

**TECH OFFER**

## Ultra Low-Profile Millimeter Wave Radar with Lensed Antennae



### KEY INFORMATION

TECHNOLOGY CATEGORY:

Electronics - Radio Frequency

Electronics - Sensors & Instrumentation

Green Building - Sensor, Network, Building Control & Optimisation

Infocomm - Smart Cities

Infocomm - Internet of Things

TECHNOLOGY READINESS LEVEL (TRL): **TRL5**

COUNTRY: **SINGAPORE**

ID NUMBER: **TO174902**

### OVERVIEW

Reduction in size of the radar unit, and the consequent improvement in mounting options, is critical for increased adoption of millimeter wave radars. The technology presented here showcases an ultra low-profile radar module using a patented lensed antennae design.

Millimeter wave radars offer key benefits -

- - Less affected by darkness, heavy rain, blizzards and other environment factors.
- - Presence and movement monitoring of a person while preserving privacy.

- - Concealed installation as millimeter waves penetrate obstacles such as walls and glass.

The ultra low profile of the new radar allows easier installation and thus facilitates use in multiple new fields. Till now used mainly in automotive sector, the new compact radar can now be used for bikes, outdoor surveillance and disaster response.

## TECHNOLOGY FEATURES & SPECIFICATIONS

The salient features of this technology are –

- Combination of end-fire antennas with lens element to realize a highly efficient, small aperture, ultra-low profile millimetre wave module that can be installed anywhere.
- Industry's thinnest height of less than 12mm which is significantly lower profile than conventional systems. [80%-90%]
- Easy installation with possibility of using narrow resin housing which are transparent to millimetre waves.
- Ability to detect multiple obstacles in poor visibility conditions such as snowstorms, fog and dust.

The PoC of the system was done with the following specifications –

- Detection Range: Vehicle/Person at 90m/35m.
- FOV: Horizontal/Vertical of 120 deg/ 20 deg.
- Frame Rate: 25 fps
- Frequency: 76-81 GHZ with ability to select 60GHz based on application.

The specifications can be adjusted by changing the antennae design to suit different applications.

## POTENTIAL APPLICATIONS

The lower profile of this radar allows it to be placed in locations where it was not possible to install a millimeter wave radar in the past. This enable its use in multiple new scenarios:

- Construction equipment.
- Outdoor surveillance / Intruder Detection.
- Disaster relief operations when mounted on helmets, goggles, and other wearables.
- Vehicles including cars, motorbikes, and bicycles.
- Robotic applications including drones and cleaning robots.
- Traffic surveillance systems.
- Privacy protected areas like bathrooms, toilets, nursing homes and others.
- Assisted mobility devices like wheelchairs.
- Cabin monitoring for sensing vitals.

## MARKET TRENDS & OPPORTUNITIES

Millimetre wave radars are a key system for monitoring the surroundings in automotive ADAS (Advanced Driver Assistance System). The increased adoption has also been facilitated by reduction in cost of the radar IC and the use of single CMOS chip. The use of these radars in other sectors is expected to grow and for this, there is a need for ultra-low profile radars which are easier to install.

## UNIQUE VALUE PROPOSITION

The ultra low profile of this radar, achieved with the unique antennae technology, allows a lot of flexibility in the choice of installation location. It also opens up more use cases for the millimetre wave radar.

When installed in a corner of the room or in a narrow space inside the wall , it allows privacy friendly monitoring of the condition of people. It can allow rescuers to sense and continue their operations in the dark and through smoke when installed on the helmets or goggles. In the healthcare sector, the ultra-low profile radar can be used for occupant monitoring and in acquiring contactless vital signs when installed inside the seat, under the rear-view mirror or the in the ceiling panel of the vehicle.