ALPS ALPINE GROUP

NEWS RELEASE

PR0421E

Alps Alpine Develops Ambient Air Sensor Module Useful for COVID-19 Prevention

Monitoring of the Surrounding Environment with High-Accuracy Sensing of CO_2, Temperature, Humidity and Other Parameters

Munich, Germany, June 28, 2021 – Alps Alpine has a developed an Ambient Air Sensor Module to perform high-accuracy sensing of carbon dioxide (CO_2) concentrations, temperature and humidity in the immediate surrounds. The module could be used in places like restaurants and entertainment facilities to monitor indoor ventilation, temperature and humidity indoors as part of COVID-19 prevention measures. Other sensors can be included, too, for detection of PM2.5, volatile organic compounds (VOCs) and alcohol. Alps Alpine will proceed with market research with a view to deployment of the module for diverse applications, such as energy-saving functionality in major appliances to help combat global warming and automotive features to stop drivers falling asleep at the wheel, contributing to safe mobility. Mass production is scheduled to begin in fiscal 2022.

Background to the Development

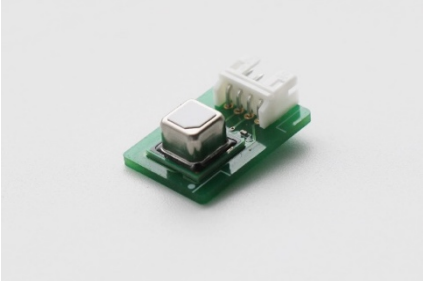
Despite progress made in the development of vaccines, there is still no end in sight for the global COVID-19 pandemic. Japan's Ministry of Health, Labour and Welfare has suggested three characteristics common among places where clusters of infections emerge – they are closed spaces with poor ventilation; they are crowded with many people; and people engage in conversation or speech there in close proximity (within arm's reach). Various strategies have been introduced to prevent infections. For example, businesses operating spaces where people gather in close quarters, such as restaurants and entertainment facilities, have limited entry, shortened hours, implemented hand sanitizing and temperature taking, and ensured ventilation.

In regard to ventilation, in particular, ensuring constant ventilation with windows or doors open the whole time can affect the

temperature and humidity inside, making it difficult to maintain a pleasant environment. The other option is routine ventilation, with priority placed on regulation of temperature and humidity. The problem here, though, is it is hard to tell whether the level of ventilation is actually effective in preventing virus transmission. This has heightened the need for high-accuracy CO_2 sensors – for determining optimal ventilation timing – and high-accuracy temperature and humidity sensors – to help restore comfortable conditions after the disruption caused by ventilation.

Alps Alpine has advantages in the sensor technology domain and has developed sensors to measure changes of a wide range of parameters besides CO_2, temperature and humidity, including air pressure, load and electric current. These sensors have been integrated into diverse products, such as automobiles, consumer electronics, smartphones and industrial equipment. Using this expertise, we have developed a Ambient Air Sensor Module that can contribute to COVID-19 prevention.

Outline of the Development



The Ambient Air Sensor Module was developed through our partnership with Sensirion Holding AG.* The module detects ambient CO_2 concentrations and temperature and humidity levels with high accuracy and will help to prevent COVID-19 transmission while maintaining a comfortable indoor environment.

Specifically examining the CO_2 sensor, many existing products employ non-dispersive infrared (NDIR) spectroscopy. The CO_2 concentration is determined from the change in the amount of infrared light absorbed by CO_2 molecules between an IR emitter and receiver. The large size of sensors is an issue given that detection accuracy corresponds to the distance the infrared light has to travel. Another concern with the NDIR method is the potential for the axis of the emitted infrared light to shift during end-product design or transportation, leading to detection errors.

The CO_2 sensor inside the Ambient Air Sensor Module employs photoacoustic spectroscopy (PAS) (see Fig.3). Here the CO_2 concentration is ascertained from the sound of CO_2 molecules captured by a microphone as they vibrate on contact with emitted infrared light.

