#1 OSAT FOR AUTOMOTIVE PACKAGING AND TEST

Automotive Excellence
THE JOURNEY TOWARDS AUTONOMOUS ELECTRIC VEHICLES

Early autos, though marvels of engineering and design, were fairly simple compared to the vehicles we rely on today. Today’s vehicles not only require advanced driver assistance (ADAS) for safety but also electrification for fuel efficiency.

The complexity inherent in automotive semiconductors means that reliability is critical. To ensure the highest safety standards, automotive technology must be high-quality, reliable and proven.

As a result of continued innovation, today’s automobiles are able to leverage technology that enhances safety, connectivity and fuel efficiency.

AMKOR AEC-Q100 PACKAGE QUALIFICATIONS

<table>
<thead>
<tr>
<th>Grade 0</th>
<th>Grade 1</th>
<th>Grade 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>CABGA</td>
<td>FCBGA</td>
<td>fpfcCSP</td>
</tr>
<tr>
<td>SOIC</td>
<td>fcCSP</td>
<td>Stacked CSP</td>
</tr>
<tr>
<td>TSSOP</td>
<td>fcMSP</td>
<td></td>
</tr>
<tr>
<td>TQFP</td>
<td>MLF®</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PBGA</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SIP</td>
<td></td>
</tr>
<tr>
<td></td>
<td>WLFO</td>
<td></td>
</tr>
<tr>
<td></td>
<td>WLCSP</td>
<td></td>
</tr>
</tbody>
</table>

AMKOR: WE KNOW AUTOMOTIVE

Amkor has extensive experience with automotive process requirements shipping billions of units every year for automotive applications. Our packages meet or exceed automotive quality, reliability, burn-in and safe launch plan criteria. Amkor also has failure analysis, tri-temp test and statistical process capability in all factories. In addition to meeting automotive standards such as IATF16949, AIAG, VDA6.3, AEC-Q100, APQP, PPAP, etc., Amkor has automotive-trained personnel and designated production lines devoted to automotive products. Lastly, Amkor also offers Unit Die Level Traceability services for automotive customers.
INDUSTRY-LEADING TECHNOLOGIES

INFOTAINMENT & TELEMATICS
- USB Interface
- Navigation/GPS Systems
- Entertainment Center
- Instrumentation
- Head-Up Display
- Vehicle Connectivity (V2X)

CAMERA MODULE
- Backup Camera System
- Side Camera Alerts
- Traffic Monitor Systems

BODY ELECTRONICS
- Interior Lighting
- Power Windows
- Power Seats
- Sunroof
- Wiper System

MEMS & SENSORS
- Accelerometers/Gyros/Magnetometers
- Pressure Sensors (MAP/BAP/TPMS)
- Comfort Control Systems
- Auto Light Dimmer (LED Systems)
- Auto Wiper Controller
- Pedestrian Detection

SAFETY SYSTEMS
- Driver/Passenger Air Bag Systems
- Side Air Bag Systems
- ABS Braking Systems
- Entry Security/Alarm
- Image and Motion Systems
- Collision Warning
- Driver Drowsiness Monitor

ELECTRIFICATION SYSTEM
- Main or Traction Inverter
- On-board Charger
- Battery Management Systems
- 48V Mild Hybrid Systems

PACKAGING AND TEST SOLUTIONS FOR AUTOMOTIVE

SiP
- Size reduction through increased component density

MEMS and Sensors
- Sensor Fusion
- ECU and Satellite Sensors

Discrete
- Cu Clip
- Al Ribbon
- Al and Cu Wire

Wirebond
- Copper wirebond and enhanced reliability BOM

Flip Chip
- Copper Pillar
- Solder Bump
- WL CSP

Test
- Wafer Sort
- Final Package Test
- System-level Test
- Burn-in
AMKOR EXPERTISE DRIVES MULTIPLE AUTOMOTIVE USE CASES

**ADAS**

Advanced Driver Assistance Systems (ADAS) automate some aspects of the driving process, such as parking assistance, lane positioning and collision avoidance. ADAS systems use multiple sensors such as cameras, radar, LiDAR and ultrasonic sensors to improve the safety of the vehicle.

**Used In:**
- Automatic emergency braking
- Adaptive cruise control
- Collision warning
- Lane keep assist
- Parking assist

**Enabling Technologies:**
- CMOS image sensors
- LiDAR
- MCUs
- mmWave radar
- PMICs
- SoCs

**Infotainment & Telematics**

Vehicles utilize a variety of hardware and software products that help enhance driver and passenger experience as well as enable safety and connectivity features.

**Used In:**
- Audio
- Display (in-panel and head-up)
- Navigation systems
- Security
- Vehicle to everything (V2X)

**Enabling Technologies:**
- CAN transceivers
- LED drivers
- MCUs
- PMICs, RFICs
- Sensors
- SoCs
- Touch screen controllers

**Body Electronics**

Central body control systems manage all of the safety, power management and diagnostic systems on the vehicle.

**Used In:**
- Climate control
- Doors/seats
- Entry/exit
- Lighting

**Enabling Technologies:**
- LEDs and LED drivers
- NFC and connectors (CAN/LIN, Ethernet buses)
- PMICs

**Powertrain**

Powertrain refers to primary components, such as the engine, transmission and drive shafts, tasked with generating power and delivering it where needed for successful vehicle operation. Powertrain semiconductors are used in managing and reducing fuel consumption and emissions.

**Used In:**
- Battery management systems
- Electric motor control
- Engine computer
- Fuel injection
- Start-stop systems

**Enabling Technologies:**
- MCUs
- Sensors
- Transceivers & connectors (CAN/LIN, Ethernet buses)

**Chassis Electronics**

The chassis is the structural framework of a vehicle to which the body (and related components) are mounted. Chassis electronics are compact and robust to ensure the safety of drivers, passengers and cargo.

**Used In:**
- Anti-lock braking system
- Suspension
- Steering control
- Tire pressure monitoring

**Enabling Technologies:**
- A/D and D/A converters
- Inertial, pressure and other sensors
- Transceivers

**xEV**

xEV solutions refer to power components that help in power conversion from battery to electric drive motors, on-board charging of DC batteries and DC-DC conversion to 12V/24V systems.

**Used In:**
- Battery management systems
- On-board charger
- Traction inverter

**Enabling Technologies:**
- DC-DC step up/step down
- Power conversion

**Safety**

Vehicle sensor systems that alert drivers to hazardous conditions or potential harm are vital for driving safety.

**Used In:**
- Airbags
- Event data recorder
- TPMS

**Enabling Technologies:**
- Amplifiers
- Inertial Measurement Units
- MCUs
- Sensors

VISIT AMKOR TECHNOLOGY ONLINE FOR LOCATIONS AND TO VIEW CURRENT PRODUCT INFORMATION

www.amkor.com
Questions? Contact us: sales@amkor.com

With respect to the information in this document, Amkor makes no guarantee or warranty of its accuracy or that the use of such information will not infringe upon the intellectual rights of third parties. Amkor shall not be responsible for any loss or damage of whatever nature resulting from the use of, or reliance upon it and no patent or other license is implied hereby. This document does not in any way extend or modify Amkor’s warranty on any product beyond that set forth in its standard terms and conditions of sale. Amkor reserves the right to make changes in its product and specifications at any time and without notice. The Amkor name and logo are registered trademarks of Amkor Technology, Inc. All other trademarks mentioned are property of their respective companies. © 2020 Amkor Technology, Incorporated. All Rights Reserved. BR202F 01/20