

Application brief

Presence detection solution based on XENSIV™ 60 GHz BGT60TR13C radar

Motion sensing is a standard feature present in many devices. Today's devices become smarter knowing if the user is around or not. Traditionally motion sensors have been designed using PIR (Passive Infrared Sensing). As simple as PIR is, there are limitations in performance. For example, PIR sensors cannot detect micro motions. In addition, they require a lens whereas radar sensor can be covered and disguised behind plastic enclosures.

What if there was a solution that detects the tiniest movements and doesn't require an opening in the product housing?

Infineon's radar presence detection solution enables the detection of human presence within a configured range. Enabled by our XENSIV™ 60 GHz radar sensor with its sophisticated presence detection algorithms, this solution provides high accuracy in detecting both micro and macro motions.

Key features

- > A tested and qualified embedded solution for presence detection applications
- > Min MCU requirement
Arm® Cortex®-M4F (120 MHz speed, 256 KB RAM, 1024 KB ROM)
- > FCC certifiable reference design available
- > Macro motion detection range for human movement 5 m (tested and qualified) and up to 10 m (not tested and not qualified)
- > Detection of micro-motion (such as breathing or typing) up to 4m
- > Field of view
 - Azimuth: $\pm 45^\circ$
 - Elevation: $\pm 40^\circ$

Key applications

- > Ready to use radar solution for presence detection with adjustable detection range
- > Immune to environmental factors such as temperature, wind, and dust/debris
- > A fully tested and verified solution for presence detection for home, office and commercial buildings



Motion sensing with a PIR sensor requires large/macro motions



Presence detection with Infineon's XENSIV™ 60 GHz supports small/micro movements for reliable detection

Presence detection solution

based on XENSIV™ 60 GHz BGT60TR13C radar

Title	Description
Living object size	<ul style="list-style-type: none"> › Detect living targets with a minimum height of 1 meter (no restriction on the maximum height)
Field of view and radar orientation	<ul style="list-style-type: none"> › Azimuth: $\pm 45^\circ$, Elevation: $\pm 40^\circ$
Movement detection range	<ul style="list-style-type: none"> › Max. supported living object speed (m/sec): 2 m/sec › Macro-motion range (regular human movements): min. 0.5 m, max. ≤ 5 m (tested and qualified) and up to 10m (not tested and not qualified) › Micro-motion¹⁾ detection range: min. 0.5 m, max. ≤ 4 m › Static objects (non-living) are not detected
Detection timings	<ul style="list-style-type: none"> › Able to detect presence and absence (≤ 1 s for presence, ≤ 2 s for absence) when at least one human being is present › Declaration of presence and absence states is configurable (time standpoint) along with the ability to introduce constant delays (1 s to 30 s) before absence state is activated
Configurability	<ul style="list-style-type: none"> › Configuration option for the end user to change important parameters (e.g. detection range, threshold etc.)
Target platform	<ul style="list-style-type: none"> › Minimum MCU requirement (based on Arm® Cortex®-M4F, 120 MHz speed, 256 KB RAM, 1024 KB ROM) for presence detection using XENSIV™ BGT60TR13C radar
Bandwidth	<ul style="list-style-type: none"> › < 500 MHz
Certifications	<ul style="list-style-type: none"> › Presence solution is certifiable for FCC certifications. Test Report available on request.
Field upgrade	<ul style="list-style-type: none"> › Ability to upgrade the radar SoM board firmware in the field via USB or SWD interface
Target applications	<ul style="list-style-type: none"> › Home › Office › Commercial buildings

1) Micro-motions

Stationary human (normally breathing and blinking eyes) in sitting and standing positions (in Line of Sight) with no active movement for at least two minutes – working on laptop/keyboard, reading book etc.



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