60 GHz AiP Gesture & Presence Radar Sensor Module, Pre-flashed

57–64 GHz FMCW radar with antenna-in-package, 2T2R, 42 × 8 mm

Development board. Pre-flashed sensor: it ships with the application you choose and is not reflashed in the field (its flash chip is too small for a programmer clip). Two options: sensor only, with its connection lead and a 3.3 V LDO module; or with a USB-TTL adapter that has an on-board 3.3 V LDO. Both include the configuration GUI for that application and UART notes. Source code is not included; for custom firmware or volume, use the B2B form at kymopsis.com/b2b/.

Overview

A narrow 60 GHz radar module with the antennas built into the chip package (two transmit, two receive). The strip format fits behind a bezel, lamp cover, or appliance panel. The board ships pre-flashed with the application you choose: gesture recognition (six hand gestures), or presence sensing in a ceiling-mount or wall-mount version.

Applications

- Touch-free control of range hoods, hobs, microwaves, dishwashers
- Mirror lights, ceiling lamps, bathroom heaters, smart toilets
- Car-cabin screens, sunroofs, and shades
- TVs, projectors, kiosks, meeting panels
- Presence and occupancy sensing, ceiling or wall mount (development use)
- Presence and fall events, ceiling mount; breathing and heart rate, one person (research use; see Other applications)

Specifications

Frequency	57–64 GHz, FMCW
Antenna	Antenna-in-package, 2T2R, 4 dBi typical
Transmit power	12 dBm typical
Field of view	±60° horizontal, ±60° elevation
Gestures	Swipe left, right, up, down; hand toward the board; hand away from the board
Gesture range	0–1 m from the antenna (gesture firmware)
Gesture accuracy	≥ 95 % (maker's figure)
Interfaces	UART0, 3.3 V TTL, 115200 baud 8N1 (gesture output); GPIO output
Supply	3.3 V typical; module current 600 mA max; average power ≤ 2 W. The maker's gesture guide asks for a 3.3 V source (USB-serial adapter or external supply) that delivers at least 100 mA; a source rated 600 mA or more covers the stated maximum
Operating temperature	−20 °C to 85 °C
Storage temperature	−40 °C to 85 °C

Pre-flashed firmware	Gesture recognition; presence, ceiling or wall mount; presence and fall events, ceiling mount; or breathing and heart rate (chosen at order)

Values are typical figures stated by the module maker, not a Kymopsis lab report. Performance depends on mounting, enclosure, target, and scene.

Pin functions

1 `3.3V`	3.3 V supply
2 `TX2`	GPIO / UART2 TX
3 `RX0`	UART0 RX
4 `TX0`	UART0 TX
5 `RST`	Reset, active low, internal pull-up
6 `GND`	Ground
7 `3.3V`	3.3 V supply
8 `SWDIO`	SWD debug / flashing data
9 `SWCLK`	SWD debug / flashing clock
10 `GND`	Ground

Mechanical

Size	42 × 8 × 6.73 mm including connector (±0.15 mm outline; other dimensions ±0.2 mm)
Antenna area	10 × 5.3 mm on the top side
Board thickness	1.6 mm
Debug / flash holes	4 × Ø0.7 mm plated through-holes (pins 7–10)
Connector	6-pin, 1.25 mm pitch (pins 1–6); lead included

Gesture firmware: quick start

- Preliminary: the gesture firmware sections below are based on the maker's preliminary user guide and may change when the maker releases its final version.
- You need: the board, its 6-wire lead (1.25 mm connector on the board end), a USB-to-TTL serial adapter with a 3.3 V output that can deliver at least 100 mA (or an external 3.3 V supply), and a bracket or clamp that lets you tilt the board.
- Wire 3.3V to 3.3V, GND to GND, the board's TX0 (pin 4) to the adapter's RX and the board's RX0 (pin 3) to the adapter's TX. With an external supply, connect its ground to the adapter's ground.
- Mount the board on a wall or a device front, 0.8–1.5 m above the floor, antenna facing the user. Gestures are read 0–1 m from the antenna, inside a 120° × 120° cone.
- Make each gesture with an open hand across the antenna area: left, right, up, down, toward the board, or away from it. The board sends one UART message per recognised gesture.
- Open the configuration GUI, choose Gesture, pick the adapter's COM port (Windows Device Manager lists it), set 115200 baud and click Connect. Get reads the firmware version; the Gesture view shows each recognised gesture and the System Log shows the raw messages.

