PROSTECH
Specialty materials and manufacturing solutions

Camera Module Assembly

Total Solution

- TSE: Thuong Tran
- Customer: Sharp

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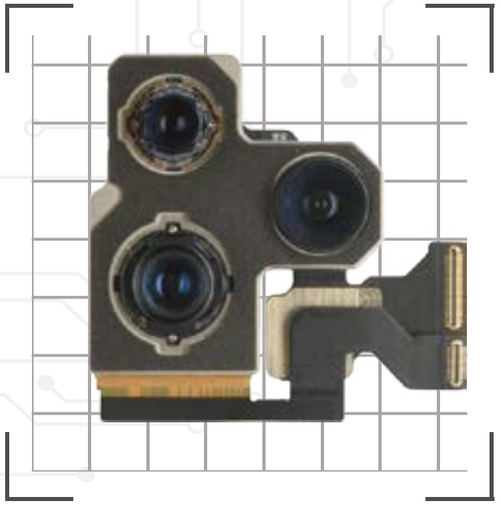

New challenges in Camera Module Manufacturing Industry

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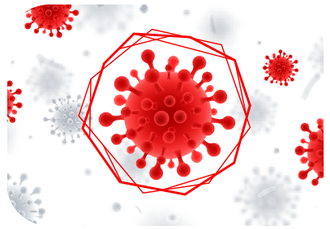
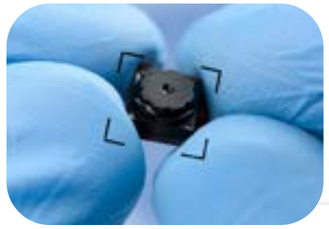


Unstable materials source and situation due to COVID-19.



Increasingly important role of **ACCURACY** during manufacturing process

Risk Management of Brand Owner make it possible to immediately switch OEM if their demand can not be met.

Selectively updating brand-new technology from big players: Apple, Samsung, ...

Sensor Shift

LiDAR

ProRaw + TrueDepth

Ultrawide

Helpful Information in Camera Module Market

Market Figure

- The COVID-19 pandemic combined with US-China trade tensions have marginally affected the continued growth in 2020.
- The global camera module revenue should reach US$59 billion in 2026.
- In 2026, the CCM revenue should be shared between actuator (11%), lens set (~14%), camera module assembly (32%), and CIS (about 43%).

Technology Trends

- CIS, the most critical component in the CCM module, is still shrinking the pixel size and increasing the resolution.
- Optic lens sets have introduced innovations, while OIS technology has moved from lens-shift to sensor-shift.
- Adhesive Technology is playing an indispensable role in CCM manufacturing process
- High cost of camera modules. Preventing fluid waste and rework is often a priority in manufacturing process.

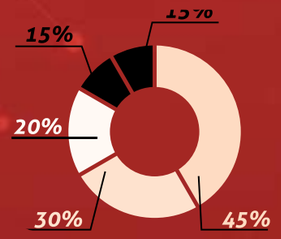
Supply Chain

- From sub-components to manufacturing, there are numerous players in the CCM ecosystem.
- Raw material partners with specific knowledge about technical issues are essential to compete in this market.

So Why PROSTECH for CAMERA MODULE?

Technically Expertising Partner

- Knowledgeable engineering team
- Experienced experts in camera module industries
- Partner's success is our success



Local Logistic Support

- Ensure the timely arrival of providing materials
- Risk sharing and management with our Customers
- Supporting closely for Procurement Process

