SAC305 or equivalent).
- Recommended stencil thickness: 60–80 µm.
- Recommended stencil aperture area ratio: 60–80%.
- Refer to “Mask Solder Pattern” on page 4.

2) Reflow profile (Pb-free, SAC)

- Ramp-up rate: ≤ 3 °C/s
- Pre-heating (soak) temperature: 150–200 °C
- Pre-heating time: ≤ 150 s
- Peak temperature: 260 °C max
- Time within 5 °C of peak: ≤ 30 s
- Cool-down rate: ≤ 6 °C/s (avoid rapid thermal shock)

3) Process notes

- Maximum number of reflow cycles: 2 (double-sided assembly allowed within this limit).
- Avoid rapid cooling after peak temperature. Extending the pre-heating (soak) time can help minimize lens/window distortion.
- Do not apply wave soldering or direct heating to the package body.
- Actual profiles may require optimization depending on board design, copper density, and oven capability.



Reflow Soldering	
	Pb-free(SnAgCu)
Pre-Heating	150 ~ 200°C
Pre-Heat Time	150sec. Max.
Peak Temperature	260°C Max.
Time within 5°C at Peak Temperature	30sec. Max.

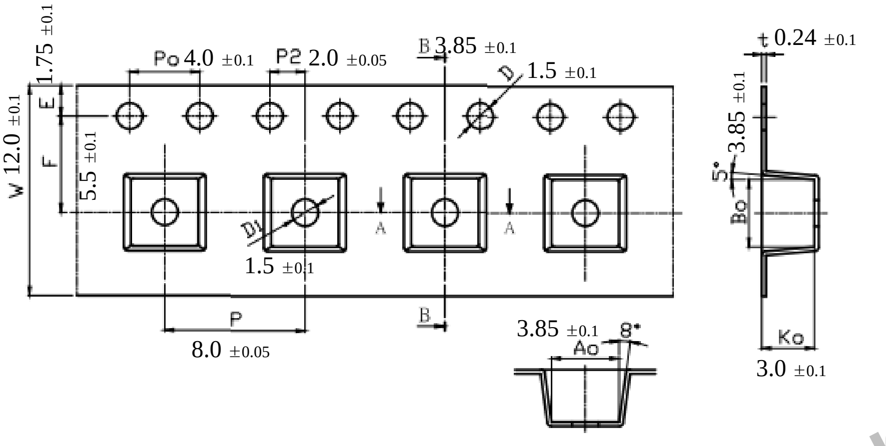
Note

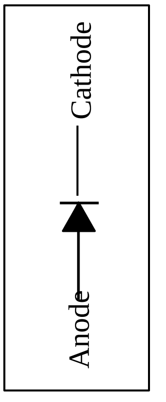
- Reflow soldering may be performed up to 2 cycles.
- Peak temperature is 260 °C max.
- Profile must be optimized per board/oven; avoid rapid thermal shock.

8. Packing

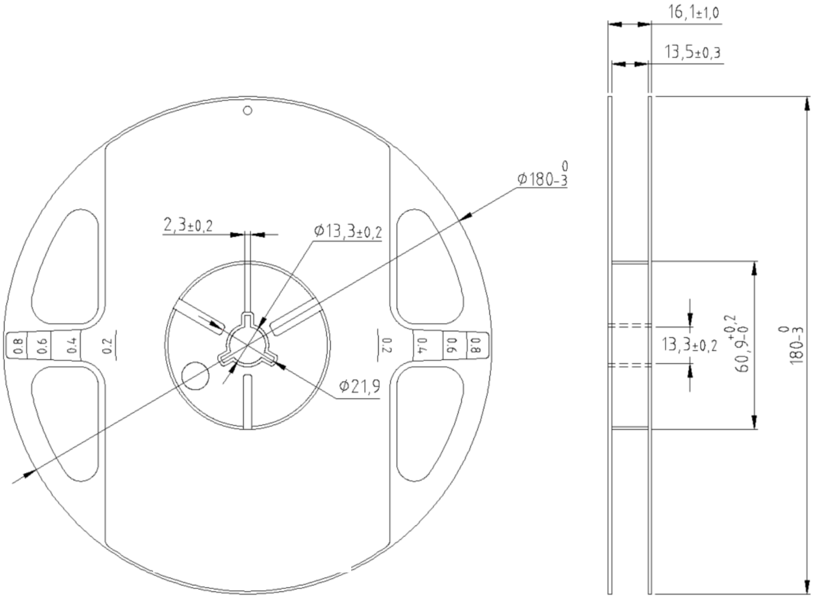
1) Tape & Reel Dimensions (unit : mm)

