LiDAR systems in autonomous vehicles

Ensuring safety requires the utilization of sensors capable of detecting water ingress and humidity

Faulty sealing can lead to water ingress and excessive humidity in the LiDAR enclosure over time. Such conditions can lead to fogging and corrosion of the electronics, consequently causing a system malfunction. Consistent monitoring of water ingress is therefore crucial for sustained system operation and to ensure the safety of the driver and passengers.

Target customers:

- LiDAR system manufacturers

Application challenges

1. LiDAR enclosure exposed to rain, snow, and moisture
2. Substantial fluctuations in operational temperature
3. Low voltage operation
4. Automotive-grade requirements

Sensirion's solutions

1. Ensuring prompt detection of water ingress to safe-guard critical electronics
2. SHT41A operating range: 0-100 %RH and -40-125 °C
3. The SHT41A has a VDD of 1.08V–5.5V
4. The SHT41A is AEC-Q100 qualified

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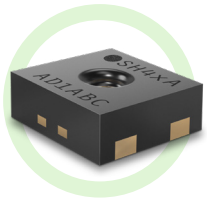
Sensirion sensor solution:



SHT41A humidity and temperature sensor (automotive grade):

Size (LxWxH): 1.5 × 1.5 × 0.5 mm³

Additional sensor features

- Ultra low power consumption (Avg. 19 µA)
- High accuracy over a wide operating range (± 2% RH, ± 0.2° C)
- Wettable flanks
- Multiple I²C addresses

Other applications

- Mass air flow module applications
- Battery management system
- ADAS/AD (radar, camera, etc.)
- Mobile and stationary charging
- Safety relevant applications

FAQs

- **Does Sensirion have previous experience from the automotive sector?**
  Yes, our presence in the automotive industry spans over two decades, during which we have catered to market leading Tier 1 and Tier 2 entities globally, offering various sensor solutions.
- **What is the qualification of the sensor for the automotive industry?**
  Our automotive graded version is AEC-Q100 qualified – and additional stress tests are performed.
- **What is the reason for using humidity and temperature sensors in LiDAR?**
  Consistent monitoring of water ingress and excessive humidity in the LiDAR enclosure ensures proactive steps to be taken in the event of a breach in the sealing, such as prompt repairs, preventing corrosion and device malfunction. For the OEMs, this safeguards the functionality of the ADAS/AD systems when the vehicle is in autonomous driving mode, with the driver no longer being liable in the unfortunate event of an accident.
- **Are the SHT41A applied for other ADAS/AD applications/systems?**
  Yes, we cater for a broad range of ADAS/AD applications with SHT41A in e.g. cameras, radars, steer/brake-by-wire, ECUs and CCUs.

Getting started

SHT41A evaluation kit

Useful documents

Datasheets, application notes handling instructions, samples codes, step files, certificates

Related sensors

- SHT40A humidity/temperature sensor (automotive grade)
- SHT40 humidity/temperature sensor
- SHT41 humidity/temperature sensor
- SHT45 humidity/temperature sensor

ADAS = Advanced Driver Assistance System
AD = Autonomous Driving
ECU = Electric Control Unit
CCU = Central Control Unit

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