OVERVIEW

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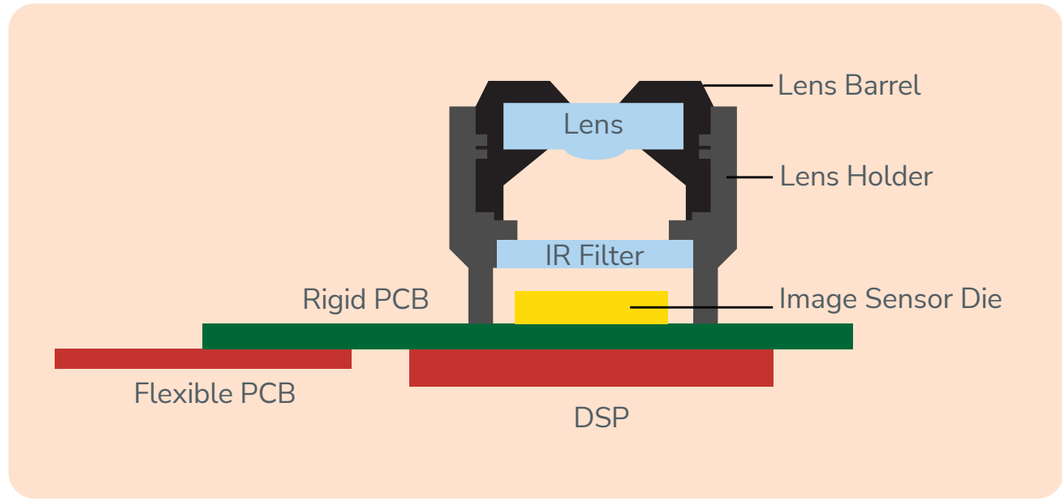
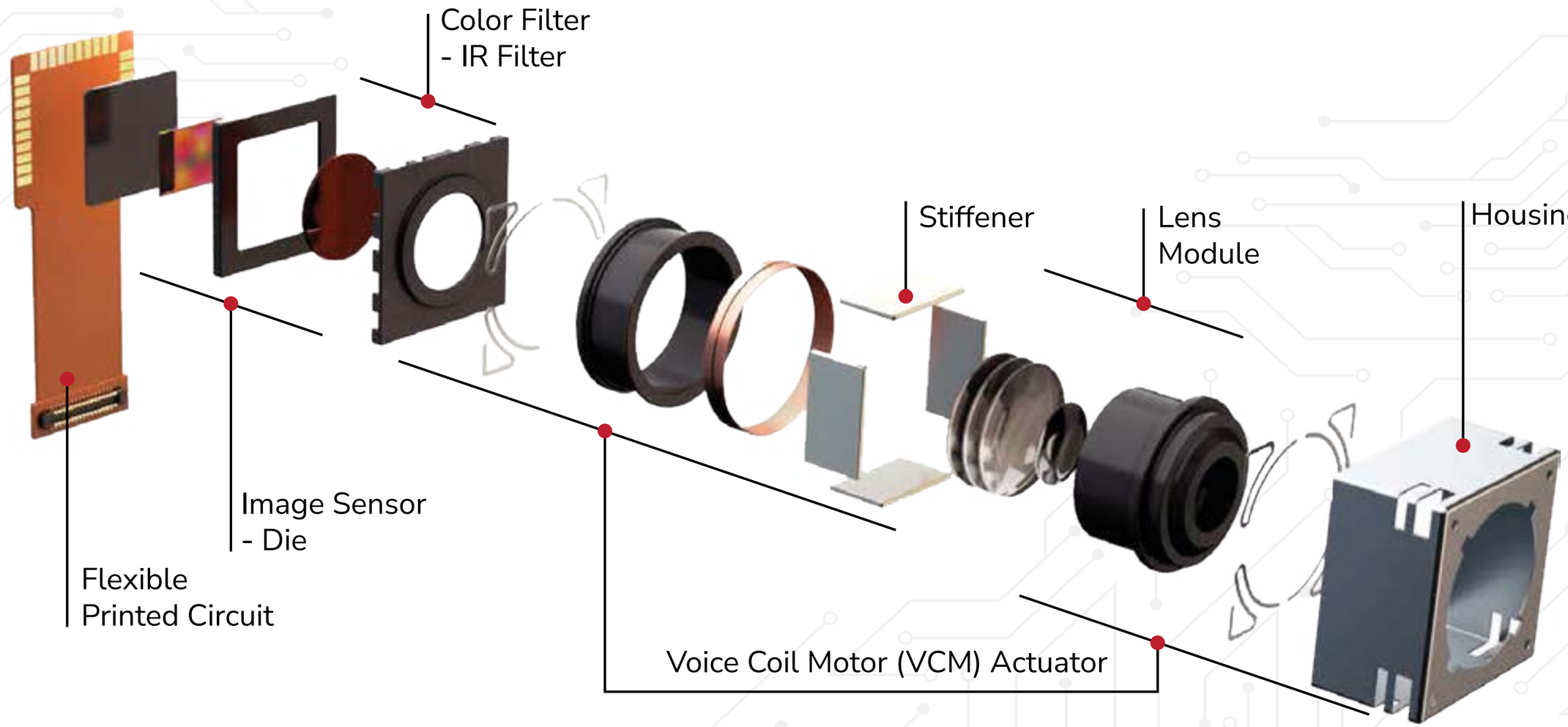
Knowing Camera Module Structure