- Tape





- Reel



Note
- Maximum quantity : 1,000pcs/7inch reel (Minimum quantity: 100pcs)
- Carrier Tape Front Blank Space : 180mm (Min) , Rear Blank Space : 360mm (Min)
- Adhesion strength of cover tape is 0.1 ~ 0.7N when the cover tape is turned off from the carrier tape.
- The maximum number of consecutive missing lamps is two

9. Precaution

1) Cleaning

- Do not immerse the device in liquids (water, oil, organic solvents).
- If cleaning is required, use IPA (>99%) with a lint-free swab locally around the package; do not rub the quartz dome. Finish with dry N_2 blow.
- Ultrasonic cleaning is prohibited.
- Strong acids/alkalis, chlorinated solvents, silicone oils, and abrasive wipes are not allowed.
- Verify the chosen cleaning method with sample qualification before mass production.

2) Pick-and-Place / Mounting & Reflow

- Top pick on the dome lens is allowed only with compliant tooling:
  - Use a ring-type or concave vacuum nozzle that matches the dome curvature and spreads the load away from the center.
  - If a flat nozzle must be used, add soft/compliant padding, keep contact time minimal, and avoid any lateral sliding/rotation.
  - Where equipment allows, side-grip or frame/sidewall support is preferred.
- Ensure adequate tool/fixture clearance around the dome and confirm with a first-article run to prevent collisions.
- Pb-free reflow: peak ≤ 260 °C, ≤ 2 cycles. Avoid rapid thermal shock. Handle/test only after the board returns to room temperature.
- Electrical: Reverse voltage is not allowed. Use a constant-current driver with soft-start and over-current/transient protection.

3) Moisture & Storage (No formal MSL assigned)

- Shipped in a moisture-barrier bag (MBB) with silica.
- Store sealed in the original MBB at 5–30 °C in a dry, controlled environment (typically ≤60 % RH). No shelf-life or exposure time is specified at this stage.
- If the bag seal is compromised, exposure time/humidity is unknown or prolonged, perform a dry-out at 60 °C for 2 hours before reflow.
- Packaging caution: Confirm reel/carrier and cover-tape heat tolerance with your supplier. If not heat-rated, transfer devices to a heat-stable tray/tape for dry-out, or use a dry cabinet (<10 % RH) for 24–48 hours.
- Reseal opened reels in MBB with fresh desiccant for storage.

9. Precaution

4) Handling / ESD–EOS

- Handle only at ESD-protected workstations (wrist strap, grounded floors/tools, ionizer).
- Prevent surge, static discharge, reverse voltage, and current spikes.
- Use a constant-current driver with proper protection features.

5) Manual Handling

- Do not touch the lens with fingers. Oils/particles reduce optical output.
- Grip the metal frame or package sidewalls. Use PTFE-tipped tweezers or ESD vacuum tweezers.
- Use guards/fixtures to avoid contact with the dome during assembly.

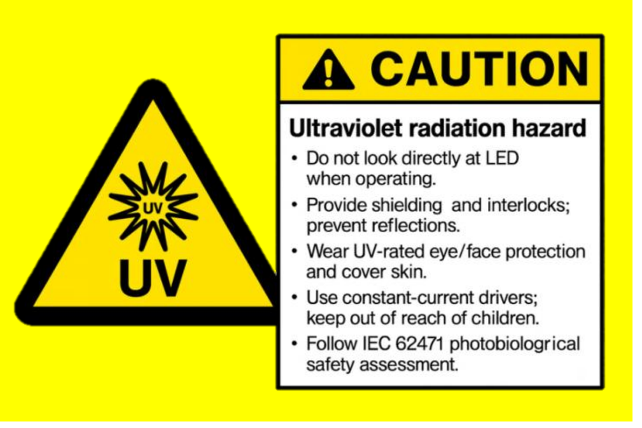
6) Rework

- Limit local rework; excessive hot-air exposure can damage the dome or bond line.
- After device removal, clean pads with low-activity flux + IPA; no ultrasonic cleaning.

7) Chemical Compatibility

- Allowed: IPA, dry N_2 blow.
- Not allowed / not recommended: Acetone/MEK, chlorinated solvents, strong acids/alkalis, silicone oils (release agents/coatings), abrasive wipes.
- If conformal coating is used, mask the lens to avoid UV transmission loss.

