# 60GHz Radio-wave ranging sensor 3D Detection model SC1240 Series

SC1240AR3 is an ultra low power and intelligent CMOS 60GHz radar sensor device available for 3D (including 1D,2D) sensing without the need for an external MCU. The sensor contains a high performance signal processing unit and detects existing objects and 3D position data of moving objects within a specified area.
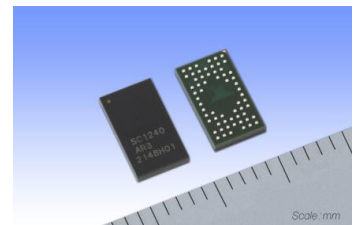
SC1240AR3

■ Features

- **Suited for 1D to 3D sensing**
  - 1 Tx and 2 x 2 Rx antennas detect azimuth / elevation angle, velocity and distance
  - Wide bandwidth (6.8GHz max.) and high-accuracy linear chirp FMCW radar
  - Sensing area example: up to 0.5m[*1] with < 1cm[*2] resolution (in case of palm gesture)
    up to 15m[*1] with < 12.4cm[*2] resolution (in case of human detection)
- **Highly integrated device enabling easy hardware design**
  - Integrating signal processing unit(Distance/Angle/Presence detection), antennas, radio, ADC, FIFO & SPI interface, and Self-Boot function
  - Enable to use reasonable PCB, less BOM and easy assembly
  - Small package (4.0mm x 7.0mm, BGA package)
- **Low power consumption**
  - 4-Level operation states (Shutdown, Deep Sleep, Light Sleep, Sensing)
  - Intelligent power control sequencer managing flexible duty cycle operation

*1: Depending on sensor configuration and environmental conditions, in front direction
*2: To be changed according to further study

■ Applications
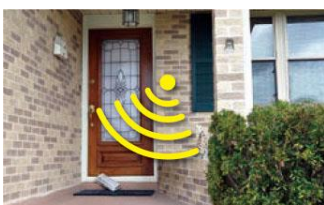
Detection of people at the front door (use in a doorbell)

Detection of people in rooms such as the living room(use in a smart thermostat)

Detection of people to switch the liquid crystal display of smart home appliances on and off

Gesture operations

■ Antenna Configuration

Tx, Rx4, Rx3, Rx1, Rx2

4mm, 7mm

■ Evaluation Kit

Sensor Board — PIN Socket — Ryle
Adaptor Board — USB

Sensor Board
Adaptor Board
MCU Board

Ryle — PIN Header
LED(option) — USB

※MCU Board
NUCLEO-L432KC

■ Block Diagram

■ Example of use case (ROM mode)

No MCU is required for sensing.

SC1240

EEPROM

Power On Reset

Loading Code

Sensing and Presence Detection

Continuous high output of DETOUT signal with moving objects (people).

3D sensing response area

■ Specifications

Radar mode	FMCW
Power supply	1.8V (core) / 1.8V – 3.3V (I/O)
Power consumption	0.7mW (Operation average*3) / 250mW (Operation maximum)
Transmitter	Frequency : 57.1 – 63.9 GHz (bandwidth : up to 6.8GHz) EIRP : +3.0dBm
Receiver	Noise Figure : 12dB
Digital block	Radar signal processing(3D location detection, Presence detection), Self-boot ROM
Temperature	-40 to 85 ℃
Sensor output	Distance detection result, 3D position(X,Y,Z) detection result, Presence detection result

*3: In case of 0.1% duty cycle operation

■ Evaluation kit

- SC1240AR3 evaluation kit hardware with USB cable
- Sensor driver/ library and 3D location sensing evaluation software (GUI)
- Related documents
  - Evaluation software (GUI) operation manual
  - Control API specification
  - Application note (Sample C source for API)