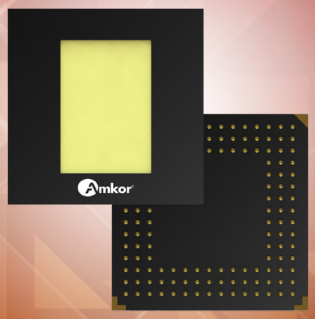
Optical Sensors

As technology advances in society, we will increasingly rely on developments in optical sensors to enhance reliable and fast sensing applications for the future.

Optical sensors convert various wavelengths into electrical signals for enhanced sensing applications. Ambient, infrared (IR) and ultraviolet (UV) light are some wave types that optical sensors measure to create applications for autonomous cars, in-display fingerprint scanners, secure facial recognition and many others. The combination of multiple sensors and light sources are crucial to creating a reliable and cohesive sensing system. The adoption of many optical sensors is growing as we rely more on technology to sense the outside world for us.



OPTICAL SENSOR PACKAGING CONSIDERATIONS

Amkor Technology is the world leader in Optical Sensor packaging technology and the world's largest outsource provider of sensor packages.

GENERAL REQUIREMENTS

- Cleanliness control
- Sensor tilt/shift management
- Optical specific materials

CONSUMER MARKET

- Package integration
- Cost effective solutions
- Miniaturization roadmap

AUTOMOTIVE MARKET

- More stringent device package protection
- IATF 16949 certification
- AEC-Q100 reliability

Optical Sensor Applications

Amkor Technology is the world's leading expert in packaging technologies which allows our standardized packages to support flexible applications.

MEMS/Sensor	Consumer Devices	Automotive	Health & Fitness	Home/ Industrial
Fingerprint	✓	✓		✓
LIDAR		✓		✓
CIS	✓	✓		✓
Ambient	✓	✓	✓	✓
3D Depth Sensing	✓	✓		✓
ToF/AR/VR	✓	✓		✓
IR	✓	✓	✓	✓
UV	✓	✓		✓
Spectrometer	✓		✓	
Gas		✓		✓
Thermopile				✓

Amkor's Value Proposition

- Optical sensor manufacturing
  - Standard platforms = faster development
  - Faster introduction of new products
- Lower development cost
- Amkor experience
  - Dedicated optical sensor team
  - Constantly updating the Optical Sensor Toolbox with investments in new equipment and materials and leveraging R&D developments
  - In-house test development capability

Amkor Technology®

Optical Sensor

Package and Board Level Reliability

Amkor offers a full range of reliability test capabilities in multiple locations.

Modeling and Simulation

Complete electrical, thermo-mechanical capabilities via Solder joint reliability, wire joint reliability, temperature distribution in package, air flow in enclosure, S-parameter, waveform.

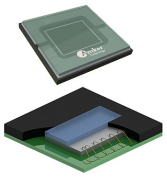
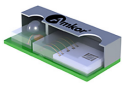
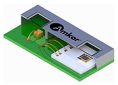
Amkor presently conducts sensor-related activities at the following strategic manufacturing locations

- China (ATC)
- Korea (ATK)
- Japan (J-Devices)
- Philippines (ATP)

Optical Assembly Toolbox

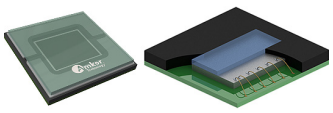
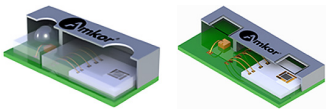
- Particle Control
- Precise Focal Tolerances
- Exposed and Cavity Expertise
- Transparent Adhesives
- CoB/CoW/CoC
- Fine Pitch Interconnect
- Multi-die Integration w/Passives
- Filter/Lens Holder Ready
- Optical Test Development
- Automotive Grade Materials and Assembly

Optical Sensor Packages

Open Tool Available (Sample Builds)	Lead Count	Body Width (mm)	Body Length (mm)	Body Thickness (mm)	Pkg Type	Glass/Lid Type	Die Qty	Interconnect	Factory
	80	11	12	2	Cavity BGA	Glass	Multi-die	WB	P3/K4
	8	9	10	0.6	Film Assist Mold	Glass	Multi-die	WB	C3/K4/JFO
	8	5	2	1	Molded Cavity LGA	Polymer	Multi-die	WB	K4
	22	6.8	4.9	1.35	Cavity LGA	Polymer with Glass/Filter	Multi-die	WB	K4

Specs will vary depending on customer requirements

Optical Sensor Package Standards

Package Type	Exposed Die Molded	Cavity Package
ChipArray® LGA/FPBGA		

Available substrate in laminate and ceramic

Visit amkor.com or email sales@amkor.com for more information.