9. Precaution



8) Optical Safety (UV)

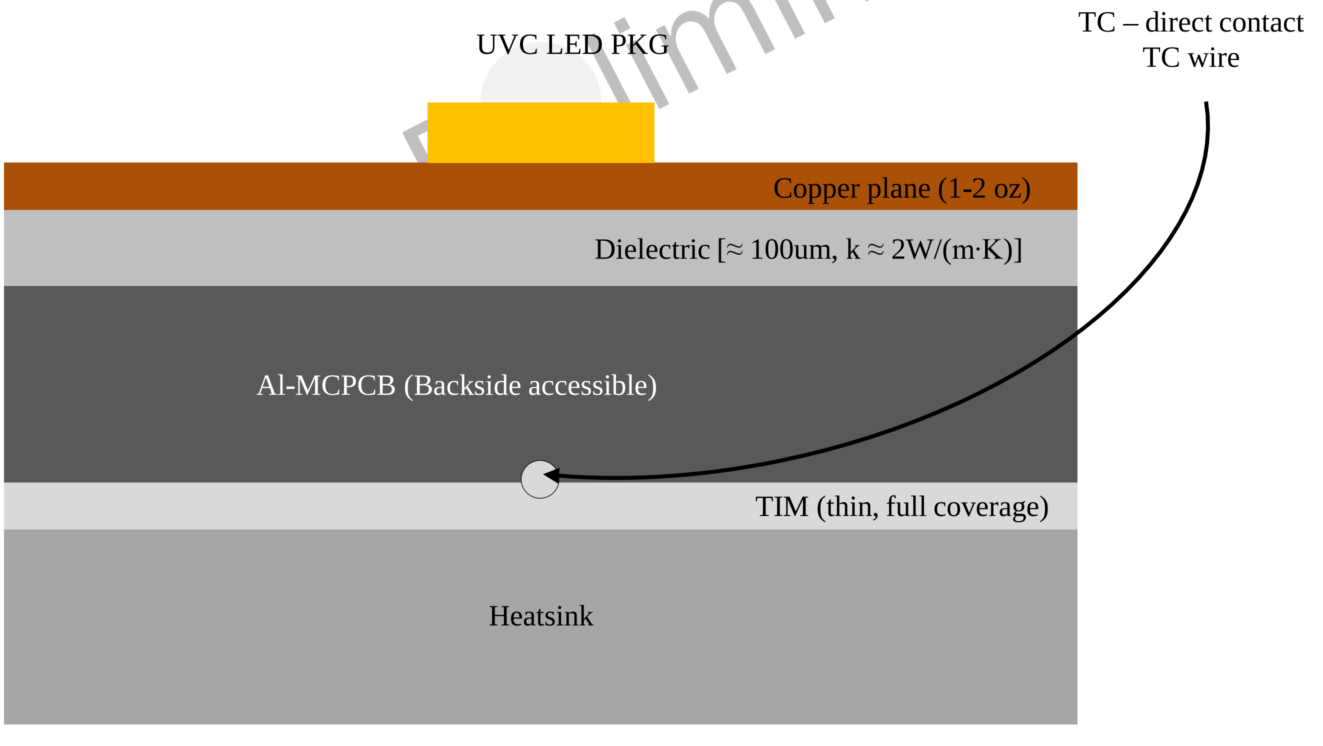
- Ultraviolet radiation (≈200–400 nm: UV-C/UV-B/near-UV) can be hazardous to eyes and skin.
- Do not look directly at the LED when operating.
- Provide optical shielding and interlocks; prevent reflections.
- Wear UV-rated eye/face protection and cover skin during testing.
- Drive with constant-current only; follow thermal/ESD precautions.
- Keep out of reach of children and untrained personnel.

10. Measurement Methods

1) Tb(bottom) Measurement Guideline

- Attach a K-type TC to the MCPCB backside (aluminum base) under the LED optical center.
- Prepare a bare-metal spot Ø 1.5–2.0 mm; clean with IPA.
- Fix with a very thin layer of thermally conductive adhesive; cover with one layer of Kapton.
- Do not place the bead between MCPCB and heatsink. If required, provide a relief groove so the bead sits flush while keeping full TIM contact.
- Define Tb(bottom) after ≥30 min stabilization at the target drive; typical uncertainty ±1–2 °C.
- Junction estimate:

$$T_j = T_{b(bottom)} + R_{th(j-b)} \times P_{out}, \qquad P_{out} \approx I_F \times V_F$$



Do not place the TC bead between MCPCB and heatsink (keeps full TIM contact).

> Note — Rationale (summary).
> - Backside probing reduces design/process sensitivity compared to top-pad probing, aligns with the thermal path Rth(j-b), and lowers handling/ESD risk.
> - It yields more reproducible, model-consistent temperatures for specification and compliance. (See Appendix B for details.)