Die Attach

VCM to sensor bonding

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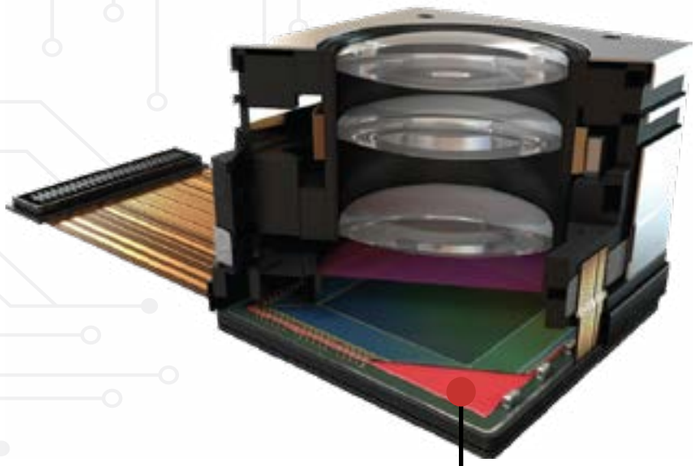
Die or called Image Sensor Die (CIS is currently the most widely used image sensor die) is bonded to the flexible PCB (substrate).

The FPBC is made from any number of materials, including FR4, ceramic or gold-plated PCBs.



Die Attach

Challenge

- pixel counts are increasing to enable greater image resolution, die sizes are getting larger, which can lead to increased warpage

Solution: Die attach adhesive

Controlling die warpage and stress with robust die attach materials is critical to highly reliable camera module operation.

- Low-temperature cure
- Low-stress die attach
- Low outgassing
- Faster cure (Improved throughput)
- Low halogen / RoHS-compliant
- CUSTOMIZABLE DEPENING ON CUSTOMER DEMAND

Electrically Conductive Adhesive

ECAs

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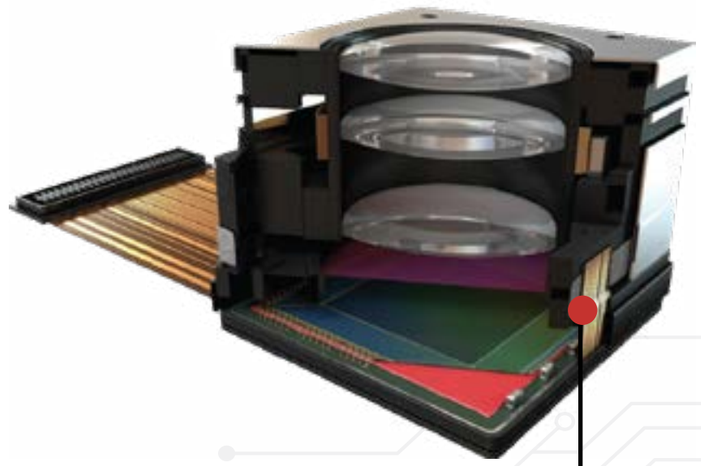
Challenge

- electrostatic discharge, further soldering process for stiffener attach.