Boot mode

BOOT1 0, BOOT0 1	Run from internal flash (default, normal operation)
BOOT1 0, BOOT0 0	Boot from UART1 (firmware loading)

BOOT1 1, BOOT0 1	Debug (SWD)
BOOT1 1, BOOT0 0	Not supported on this module

UART protocol · gesture firmware

Port: UART0 (TX0 pin 4, RX0 pin 3), 3.3 V TTL, 115200 baud, 8 data bits, no parity, 1 stop bit. The board sends a gesture message on its own each time it recognises a gesture; no request is needed.

Gesture message frame (TYPE 0x1000)

Field	Size	Content
SOF	1 byte	Start of frame
ID	2 bytes	Frame ID
LEN	2 bytes	Length of DATA in bytes (2 for this message)
TYPE	2 bytes	Message type, 0x1000 = gesture result
HEAD_CKSUM	1 byte	Checksum over SOF, ID, LEN and TYPE
DATA	2 bytes	gesture_dir, unsigned 16-bit gesture code (table below)
DATA_CKSUM	1 byte	Checksum over DATA

Gesture codes (gesture_dir)

0	Swipe up
1	Swipe down
2	Swipe left
3	Swipe right
4	Hand moves toward the board
5	Hand moves away from the board

Decoding notes

- The field layout and the gesture codes above are the maker's. The maker does not state the SOF value, the checksum rule or the byte order.
- Kymopsis's open-source decoder for the same maker's 60 GHz radar firmware (github.com/Kymopsis/radar-desk-buddy, radar_protocol.h) reads these frames with SOF = 0x01, ID, LEN and TYPE big-endian, each checksum = bitwise NOT of the XOR of the bytes it covers, and DATA values little-endian. Log one raw message in the GUI's System Log or a serial terminal to confirm this on your unit before you rely on it.
- The presence firmware builds use a different output; their messages are not covered here.

Other applications

- Besides gesture and presence, the module can be ordered pre-flashed with a presence and fall-event build (ceiling mount, one person in a small room) or a breathing and heart-rate build (one person, board above the chest). Both are experimental research builds, not medical devices.
- Every figure on this sheet comes from the gesture and presence documentation for this module. The fall-event and breathing builds have no module-level specification yet, so no range, accuracy or timing is stated for them.

Integration notes

- Keep the antenna area clear of metal; use a thin plastic cover with low loss at 60 GHz.
- Gesture decisions can be extended with your own rules on the host side.
- Presence firmware: use the ceiling-mount build with the antenna facing down over the area, and the wall-mount build with the antenna facing into the room. Wall-mount presence range is up to about 6 m per the chip-platform supplier data; actual range depends on mounting height and the room.

Not a medical device. Breathing, heart-rate, sleep, and fall-related outputs are experimental signals for evaluation and research. This board is not a medical device, is not cleared or approved by any health authority, and must not be used to diagnose, monitor, or treat any condition, or as a safety or emergency alarm.

Regulatory status. This board is sold as a development kit for engineers, developers, and integrators. It is not FCC certified, and this datasheet does not claim CE or any other certification. It is not an authorized transmitter for unrestricted installation or operation. A finished product that uses it needs its own equipment authorization; Kymopsis can scope that work through its B2B program but does not issue grants.

Kymopsis · kymopsis.com · support@kymopsis.com. Specifications may change without notice.