

## LOW-COST 8GHz UWB RADAR FOR OCCUPANCY AWARENESS IN SMART BUILDINGS

This exceptional radar transceiver is designed as an efficient, low-cost hardware solution for occupancy awareness in smart building solutions. The chip is capable to detect people at up to 15m distance, and suitable for sensor network deployment, e.g. in conjunction with Bluetooth LE. Amongst state-of-the-art smart building solutions, it stands out because of its low power consumption below 1mW and its compliance to international UWB standards. It is a breakthrough solution for the IoT and for building automation, to be used at the heart of low-cost battery-powered presence-detection applications in homes, offices, and on industrial sites.

### CHOOSE THE RIGHT SENSOR FOR YOUR APPLICATION

For continuous occupancy awareness and tracking in smart building applications, radar sensors may often be better suited than cameras. That is for example the case when privacy considerations are key, such as in hospital rooms, shops, or office spaces. Another use case are spaces which regularly have low lighting or even no lighting at all. Imec's radar transceiver has been especially designed to cope with such cases. In addition, it is optimized for long-term low-cost maintenance-free battery-powered operation.

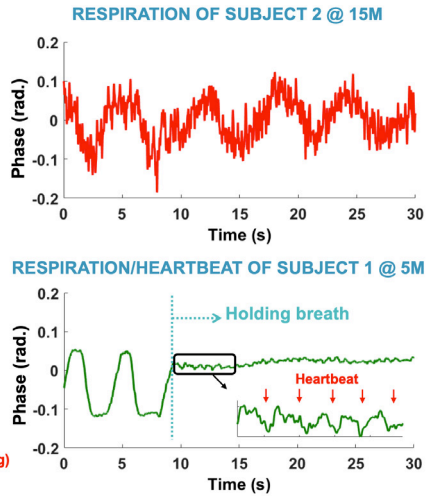
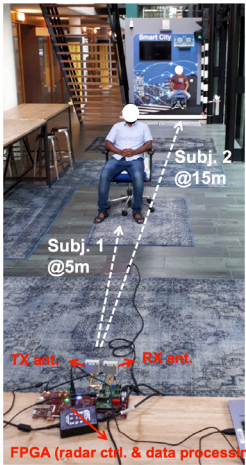
The radar sensor allows for occupancy awareness, i.e. person localization and occupancy tracking. However, the sensor is also able to detect micro-motions, including the chest's breathing patterns, or even micro-skin motions resulting from heartbeats. It operates in the UWB frequency range, and is ETSI and FCC compliant, making it suitable for indoor use. To minimize power consumption, it has been designed to operate in burst-chirp mode. And because of the low RF frequency compared to mm-wave radar solutions, it might even detect people's presence through typical office walls.

### IMEC IS AN EXCELLENCE CENTER FOR COGNITIVE RADAR

The 8GHz UWB radar is part of imec's radar IC program developing low-cost and low-power radar technologies based on the standard CMOS process. Other realizations include a 79GHz phase-modulated digital radar and a 140GHz radar with on-chip antennas. Together with imec's novel sensor fusion algorithms, imec opens up completely new opportunities for remote sensing in various fields such as automotive, security, and human-machine interaction.

Imec invites interested companies to come and discuss options to join our R&D of these world-class radar chips. This could be both in a bilateral agreement or as part of a collaborative R&D program. Joining our R&D will give you early access to world-class designs, and the unique opportunity to co-develop the technology with your applications.

## RADAR SETUP



| IMEC - ISSCC 2019                   |                          |
|-------------------------------------|--------------------------|
| Tech.                               | 40nm                     |
| Freq. (GHz)                         | 6.8-8.2GHz               |
| UWB indoor regulation<br>Compliance | FCC/ETSI/<br>KCC/ARIB    |
| UWB sideband PSD                    | <b>-85dBm/MHz</b>        |
| Modulation                          | Burst chirp              |
| VDD                                 | 1.1V                     |
| Mod. BW                             | 0.7-0.8GHz               |
| TX P <sub>OUT</sub>                 | 0dBm                     |
| Heartrate det. distance             | 5m                       |
| Breath det. distance                | <b>15m</b>               |
| Die area                            | <b>1.8mm<sup>2</sup></b> |
| Peak DC power                       | <b>19mW</b>              |
| DC power active det.                | <b>&lt;0.68mW</b>        |

8GHz transceiver characteristics

## KEY FEATURES

- 8GHz UWB transceiver, worldwide UWB compliant
- Breathing detection up to 15 meter
- Burst-chirp mode operation
- Power consumption < 1mW
- Sideband power spectral density -85dBm/MHz
- Standard 40nm CMOS (1.8mm<sup>2</sup> die)

## APPLICATION FIELDS

- Occupancy awareness and tracking
- Home and office automation
- Energy saving applications (lights, heating)
- Hospital and care centers (presence, tracking)
- Industrial machinery and facilities (security, perimeter guarding)

## OFFERING

Collaborative R&D for radar system chip design and application development, including artificial intelligence for sensor fusion.

## WHY TEAM UP WITH IMEC?

- 35 years of proven leadership in innovation
- World-class expertise from system analysis, IC design and demonstration to fab
- Dedicated, hands-on teams
- Flexible collaboration modes
- Large partnership network

CONTACT US  
[WWW.CONTACTIMEC.COM](http://WWW.CONTACTIMEC.COM)

DISCLAIMER - This information is provided 'AS IS', without any representation or warranty. Imec is a registered trademark for the activities of IMEC International (a legal entity set up under Belgian law as a "stichting van openbaar nut"), imec Belgium (IMEC vzw supported by the Flemish Government), imec the Netherlands (Stichting IMEC Nederland, part of Holst Centre which is supported by the Dutch Government), imec Taiwan (IMEC Taiwan Co.) and imec China (IMEC Microelectronics (Shanghai) Co. Ltd.) and imec India (Imec India Private Limited), imec Florida (IMEC USA nanoelectronics design center).