



Material Application Solution for Pocket Gimbal Camera Components from a Leading Action Camera Brand

CIRCUIT PROTECTION WEATHER RESISTANCE CAMERA MODULE BONDING

[APPLICATION SOLUTION](#) | [TECHNICAL APPLICATION SHEET](#)



Figure 1 Pocket Gimbal Camera from a Leading Action Camera Brand

Solution Summary

Use a three-layer material system: thin-film circuit protection, weather-resistant protection for exposed areas, and staged bonding and encapsulation of the optical module. The system brings environmental protection, optical-axis stability, and assembly efficiency into one validation process without materially increasing product size.

This illustrative case study does not imply brand authorization, a supply relationship, or mass-production endorsement.

1 Application Scenarios and Primary Failure Risks

Pocket gimbal cameras integrate an optical module, three-axis motors, a main PCB, a rotating screen, a battery, and multiple flexible printed circuits in a compact enclosure. Long-term exposure to outdoor temperature and humidity changes, perspiration, dust, ultraviolet radiation, drops, vibration, and frequent start-stop cycles can cause failures. The material solution should prioritize optical-axis drift, electronic corrosion, water ingress at housing seams, and cosmetic aging.

Application Area	Critical Locations	Primary Risks	Design Objective
01 Circuit Protection	Main PCB, solder joints, connector-adjacent areas, and FPC bend areas	Condensation, perspiration ions, moisture migration, and localized corrosion	Form a continuous thin-film barrier while preserving service access and connector keep-out zones
02 Outdoor Weather Resistance	Housing seams, areas around the lens window, and exposed button and bottom-cover areas	UV aging, stain adhesion, rainwater ingress, and cracking under thermal cycling	Reduce surface wetting and contamination while maintaining appearance and seam reliability
03 Bonding and Encapsulation	Lens-to-barrel joints, AA module, bracket-to-PCB joints, and gimbal camera compartment	Cure shrinkage, optical-axis drift, drop-induced loosening, and dust or moisture ingress	Use staged curing and localized encapsulation for rapid positioning and long-term structural stability

Recommended Material Architecture

- Use a thin-film conformal coating on the PCB and solder joints, with localized reinforcement at high-stress solder joints, FPC roots, and connector-adjacent areas.
- When applying a weather-resistant, hydrophobic, stain-resistant coating to exposed surfaces, distinguish non-optical surfaces from the active optical area of the lens to avoid risks to transmittance, haze, or coating compatibility.
- Secure the camera using AA positioning and tack cure followed by secondary cure or structural reinforcement. Use optical-axis drift, MTF, and cosmetic contamination as key acceptance criteria.

2 Exploded Structure and Material Application Areas

The figure below shows typical application areas for the three material categories, organized by product function. Actual dispensing width, film thickness, keep-out zones, and cure energy should be defined based on component materials, gaps, equipment capability, and rework strategy.



Figure 2 Pocket Gimbal Camera Exploded View and Material Application Areas

No.	Candidate Material	Recommended Application Area	Implementation Considerations
01	LG-F5230 Fluorinated Coating LG-S2110 Silicone	Thin-film protection for the main PCB; thicker flexible protection in localized areas	Establish keep-out zones for connectors, microphones, thermal interfaces, and grounding points; control film thickness and reworkability
02	LG-RW0385 Inorganic Hydrophobic and Stain-Resistant Coating	Candidate areas: non-optical exterior surfaces, areas around the lens window, and exposed seam areas	Validate transmittance, haze, AR-coating compatibility, and abrasion resistance in the active optical area of the lens
03	LG-UE3612 UV Epoxy LG-U0867 UV Adhesive LG-U0826 UV Adhesive LG-E47111 Epoxy Adhesive	AA positioning; lens-to-barrel bonding; module structural reinforcement; bracket-to-PCB and filter bonding	Select a single-cure or dual-cure process based on shadowed areas, cure depth, shrinkage stress, and cycle time

3 Recommended Process Flow

Separate optical-module assembly from whole-device protection into two controlled process stages. First establish optical-axis and structural stability, then apply circuit and housing protection to reduce coating contamination on optical surfaces or interference with downstream bonding.

Step	Process	Key Control Points
1	Incoming Inspection and Surface Preparation	Verify the surface condition of PC/ABS, aluminum alloy, glass, FPC, and PCB; clean and dry; use plasma treatment when required and record surface energy
2	Lens-to-Barrel Dispensing	Control adhesive volume and squeeze-out limits; prevent contamination of the lens, sensor, and gimbal bearings
3	AA Active Alignment and Tack Cure	Monitor optical axis, focus, and MTF in line; remeasure displacement after UV tack cure before defining the secondary-cure window
4	Bracket and Module Reinforcement	Use a deep-curing or secondary-curing system for shadowed areas; control shrinkage stress and temperature rise during cure
5	PCB Conformal Coating and Local Reinforcement	Mask connectors, test points, microphones, and thermal interfaces; control coating continuity, pinholes, and edge creep
6	Housing Weather Resistance and Seam Protection	Separate optical from non-optical areas; complete hydrophobicity, stain resistance, adhesion, and appearance-consistency checks
7	Final Product Inspection	Inspect function, optical axis, screen rotation, gimbal movement, current, appearance, and sealing; establish process traceability

Key Error-Proofing Measures

- Create and use three controlled drawings for optical adhesive keep-out zones, moving-mechanism adhesive keep-out zones, and electrical-connection coating keep-out zones; do not rely on operator judgment alone.
- Lock the UV curing wavelength, energy, distance, and irradiation angle; separately verify complete cure in shadowed areas.
- Complete all bonding and rework before conformal coating to avoid reducing the strength of subsequent bonds.

4 Recommended Validation Matrix and Acceptance Logic

The following is a recommended validation framework for project initiation, not guaranteed values in a product TDS. Final conditions should be confirmed against finished-product requirements, customer specifications, and the applicable material TDS.

Validation Item	Recommended Condition Range	Key Metrics
High Temperature and High Humidity	85°C / 85% RH, 500-1,000 h	Insulation resistance, corrosion, blistering, delamination, lens contamination, function, and optical-axis drift
Thermal Cycling	-40°C to 85°C, starting at 500 cycles	Adhesive-interface cracking, housing seams, FPC bending, MTF, and zero-position shift
UV and Xenon Arc Aging	UVA-340 or xenon arc, 500-1,000 h	Yellowing, gloss loss, chalking, hydrophobicity, adhesion, and color difference
Rain and Dust	Define according to the target IP rating	Water ingress at seams, leakage at buttons or bottom cover, lens fogging, and finished-product function
Vibration and Drop	Based on transportation and use conditions for the finished product	Camera-module loosening, abnormal gimbal noise, changes in optical axis or focus, and solder-joint failure
Chemical Media	Artificial sweat, sunscreen, alcohol, and cleaning agents	Coating tackiness, cracking, adhesion, appearance, and seal compatibility
Optical Cleanliness	Inspect after cure and after aging	Haze, transmittance, volatile contamination, sensor spots, and residual adhesive on the lens

Recommended Deliverables

- Material selection comparison: substrate, gap, cure method, rework requirements, reliability target, and candidate grade.
- Prototype DOE: adhesive volume or film thickness, UV energy, secondary cure, surface treatment, and performance changes before and after aging.
- Mass-production control plan: key parameters and traceability rules for incoming inspection, dispensing, curing, coating, appearance, optics, and finished-product sealing.

Solution Version V1.0 | September 22, 2026