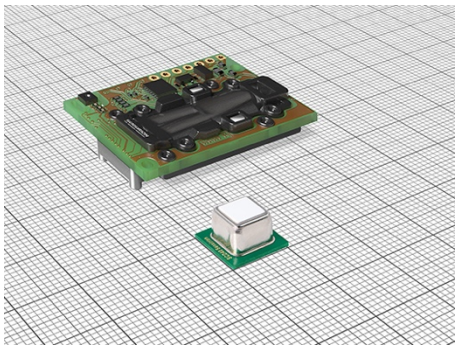
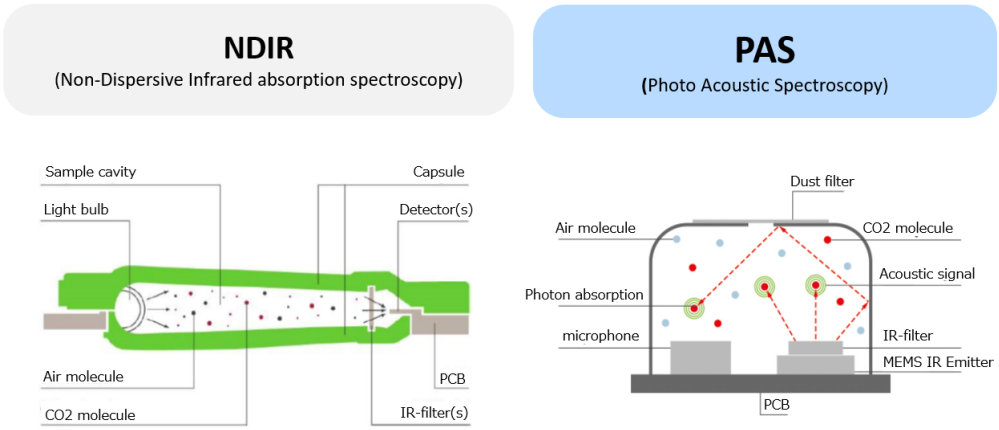


Fig. 2. Size comparison:
Sensirion NDIR and PAS sensors

Because detection accuracy is not dependent on the distance traveled by the infrared light, we managed to maintain high accuracy while realizing a compact sensor measuring 10.1 × 10.1 × 6.5mm. And because there is no longer a need to place a detector opposite the IR emitter, as is the case with an NDIR sensor, external impacts will not have an effect, enabling stable performance.

Expertise in module creation built up through many years of sensor development was also utilized to offer customers the option, depending on their requirements, of including VOC and alcohol sensors in addition to the CO_2 and temperature and humidity sensors. This lessens the burden for customers in end-product design and supports diverse needs for additional functions depending on the application.

Fig. 3



Outlook

Besides monitoring of ventilation in places like restaurants and entertainment facilities, we foresee effective use in a wide range of applications, such as energy-saving functionality in major appliances and automotive features to stop drivers falling asleep at the wheel. Market research will be conducted both in Japan and globally with aims to achieve sales in excess of 1 billion Yen during fiscal 2023 (the year ending March 31, 2024). Market deployment of the module will help fight both COVID-19 transmission and global warming and also contribute to safe mobility. To that end, Alps Alpine is innovating value for humans and society on a brighter planet.

* Press release, May 7, 2020: “Alps Alpine Enters into Strategic Partnership with Sensirion”
https://www.alpsalpine.com/e/news_release/2020/0507_01.html

Principal Applications

- Products related to the ambient air environment
- Major appliances
- Household equipment

Specifications

Model	Ambient Air Sensor Module
Dimensions (W×D×H)	24mm x 16mm x 7.8mm
Detection range	400 – 5,000 ppm
Detection accuracy – CO_2 sensor	± 40ppm + 5% of reading
Detection accuracy – temperature and humidity sensor	±9%RH / ±1.5°C (typ.)
Supply voltage	2.4 – 5.5V
Operating temperature range	-10°C to +60°C
Communication standard	Digital (I^2C)

Alps Alpine Co., Ltd. On January 1, 2019, Alps Electric Co., Ltd. and Alpine Electronics, Inc. integrated their businesses and started out afresh as Alps Alpine Co., Ltd with 42,289 employees. Alps Alpine will steadily bring about synergies by drawing on the two companies' advantages in core devices, system design and software development.
The new company will endeavour to create its own unique value for not only the automotive market, but also mobile devices and consumer electronics, as well as new sectors

such as energy, healthcare and industry. For more information please visit www.alpsalpine.com

Alps Alpine Europe GmbH, a subsidiary of Alps Alpine Co., Ltd., was established in 1979. Since 2013 the European Head Office has been located in Munich and as such co-ordinates the Sales, Marketing and Product Engineering activities of our offices in Dusseldorf, Stuttgart, Wolfsburg, Paris, Milton Keynes, Coventry, Gothenburg, Frolunda and Milan, as well as the production activities of our manufacturing site in Dortmund. Alps Electric Europe GmbH changed its name on 01.04.2020 to Alps Alpine Europe GmbH.

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