

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.

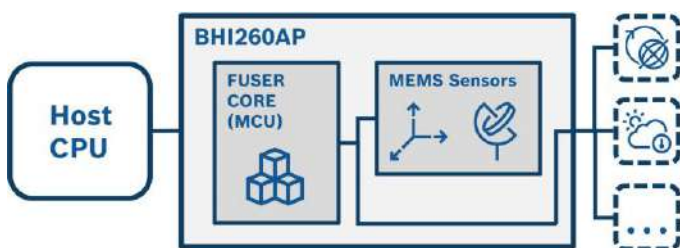
BHI260AP supports the following platforms and solutions:

- ▶ 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.

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

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

Software features

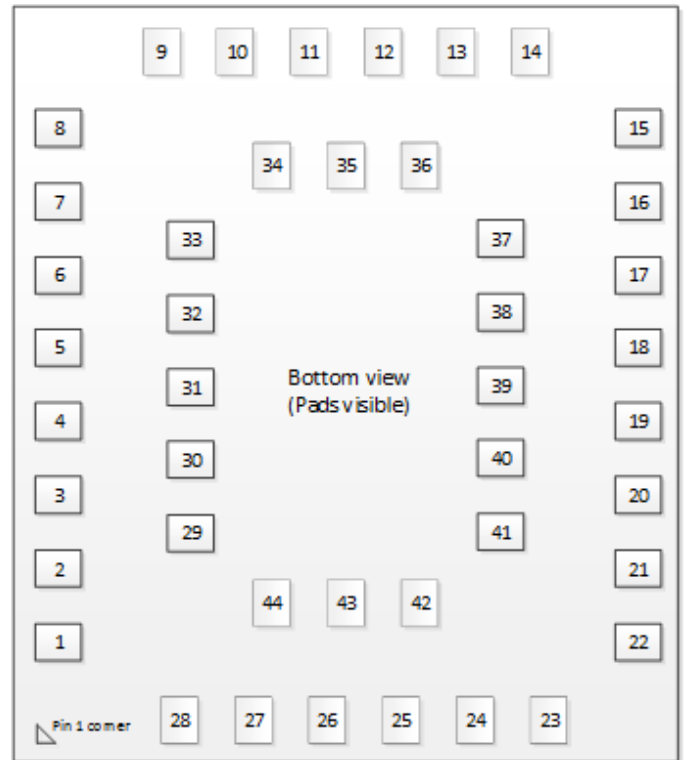
- ▶ Self-learning AI software for fitness tracking:
 - Enables on-device learning and automatic tracking of a wide variety of fitness movements, including options for on-device individual-specific personalization of movements and support for increasing number of activities without the need to modify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