# BHI260AP

## Self-learning AI smart sensor with integrated IMU

### GENERAL DESCRIPTION

BHI260AP is a smart sensor that includes a wide variety of software functionalities, a 32-bit customer programmable microcontroller, and a 6-axis IMU all in one package.

The BHI260AP provides an ideal all-in-one solution for always-on sensor applications such as fitness tracking, navigation, machine learning analytics and orientation estimation.

BHI260AP supports the following platforms and solutions:

- Self-learning AI software platform for fitness tracking
- Swim analytics
- Pedestrian dead reckoning
- Relative and absolute orientation

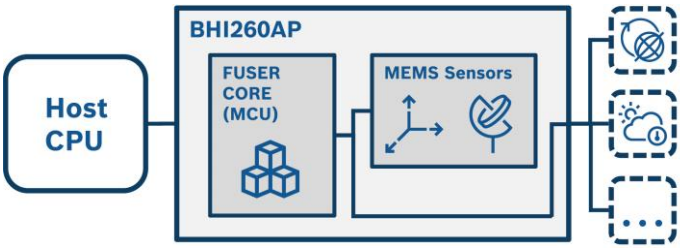
In combination with these functions, the BHI260AP becomes a versatile and ideal solution when it comes to always-on sensor processing at ultra-low power consumption.

### BHI260AP TARGET APPLICATIONS

- Wrist wearables such as smartwatches, fitness bands and smart hybrid watches
- Head mounted devices such as headsets, truly wireless in-ear devices and smart sunglasses
- Smartphones and other mobile communication devices
- AR/VR/MR headset and controller devices

### OVERVIEW FEATURES

#### Hardware features




CPU Core:

- ARC EM4 CPU with ARCv2 16/32 bit instruction set (up to 3.6 CoreMark/MHz)
- Floating Point Unit (FPU) / Memory Protection Unit (MPU)
- 4-channel micro DMA controller / 2-way associative cache controller

Integrated sensor (6-DoF IMU):

- 16-bit 3-axis accelerometer
- 16-bit 3-axis gyroscope

#### Software features

- Self-learning AI software for fitness tracking:
  Enables on-device learning and automatic tracking of a wide variety of fitness movements, including options for on-device individual-specific personalization of movements and support for increasing number of activities without the need to modify the original software.

- Swim analytics:
  Dedicated software for wrist wearables by generating useful information on users' swimming activities, such as length count, style of swimming and stroke counts.

- Pedestrian dead reckoning:
  This software helps reducing the power consumption of wearable devices by enabling the duty cycling of power-consuming GNSS components, as well as improving the accuracy of outdoor positioning with pedestrian dead reckoning.

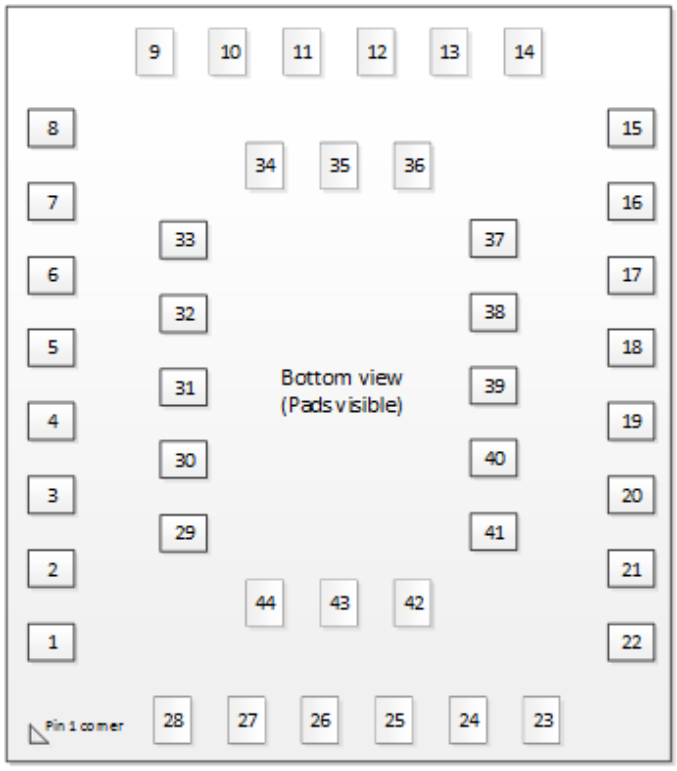
- Relative and absolute orientation:
  This software estimates relative and absolute orientation of the device, including outputs such as rotation vector, game rotation vector, linear acceleration and gravity.