Stiffener Attach

Solution: Alternative for solder - Electrically conductive adhesive

- also used in many other place of auto-focus camera (cost down thanks to large quality).
- enable electrical connection of the voice coil actuator to the spring
- facilitate voice coil motor terminal bonding and provide bottom-attach
- Side sealing stiffener for ground bonding and fixturing

Features

- Good electrical conductivity
- Fast curing
- High and stable adhesion
- Low-temperature cure
- Long pot life
- Low halogen / RoHS-compliant

House Bonding

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Challenge

- Bonding the lens holder to the FPCB substrate requires different adhesive characteristics depending on the type of camera module being assembled.
- Strickly Precisive Process

Solution: Dual Cure Adhesive (UV & Heat Cure)

Active Alignment Process

Watch Demo Video

IR Filter Bonding

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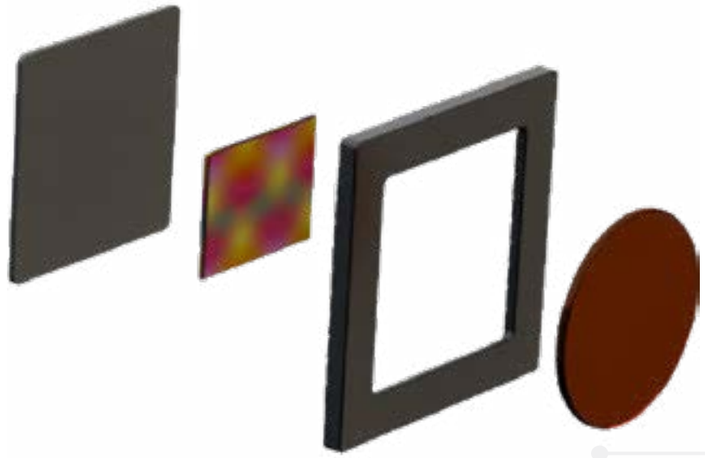


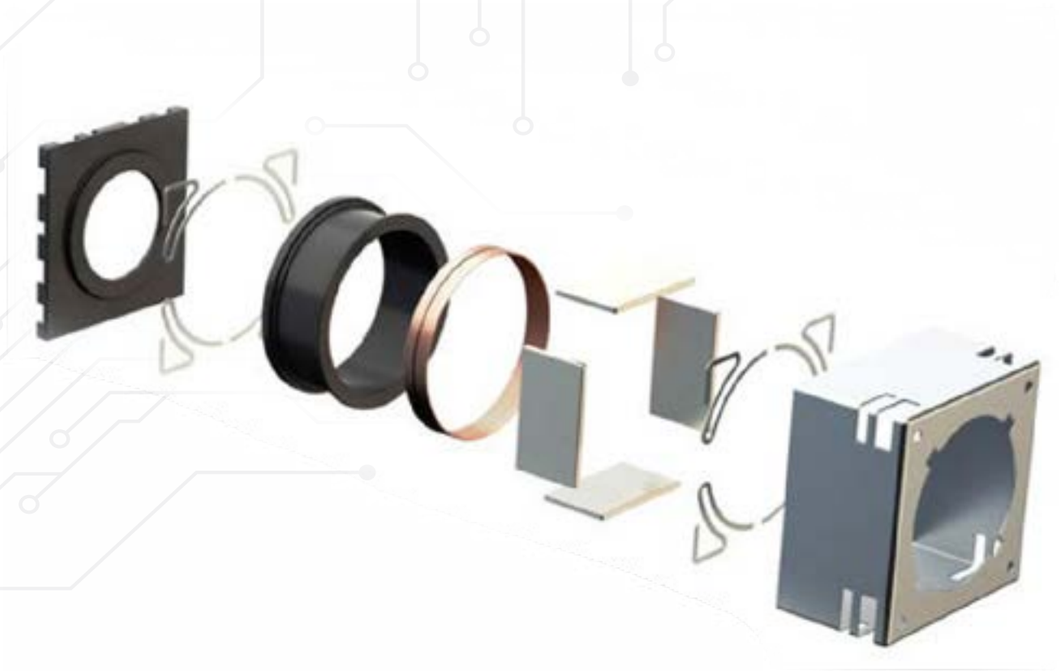
Challenge

- IR filter will be bonded with VCM or lens barrel
- Requires a strong, yet flexible, material to accommodate fast, high-adhesion curing with the ability to absorb stress.
- Though most substrates are ceramic, substrate materials can vary depending on manufacturing preferences and final product function.
- IR bonding material should be able to adhere to a variety of substrates.

