



We are the link
between the real and
the digital world.

XENSIV™ PAS CO₂ Measure what matters!

Infineon's virtual show 2020



Introducing a disruptive real CO₂ sensor based on the photoacoustic spectroscopy (PAS) principle

XENSIV™ PAS CO₂



Real CO₂ sensor ensuring high data quality



Small form factor in SMD package for easier assembly



Plug & Play for fast customer design-to-market

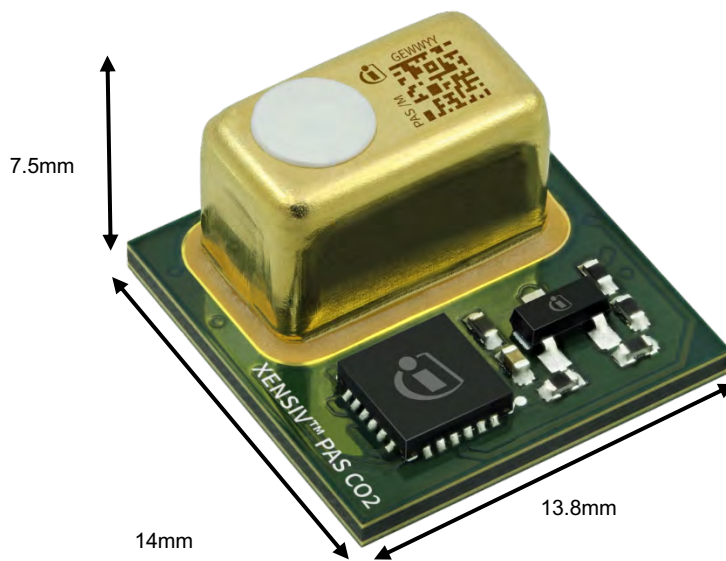


Infineon's quality and supply guarantee

Measure what matters! – XENSIV™ PAS CO₂

XENSIV™ PAS CO₂ Sensor – Introduction

Key building blocks of PAS CO₂ Sensor Module



Sensing Chamber:

Emitter Package (Filter & IR Emitter):



Optical Filter for
4.26um light wavelength



MEMS Heater
for light beam



Acoustic Detector: optimized
for low frequencies

XENSIV™ MEMS



MOSFET to drive
MEMS Heater
supplying
stable 12 V supply

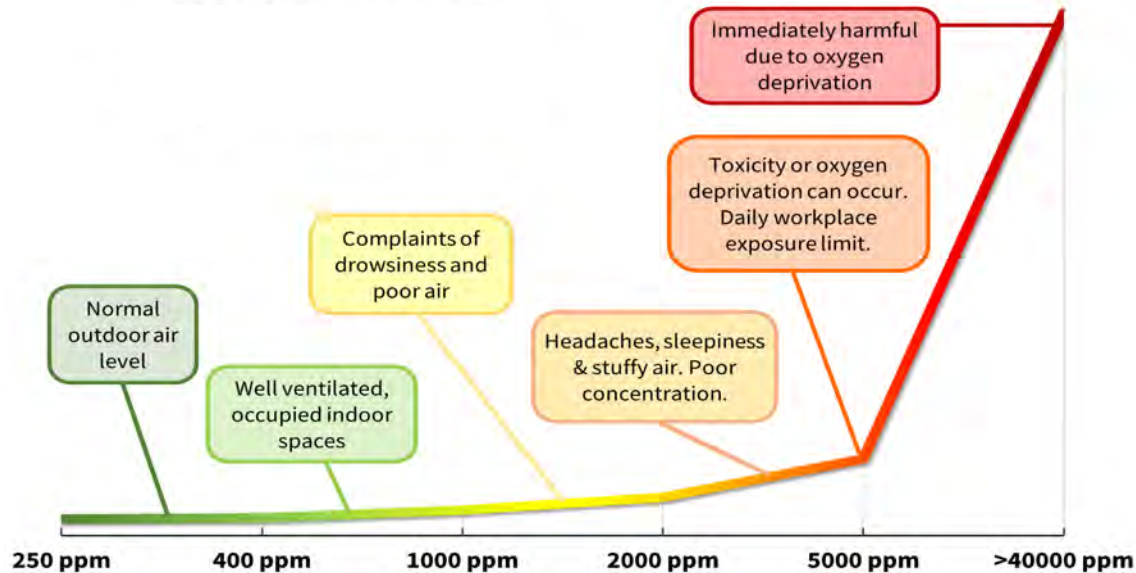


PAS CO₂ Microcontroller running
compensation firmware, delivering
CO₂ levels in PPM level and supporting I2C,
UART, PWM interfaces