## PIN CONFIGURATION

| Pin configuration | | |
|---|---|---|
| **Pin** | **Name** | **Description** |
| 1 | M3SDA | M3 I2C SDA |
| 2 | M3SCL | M3 I2C SCL |
| 3 | HOSTBOOT | Boot select |
| 4 | QSPI_D0 | External Flash Data 0 |
| 5 | QSPI_CLK | External Flash Clock |
| 6 | VREG | Voltage regulator output |
| 7 | VDDIO | Digital IO and Fuser Supply |
| 8 | QSPI_D3 | External Flash Data 3 |
| 9 | RESETN | Reset input, active low |
| 10 | HIRQ | Host Interrupt Output |
| 11 | HSDX | Host Interface SPI MOSI, I2C SDA |
| 12 | VDDIO | Digital IO and Fuser Supply |
| 13 | M2SCX | M2: SPI SCK / I2C SCL |
| 14 | QSPI_CSN | External Flash Chip Select |
| 15 | QSPI_D1 | External Flash Data 1 |
| 16 | MCSB3 | SPI Chip Select 3 |
| 17 | GNDIO | Digital IO and Fuser Ground |
| 18 | MCSB2 | SPI Chip Select 2 |
| 19 | MCSB4 | SPI Chip Select 4 |
| 20 | QSPI_D2 | External Flash Data 2 |
| 21 | OCSB | OIS Chip Select Input |
| 22 | ASCX | OIS Clock / Aux I2C SCL |
| 23 | JTAG_CLK | Fuser Debug Clock |
| 24 | JTAG_DIO | Fuser Debug Data |
| 25 | GND | Analog Sensor Ground |
| 26 | GND | Analog Sensor Ground |
| 27 | GND | Analog Sensor Ground |
| 28 | VDD | Analog Sensor Supply |
| 29 | M1SCX | M1: SPI SCK / I2C SCL |
| 30 | ASDX | OIS MOSI / Aux I2C SDA |
| 31 | RESV3 | Reserved |
| 32 | HSDO | Host Interface SPI MISO / I2C address select |
| 33 | HSCX | Host Interface SPI SCK / I2C SCL |
| 34 | HCSB | Host Interface SPI CSN / Protocol select |
| 35 | M2SDX | M2: SPI MOSI / I2C SDA |
| 36 | GNDIO | Digital IO and Fuser Ground |
| 37 | M2SDI | M2: SPI MISO / I2C unused |
| 38 | MCSB1 | SPI Chip Select 1 |
| 39 | OSDO | OIS MISO |
| 40 | RESV2 | Reserved |
| 41 | RESV1 | Reserved |
| 42 | VDDIO | Digital IO and Fuser Supply |
| 43 | M1SDI | M1: SPI MISO |
| 44 | M1SDX | M1: SPI MOSI / I2C SDA |

## TECHNICAL SPECIFICATIONS

| BHI260AP technical data | |
|---|---|
| **Operating voltage** | **1.8 V** |
| **CPU current consumption** | |
| – Self-learning AI function (25 Hz) | **249 µA** |
| – Self-learning AI function (50 Hz) | **386 µA** |
| – Standby current | **8 µA** |
| **Performance** | |
| – Self-learning AI software New activity learning time / Personalization time | **< 30 secs** |
| – Typical recognition rate (F1 score) personalized to individuals | **0.95~1.0** |

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