

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 alwayson sensor applications such as fitness tracking, navigation, machine learning analytics and orientation estimation.

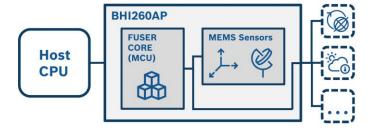
BHI260AP supports the following platforms and solutions:

- ▶ 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 Al software for fitness tracking:
 Enables on-device learning and automatic tracking of a
 wide variety of fitness movements, including options for ondevice 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:

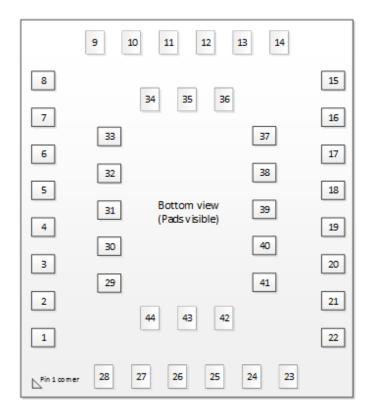
This software estimates relative and absolute orientation of the device, including outputs such as rotation vector, game rotation vector, linear acceleration and gravity. Bosch Sensortec | BHI260AP 2 | 2

PIN CONFIGURATION

Pin c	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		
		Host Interface SPI MISO / I2C address		
32	HSDO	select		
33	HSCX	Host Interface SPI SCK / I2C SCL		
24	LICCD	Host Interface SPI CSN / Protocol		
34	HCSB	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 μΑ		
- Self-learning AI function (50 Hz)	386 μΑ		
- Standby current	8 μΑ		
Performance			
- Self-learning AI software	< 30 secs		
New activity learning time /			
Personalization time			
 Typical recognition rate (F1 score) 	0.95~1.0		
personalized to individuals			



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