11. Revision Sheet

Revision	Date	Page	Description	Remark
Rev.1.0	25.08.22	-	Preliminary edition	

Appendix A.
Visual Identification & Electrode Map (Top View)

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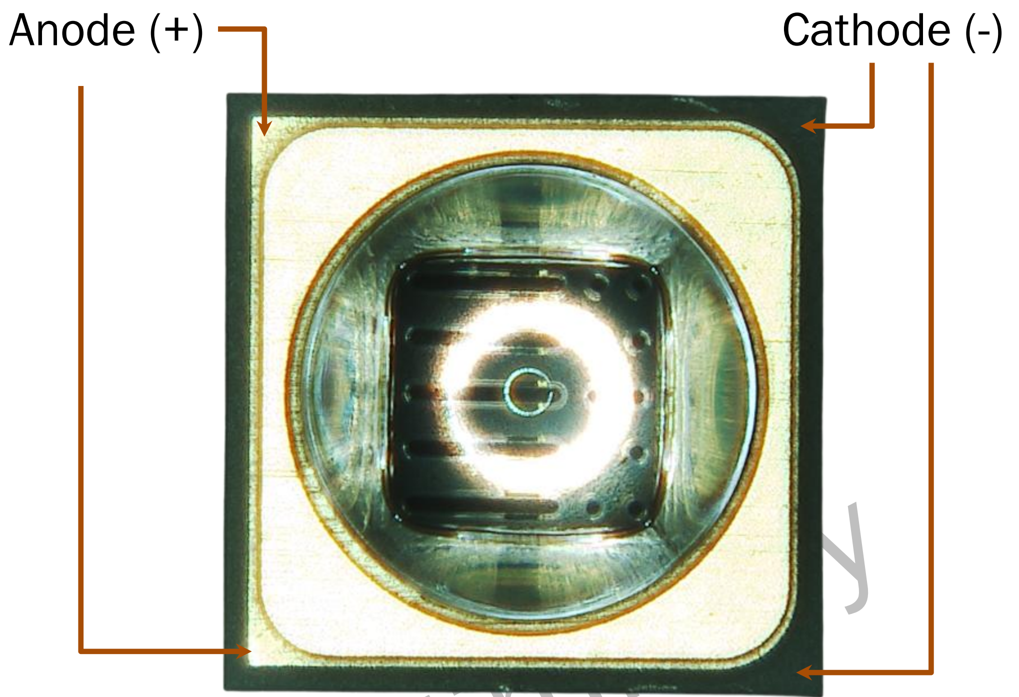
Top View Photo (Actual Device)



Appendix B.
Rationale for Bottom-Side Thermocouple [Tb(bottom)] Measurement

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Rationale for Bottom-Side Thermocouple [Tb(bottom)] Measurement

We specify Tb(bottom) by attaching a fine-wire thermocouple to the MCPCB backside (aluminum base), directly under the LED center, rather than probing any top-side pads. This approach is chosen for the following reasons:

- Better repeatability across designs. Top-side readings depend on local pad geometry, solder volume, mask openings, and nearby copper pours; these vary by customer PCB and process. Backside aluminum contact reduces design/process sensitivity, improving reproducibility between builds and sites.
- Direct correlation to the thermal model. The junction-to-backside thermal path is characterized as Rth(j-b). Measuring at the aluminum base provides a consistent boundary condition for estimating junction temperature:

$$T_j = T_{b(bottom)} + R_{th(j-b)} \times P_{out}\,, \qquad P_{out} \approx I_F \times V_F$$

- Lower measurement bias and handling risk. Avoids touching functional electrodes or adding solder/adhesive near the package that may alter heat spreading or introduce ESD/handling risks.
- Simple fixturing in real systems. A small relief groove/pocket in the heatsink allows the bead to sit flush on the aluminum base while maintaining full TIM contact, avoiding air gaps and preserving normal thermal performance.

Implementation notes.

Place a K-type TC on a clean, bare-metal spot (Ø 1.5–2.0 mm) on the MCPCB backside under the optical center. Fix with a very thin layer of thermally conductive adhesive and cover with one layer of Kapton to suppress convection. Do not place the bead between MCPCB and heatsink. Define Tb(bottom) after ≥ 30 min stabilization at the target drive; typical uncertainty ±1–2 °C (dominant factors: adhesive thickness, ambient airflow).

Trade-offs.

Backside readings have a slightly longer time constant than top-side pad measurements; however, once stabilized they provide a more transferable and model-consistent temperature for specification and compliance. Top-side probing may still be used for engineering debug, but it is not the compliance reference for this product.