Invented for life



Programmable AI sensor with extended g-range – BHI385

Bosch Sensortec's best-in-class BHI385 is a fully programmable smart IMU. Its extended accelerometer range and advanced software enable motion tracking, even in high-dynamic applications like sports wearables. Motion AI Studio empowers you to easily deploy custom machine learning models, bringing unmatched performance and flexibility to the edge of your wearable designs.

Target applications





Head mounted devices



Fitness equipment & smart clothing



Sports activity tracking & evaluation



Impact detection



Human-machine interaction

Benefits



Easy deployment Provides processing power and tools to integra

Provides processing power and tools to integrate ML-based algorithms



Precise AI algorithm

Features an accurate self-learning AI algorithm for fitness and other applications



Power efficient

Low power consumption of the high-g programmable IMU

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Technical features

BHI385 technical data		
Package dimensions (typ.)	2.5 x 3.0 x 0.95 mm ³	
Digital resolution	Accelerometer (A): 16-bit Gyroscope (G): 16-bit	
Measurement ranges (* at Full Scale ±32g, the maximum measurable acceleration is typically ±28g)	(A): ±4, ±8, ±16 g, ±28g* (G): ±125°/s, ±250°/s, ±500°/s, ±1000°/s, ±2000°/s	
Output data rates (selectable)	(A): 12.5Hz 1.6KHz (G): 12.5 Hz 6.4 kHz	
Offset soldered, over life	(A): ± 25 mg (G): ± 0.5 °/s	
тсо	(A): ± 0.25 mg/K (G): ± 0.015 °/s/K	
Sensitivity Error	(A): 0.4% (G): 2%	
Noise density (typ.)	(A): 160 $\mu g/\sqrt{Hz}$ (8g), 170 $\mu g/\sqrt{Hz}$ (28g) (G): 0.007 °/s/ \sqrt{Hz} (performance mode), 0.01 °/s/ \sqrt{Hz} (normal mode)	
 Current consumption Fuser2 (running CoreMark) Long Run mode (20 MHz) Turbo mode (50 MHz) Sensor Fusion (Hub+IMU) operation (calculating Game Rotation Vector) 800 Hz ODR 100 Hz ODR Standby current 	959 μA 2.8 mA 1.2 mA 1.0 mA 8 μA	
Interface	 Host interface configurable as SPI or I2C 2 secondary master interfaces one I²C interface one selectable SPI or I²C Up to 14 GPIOs 	
Power modes	High perf. mode, normal mode, low power mode (LPM), suspend mode	
Memory	256 kByte on-chip SRAM	
Temperature range	-40 +85 °C	
Supply voltage	1.71 3.6 V (VDD) 1.71 1.89 V (VDDIO)	

Pin configuration



Pin-out bottom view

Pin	Name	Description
1	HSDO	Host Interface SPI MISO / I2C address select
2	ASDX	OIS MOSI / Aux I2C SDA
3	ASCX	OIS Clock / Aux I2C SCL
4	HIRQ	Host Interrupt Output
5	VDDIO	Digital IO and Fuser Supply
6	GNDIO	Digital IO and Fuser Ground
7	GND	Analog Sensor Ground
8	VDD	Analog Sensor Supply
9	VREG	Voltage Regulator Output
10	OCSB	OIS Chip Select Input
11	OSDO	OIS MISO
12	HCSB	Host Interface SPI CSN / Protocol Select
13	HSCX	Host Interface SPI SCK, I2C SCL
14	HSDX	Host Interface SPI MOSI, I2C SDA
15	JTAG_CLK/ M3SCL	Fuser Debug Clock / M3 I2C SCL
16	JTAG_DIO	Fuser Debug Data
17	RESETN	Reset input, active low
18	M3SDA	M3 I2C SDA
19	RESV1	Reserved: do not connect
20	RESV2	Reserved: do not connect

Headquarters Bosch Sensortec GmbH

Gerhard-Kindler-Strasse 9 72770 Reutlingen · Germany Telephone +49 7121 3535 900

www.bosch-sensortec.com



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