Solution: UV Adhesive/ Dual Cure Adhesive

- Optimized modulus for drop test reliability
- Excellent adhesion to IR glass, many plastic materials and ceramics
- Optimized flow behavior and viscosity to allow tilt adjustment
- Very fasr curing for high production volumes
- Low-temperature curing at temperatures from 80C to avoid damage of optical components and coating

Voice Coil Motor (VCM) Assembly



Solution: Customized Adhesive Solution for variable applications

- Bonding OIS coil to OIS plate
- Bonding Stabilizer wire to OIS plate
- Bonding VCM spring to holder
- Bonding Magnet to yoke
- VCM spring bonding
- Bonding OIS plate to yoke
- Bonding VCM coil to holder
- Bonding front plate to yoke

Lens Bonding

Challenge

Lens locking adhesives also play a critical role in the function of the camera module.

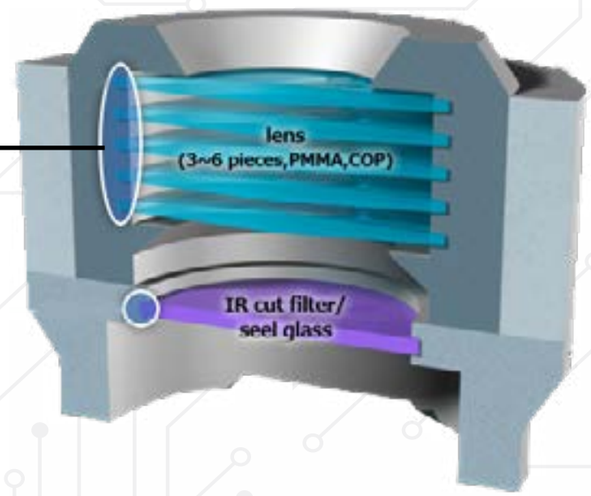
Effective bonding of the lens barrel to the lens holder requires specialized adhesives that accommodate low-temperature processing.

Lens Module:

- Lens to lens barrel bonding
- Lens barrel to VCM bonding

Solution: UV Adhesive

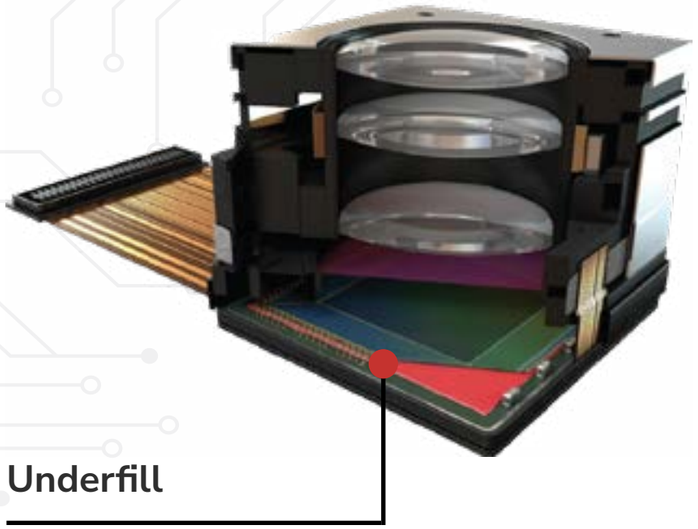
- UV cure handling strength
- A high thixotropic index to reduce liquid migration and unwanted contamination the ability to enhance load-bearing and shock-absorbing characteristics strength, reliability
- Performance required all without high-temperature processing

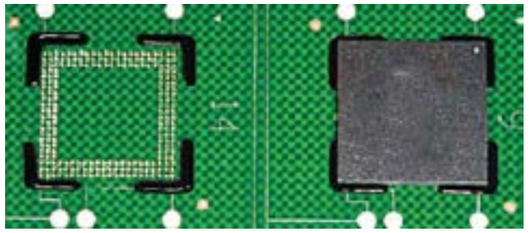


Underfill Adhesive

Challenge

- In the handheld device world with frequent vibration and impact, flip-chip image die must be safeguarded side fill underfill is the material of choice to ensure bump reinforcement during reliability testing and while in use.
- Image sensor is easily to be contaminant
- Impact affects the connection of the camera module to the PCB.





