

Like a sniffer dog:

A gas sensor for air quality

BME690 – 4-in-1 environmental sensor with AI

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 super-sensitive 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 x 3.0 x 0.93 mm³).



Target applications



Wearables



Mobile & care
devices



Smart
home
devices



**Indoor air quality
detection**

Benefits



Standardizability

Alignment to WELL/RESET standards for indoor air quality



Robustness

Usage in high condensation use cases



Power-efficient

Reduced power consumption - optimal for battery operated devices



Breath analysis



**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: 300...1100 hPa Humidity 0...100% Temperature: -40...85°C |
| Supply voltage VDDIO | 1.2 ... 3.6 V |
| Supply voltage VDD | 1.71 ... 3.6 V |
| Interface | I²C (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 | 1 s (τ0-63%) |
| Accuracy tolerance | ± 3 % relative humidity |
| Hysteresis | ± 1 % relative humidity |
| Pressure sensor | |
| Relative Accuracy | ±0.05 hPa |
| Absolute Accuracy | ± 0.5 hPa |
| Temperature coefficient offset | ±1.3 Pa/K (equiv. to ±10.9 cm at 1°C temperature change) |
| Temperature sensor | |
| Absolute accuracy | ±0.5 °C (0-65°C) |

Pin configuration

TOP VIEW
(pads not visible)

Vent hole

Pin 1 marker

BOTTOM VIEW
(pads visible)

Pin 1 marker

| 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 | VDD | Analog supply |



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product details!

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