Advanced driver assistance systems (ADAS): Front camera temperature sensors

Texas Instruments

Advanced driver assistance systems (ADAS) have been rapidly evolving and increase both driver and passenger safety. Front camera and surround view camera systems are critical vision-based systems that help drivers stay in their lanes, avoid collisions, keep pedestrians safe, and provide parking assistance.

Front cameras are usually mounted between the rearview mirror and the windshield. The heat dissipated from the on-chip heater, PMIC, and ADAS processors can greatly elevate the front camera board temperature.The risk of overheating is further increased by extensive exposure to direct sunlight. At elevated temperatures, the image quality from the CMOS image sensor will degrade and negatively impact critical vision-based systems. The PMIC, ADAS processor, and CMOS image sensor often have an internal die temperature sensor, but they are very inaccurate when trying to measure board temperature. The TMP112-Q1 is a small external temperature sensor that can help reduce the risk of overheating by monitoring board temperature with ±1°C accuracy.

Surround view camera systems consist of several cameras strategically placed around the car to create a 360° view of the car's surroundings. These surround view cameras typically do not have an onboard ADAS processor, but the board temperature must still be monitored maintain high image quality. The LMT87-Q1 is a cost-effective option that will monitor board temperature with ±2.7°C accuracy between -40°C and +150°C.

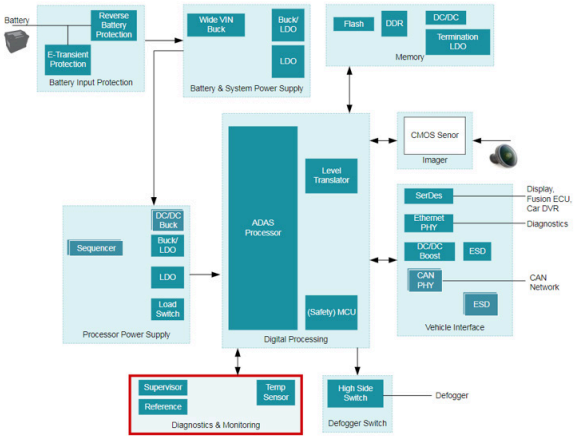

***Figure 1**. Front camera*

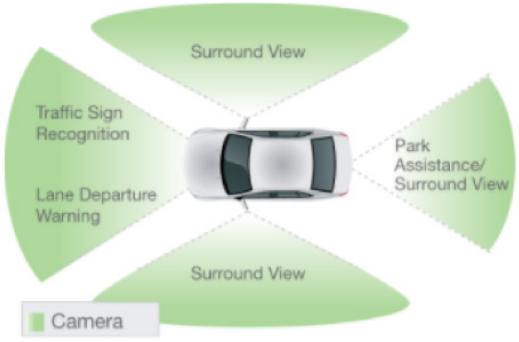

***Figure 2**. Surround view*

The TI automotive temperature sensor portfolio features both low cost and high accuracy temperature sensor products that simplify temperature measurement. Additionally, TI's integrated circuit solutions have the following advantages compared to thermistors:

- No device-level calibration required
- Highly linear temperature response
- Fewer external support components required

Part number	Interface	Accuracy (max)	Supply range	Package type	Package footprint
LMT87-Q1	Analog	2.7°C, -50°C to +150°C	2.7 V to 5.5 V	SC70	2.10 x 2.00 mm
TMP112-Q1	I^2C / SMBUS	1.0°C, -40°C to +125°C	1.4 V to 3.6 V	SOT-563	1.60 x 1.60 mm
TMP101-Q1	I^2C / SMBUS	2.0°C, -40°C to +125°C	2.7 V to 5.5 V	SOT-23	2.80 x 2.90 mm
TMP102-Q1	I^2C / SMBUS	3.0°C, -40°C to +125°C	1.4 V to 3.6 V	SOT-563	1.60 x 1.60 mm

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