BMI323

Small, versatile Inertial Measurement Unit

GENERAL DESCRIPTION

The BMI323 is a general purpose, low-power Inertial Measurement Unit (IMU) that combines precise acceleration and angular rate (gyroscopic) measurement with intelligent on-chip motion-triggered interrupt features. The 6-axis IMU comprises a 16-bit triaxial gyroscope, a 16-bit triaxial accelerometer, and a 16-bit digital temperature sensor in a miniature 2.5 x 3.0 x 0.83 mm^3 (14-pin) LGA package.

Target applications

- Device orientation
- Motion sensing and gesture recognition
- Fitness tracking
- Activity and context recognition
- Stabilization and motion control

BMI323 target devices

- Notebooks and tablets
- Wearable devices such as smart watches, sports and fitness devices
- Game controllers and smart remote controls
- Toys and gadgets
- Smart IoT devices

BMI323 targets fast and accurate inertial sensing in all applications. It is an easy-to-use IMU with an integrated feature set.

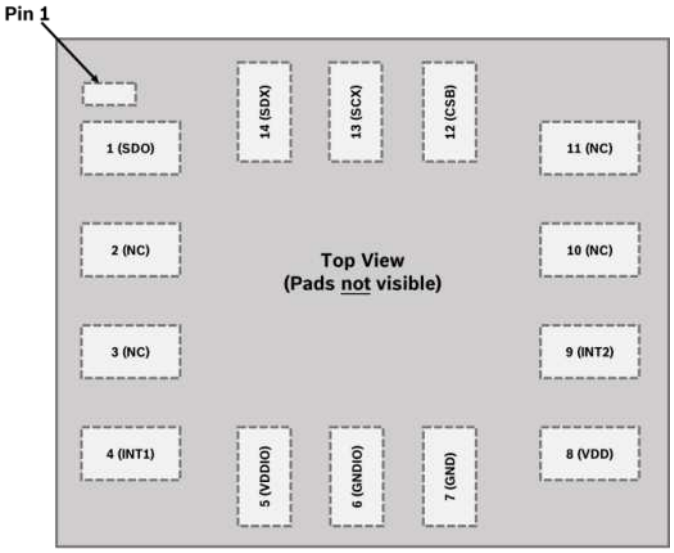
The sensor features a self-calibrating gyroscope using motionless CRT (component re-trimming) functionality to compensate MEMS typical soldering drifts, ensuring post-soldering sensitivity errors down to ± 0.7%.

BMI323 includes embedded gesture and activity recognition with an integrated plug-and-play step counter/detector, which is optimized for accurate step counting in wrist-worn devices. The IMU is well-suited for other types of wearable devices, such as hearables or smart fitness trackers and for other mobile devices.

TECHNICAL SPECIFICATIONS

BMI323 technical data	
Digital resolution	Accelerometer (A): 16-bit Gyroscope (G): 16-bit
Resolution	(A): 16-bit or 0.06 mg/LSB (G): 16-bit or 0.004 dps/LSB
Measurement range and sensitivity (calibrated)	(A) ±2 g: 16384 LSB/g ±4 g: 8192 LSB/g ±8 g: 4096 LSB/g ±16 g: 2048 LSB/g (G) ±125 °/s: 262.1 LSB/°/s ±250 °/s: 131.1 LSB/°/s ±500 °/s: 65.5 LSB/°/s ±1000 °/s: 32.8 LSB/°/s ±2000 °/s: 16.4 LSB/°/s
Zero offset (typ. over lifetime)	(A): ± 50 mg (G): ± 1 °/s
TCO	(A): ± 0.3 mg/K (G): ± 0.04 °/s/K
Noise density (typ.)	(A): 180 µg/√Hz (G): 0.007 °/s/√Hz
Bandwidths (progr.)	(A) 6.2 Hz ... 1677 Hz (G) 6.2 Hz ... 563 Hz
Selectable output data rates	12.5 Hz ... 6.4 kHz
Digital inputs/outputs	SPI, I2C, I3C
Supply voltage	1.71 ... 3.63 V (VDD) 1.08 ... 3.63 V (VDDIO)
Temperature range	-40 ... +85 °C
Current consumption (high performance mode, A+G)	790 µA
LGA package	2.5 x 3.0 x 0.83 mm^3

Pin configuration



Pin-out top view

Pin	Name	Description
1	SDO	Serial data output in SPI 4W I2C address in I2C mode
2	NC	Do not connect
3	NC	Do not connect
4	INT1	Interrupt pin 1
5	VDDIO	Digital I/O supply voltage
6	GNDIO	Ground for I/O
7	GND	Ground for digital & analog
8	VDD	Power supply analog & digital
9	INT2	Interrupt pin 2
10	NC	Do not connect
11	NC	Do not connect
12	CSB	Chip select for SPI mode
13	SCx	SCK for SPI serial clock SCL for I2C serial clock
14	SDx	SDA serial data I/O in I2C/I3C SDI serial data input in SPI 4W SDA serial data I/O in SPI 3W

Note: BMI323 is pin to pin compatible to BMI160 and BMI270

SYSTEM COMPATIBILITY

The BMI323 is designed for best possible fit into modern embedded consumer electronics devices. The sensor has very wide ranges for V_{DD} and V_{DDIO} supply voltages. The performance and the current consumption are stable over the whole voltage supply range. BMI323 provides three digital serial interfaces: I2C, I3C, and SPI.

BMI323 features a 2 kB on-chip FIFO buffer and provides synchronized data. It supports the following features for always-on applications (e.g. activity, action, and gesture recognition) using the IMU ultra-low power domain:

- motion detection
- step detector
- plug ‘n’ play step counter
- orientation, flat
- single tap, double tap, triple tap detection

The embedded feature set can be optimized for wearable, hearable and mobile device context via the sensor API (available via www.bosch-sensortec.com).

Headquarters
Bosch Sensortec GmbH
Gerhard-Kindler-Straße 9
72770 Reutlingen · Germany
Telephone +49 7121 3535 900
Fax +49 7121 3535 909

www.bosch-sensortec.com

Data & Specification are preliminary and subject to change without notice | Bosch Sensortec GmbH reserves all rights in the event of industrial property rights. We reserve all rights of disposal such as copying and passing on to third parties. BOSCH and the symbols are registered trademarks of Robert Bosch GmbH, Germany.

Doc.-Number: BST-BMI323-FL000-00 / Version_1.0_092022