Solution: Underfill Adhesive

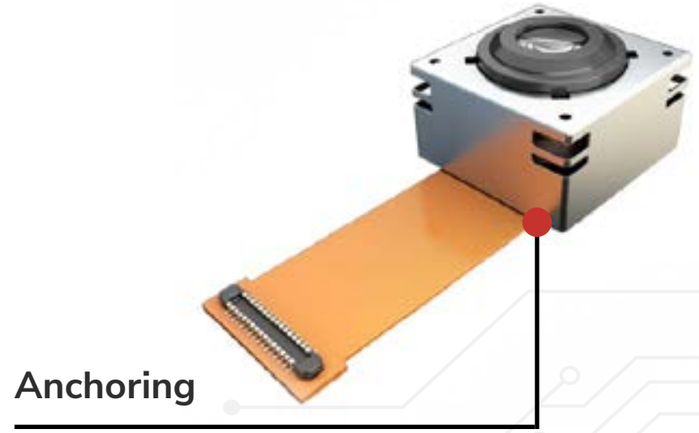
- ensure bump reinforcement during reliability testing and while in use.
- The capability of the underfill is critical, with controlled flow essential to material containment and to avoid image sensor contamination.
- Protect the connection between the camera module and PCB
- Controlled flow
- High thixotropic index
- Good bump coverage
- Good fillet capability
- Low-temperature cure
- Long pot life
- Low halogen / RoHS-compliant

FCB Anchoring and Reinforcement

Challenge

Camera modules tend to be connected to their final assemblies via flexible printed circuits (FPC).

- FPC grounding
- FPC anchoring
- Enclosure bonding



Solution: UV Adhesive

UV curing adhesives provide excellent adhesion to FPC substrates such as polyimide and polyester in addition to excellent peel resistance, flexibility and water resistance.

- UV/light fixation in less than 1s
- Heat curing mechanism to cure shadowed areas
- Low-temperature curing:
- Final curing at +60°C is possible
- Utilization of the process advantages of a heat-curing adhesive
- Excellent adhesion to plastic substrates, such as LCP

Precisive Dispensing System

Challenge

- Accuracy: As camera module technology advances, some key manufacturing challenges come into focus. One is the miniaturization of image sensor chips.
- Time Saving: one of the significant advantages of automation system
- Cost Saving: reduce exceed labor cost in long term
- Difficult to handle adhesive: Some materials can be so abrasive it would render a dispense valve obsolete within a shift or two. In this case

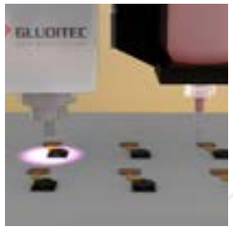
Solution: High Precision Dispensing System

- Accuracy: Dispense valves offer greater deposit accuracy and repeatability than dispensers, which make them the go-to solution when demanding deposit tolerances must be met.
- Precision valves also allow dispensing at angles and onto uneven surfaces since no contact with the workpiece is required.
- Time Saving: fast cycle rates at continuous dispensing speeds up to 1000Hz (cycles per second). They produce more units per hour for high-volume production requirements.
- Difficult to handle adhesive: fluid dispensers may be a better option since they dispense from a disposable syringe barrel and tip that are thrown away after each use.

UV Curing System

Wide range of types can be customimized:

- Spot-light UV Curing
- Flood light UV Curing
- Conveyor integrated System



with different power range of UV light bulb

Heat Curing System

Customized volume depending on customers' demand.