CO₂ measurement matters, because CO₂ in indoor environments has health impact already at moderate levels



Health impact of CO₂ concentrations

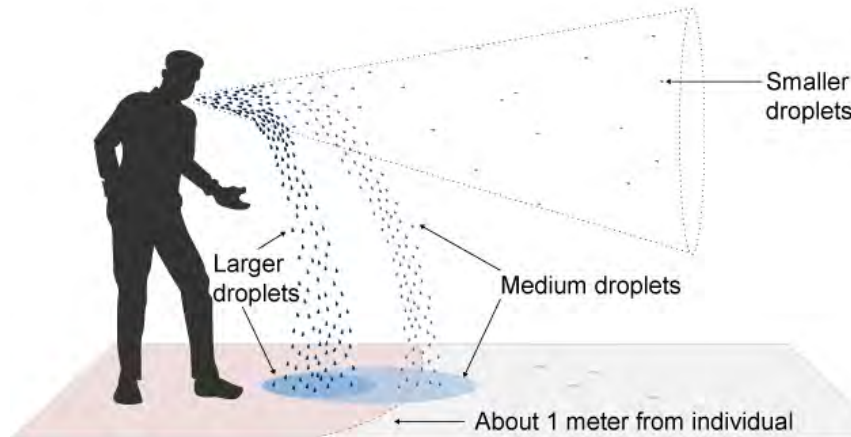


Source: Wisconsin Department of Health Services; Fisk et. al.

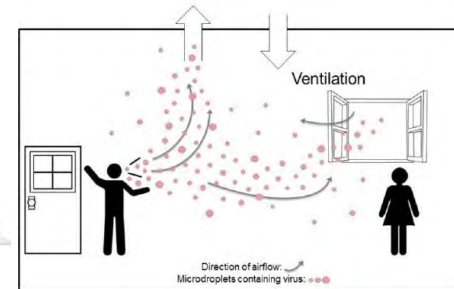
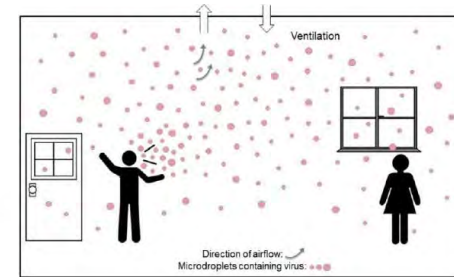
CO₂ measurement matters, because poor ventilation increases the risk of virus transmission in closed spaces



While droplets of all sizes increase risk of infection in poorly-ventilated spaces, smaller droplets (aerosols) can travel further distances



