

# **Technical Information**

## *Electronics – Air Conditioning Sensors*



*Ideas today for  
the cars of tomorrow*

Hella offers an extensive product range of sensors for vehicle air conditioning control. Temperatures inside the vehicle, in the air inlet and outlet channels, as well as directly at the evaporator are mapped by differently designed NTC measuring elements. In addition, the intensity and direction of sun insolation are measured to control the air conditioning system, in order to compensate the increased heat felt by the driver due to direct insolation. Alongside existing solutions, and those already used in series production, more advanced concepts are constantly being developed in order to meet future application requirements.

**Temperature sensors**

There is already a series of standardized sensor components available for temperature measurement in the different areas of application.

Open measuring systems are characterized by a quick response time. This is particularly relevant for measuring the evaporator temperature, which is used both to prevent the evaporator from icing up and to control compressor power. With the standardized structural concept, the sensor length, connector and NTC characteristic can be selected for the respective project according to the specific application involved.

**Technical parameters**



Evaporator temperature measurement

Measuring element		
NTC thermistor	$R(0\text{ }^\circ\text{C}) = 9\text{ k}\Omega$	$B(0/25) = 3,873\text{ K}$
Tolerances	$\Delta R/R(0\text{ }^\circ\text{C}) = \pm 1.5\%$	$\Delta B/B(0/25) = \pm 0.75\%$
Response time	approx. 8 sec	
Housing		
Connector	Tyco MQS	
Length	3–15 cm	



Air temperature measurement – air outlet channels

Measuring element		
SMD NTC thermistor	$R(25\text{ }^\circ\text{C}) = 10\text{ k}\Omega$	$B(25/85) = 3,500\text{ K}$
Tolerances	$\Delta R/R(0\text{ }^\circ\text{C}) = \pm 1.5\%$	$\Delta B/B(25/85) = \pm 1.0\%$
Response time	approx. 9 sec	
Housing		
Connector	VW – Grote & Hartmann	
Length	3–12 cm	

The air that flows through the mixing chamber and the air vents into the interior of the vehicle is characterized by high gradients between cold and warm air flows. Measurement at a given point is not suitable for obtaining a representative measurement of the inflowing air mass. For this application, Hella offers an integrated temperature sensor that determines the mean temperature of the inflowing air via a patented copper structure. A capacitor guarantees high electro-magnetic compatibility.

**Outlook**

**Wireless temperature measurement**

The new generation under development by Hella is a solution that will make wireless temperature measurement possible. The temperature is recorded locally using radio-capable sensors and is transmitted on the basis of RFID technology (transponder) to a centrally positioned evaluation unit.

The system offers the following advantages:

- Sensor positions can be freely chosen to a large extent.
- Only one evaluation unit is necessary for all transmitters.
- The integration of a complete measuring range is possible (e. g. engine compartment or vehicle interior).
- Low system costs due to low sensor costs.

**Sun sensors / ambient light sensors**

Hella's new generation of sun sensors stands out thanks to its innovative measuring and design technology. The use of optical ASICs that integrate both the opto-sensitive element and the respective electronic circuit minimizes expenditure for equipping and the fault sources linked with this. The mechanical centerpiece of the sensor is executed using **MID technology (Molded Interconnect Device)**. The standardized concept allows for a wide range of different configurations without additional development expenditure. Only the exterior design is adapted to respective customer requirements accordingly.

Depending on the number and positioning of the optical ASICs, sun sensors can be realized as mono, dual and dual with solid-angle recognition versions. "Ambient light sensor" functionality is possible by mounting an additional ASIC in the same device.

**Technical parameters**



**Structure of the sun sensor with standardized component part carrier using MID technology**

<b>Sun sensor</b>	
Measurable irradiance	0 W/m <sup>2</sup> to 800 W/m <sup>2</sup>
Spectral range	approx. 400 nm to 1000 nm
Absolute tolerance of the electrical output	±3 %
<b>Ambient light sensor</b>	
Measurable illuminance	0 Lux to 5,000 Lux
Spectral range	approx. 400 nm to 700 nm
Absolute tolerance of the electrical output	±3 %

This innovative structural concept allows Hella to develop and produce a sun sensor with an active output signal and low electrical tolerances at an optimum price/performance ratio. The design of the optical ASICs determines one current signal as the output signal, which means that only three connector pins are necessary, even for a dual sensor.

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