

Like a sniffer dog:

A gas sensor for air quality

BME690 - 4-in-1 environmental sensor with Al

A dog's nose has up to 220 million olfactory cells. Sniffer dogs have an incredible nose and can even sniff out forbidden substances. Inspired by the animal's supersensitive organ, the BME690 detects spoiled food or bad breath, for example. The BME690 is further developed on BME688, with increased robustness for use in environments with high condensation levels. It can measure gas, humidity, temperature and air pressure simultaneously and is the world's smallest 4-in-1 air quality sensor $(3.0 \times 3.0 \times 0.93 \text{ mm}^3)$.



Target applications



Wearables



Mobile & care devices



Smart home devices



Indoor air quality detection

Benefits



Standardizability

Alignment to WELL/RESET standards for indoor air quality



Breath analysis



Robustness

Usage in high condensation use cases



Power-efficient

Reduced power consumption - optimal for battery operated devices

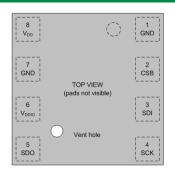


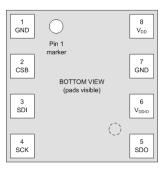
Food freshness detection

Technical features

BME690 technical data	
Package dimensions (typ.)	3.0 x 3.0 x 0.93 mm³ 8-Pin LGA with metal
Operating range	Pressure: 3001100 hPa Humidity 0100% Temperature: -4085°C
Supply voltage VDDIO Supply voltage VDD	1.2 3.6 V 1.71 3.6 V
Interface	I ² C (up to 3.4 MHz) and SPI (3 and 4 wire, up to 10 MHz)
Average typical current consumption	 2.2 μA at 1 Hz for h/T 3.1 μA at 1 Hz for p/T 4.2 μA at 1 Hz for h/p/T 50 μA at ULP mode for p/h/T/air quality 0.5 mA at LP mode for p/h/T/air quality 3.1 mA in standard gas scan mode
Gas sensor Sensor-to-sensor deviation (IAQ)	± 15% ± 15 IAQ
IAQ Operating modes	3 sec (LP) and 300 sec (ULP)
Major sensor outputs	Index for Air Quality (IAQ), bVOC- & CO2-equivalents (ppm)
Humidity sensor Response time Accuracy tolerance Hysteresis	1 s (τ0-63%) ± 3 % relative humidity ± 1 % relative humidity
Pressure sensor Relative Accuracy Absolute Accuracy Temperature coefficient offset	±0.05 hPa ± 0.5 hPa ±1.3 Pa/K (equiv. to ±10.9 cm at 1°C temperature change)
Temperature sensor	

Pin configuration





Pin	Name	Description
1	GND	Ground
2	CSB	Chip select
3	SDI	Serial data input
4	SCK	Serial clock input
5	SDO	Serial data output
6	VDDIO	Digital interface supply
7	GND	Ground
8	V_{DD}	Analog supply



Absolute accuracy

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±0.5 °C (0-65°C)