Source: Elsevier. Credit: Jianjian Wei, Yuguo Li. | GAO-20-545SP

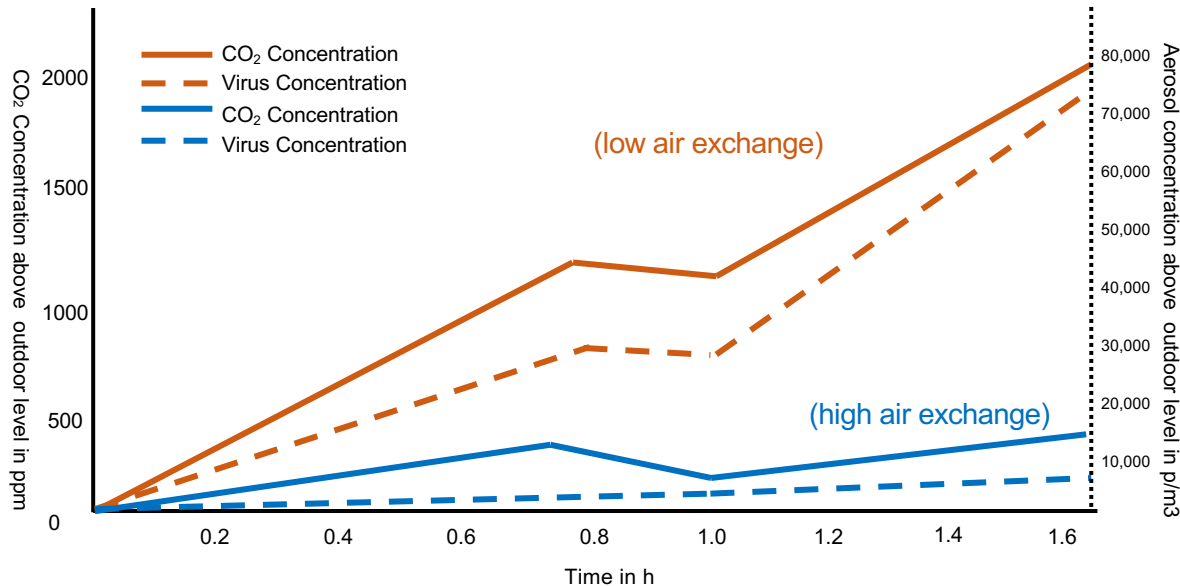


Source: <https://depositonce.tu-berlin.de/handle/11303/11478.2>

Monitoring CO₂ levels & improving ventilation can help reduce the risk of virus airborne transmission in closed environments



Correlation between CO₂ concentration and aerosol concentration



Source: TU Berlin

CO₂ measurement matters, because Demand Controlled Ventilation enables significant energy savings in buildings



Demand Controlled Ventilation reduces the overall energy consumption of heating, ventilation, and air conditioning (HVAC) by 20% on average



XENSIV™ PAS CO₂ is targeting many applications for air quality monitoring and energy saving...



Ventilation Control



Smart Appliances



Consumer Devices



In Cabin Air Quality



Smart Home



Smart City



Agriculture



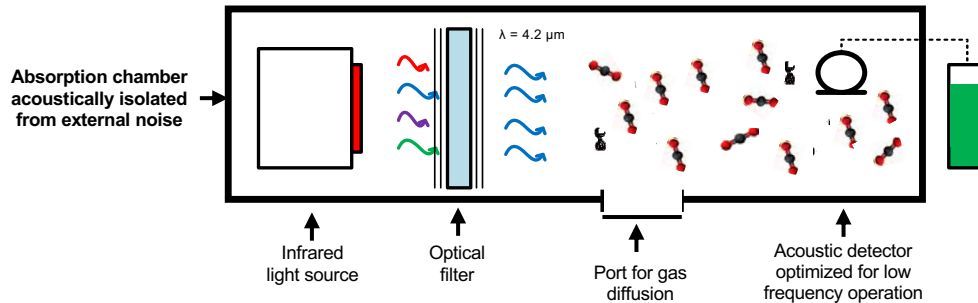
Others

Customer benefits

- Air quality awareness
- Higher comfort levels
- Healthier life
- Lower energy consumption
- Increased productivity
- Energy cost savings

...making use of photoacoustic spectroscopy to disrupt established NDIR technology for CO₂ detection

PAS – Photoacoustic Spectroscopy principle for CO₂ detection



Principle

- › Infrared emitter with blackbody radiation characteristic – periodically chopped
- › Optical filter tuned specifically to the CO₂ absorption wavelength ($\lambda = 4.2 \mu\text{m}$)
- › Low frequency acoustic detector acting as a pressure sensor
 - CO₂ molecules absorb light
 - Absorption causes a periodic local change in temperature and pressure
 - Change in pressure detected by acoustic detector

Detector

- › The absorption chamber is acoustically isolated from the external environment to provide accurate CO₂ sensing information
- › The detector is optimized for the low frequency range outside of the most important frequencies for speech and language



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