BMC050
eCompass (6-axes electronic compass)

Bosch Sensortec

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Introduction

With leading-edge digital accelerometers and pressure sensors Bosch Sensortec is a well established supplier of MEMS sensors for the mobile world.

Backed by Bosch's huge technology and IP portfolio, Bosch Sensortec is now introducing the BMC050, a latest generation fully compensated electronic compass that delivers excellent performance in very small size.

The BMC050 allows for determining precise tilt-compensated geomagnetic heading information and for providing accurate acceleration sensor data.
The BMC050 6-axes, digital eCompass comes in a small 3mm x 3mm x 0.95mm LGA package. It comprises Bosch Sensortec proprietary FlipCore geomagnetic sensing technology with Bosch Sensortec's well-proven, leading edge MEMS sensor technology for the accelerometer.

Function

The BMC050 eCompass measures the earth's geomagnetic field in three dimensions (3 axes) and it measures dynamic and static acceleration, and thus also the tilt of the sensor by the help of the accelerometer (3 axes). The tilt information is required in situations where the geomagnetic sensor can not be held flat, i.e. parallel to the earth's surface.

By combining this output information of the BMC050 the eCompass software produces precise heading information, independent from the orientation of the device that the BMC050 is integrated in.

In addition to that, the accelerometer integrated within the BMC050 provides all the precision and functionality of Bosch Sensortec's leading-edge 10bit digital accelerometer BMA250.

Technical details	
BMC050	
Digital interfaces	I²C, SPI (3/4wire)
	4 interrupt pins
Current consumption	
regular mode	540 µA @10 Hz
low power mode	190 µA @10 Hz
Supply voltage	1.62 V ... 3.6 V
Supply voltage I/O	1.20 V ... 3.6 V
Operating temperature	-40°C ... +85°C
Package (LGA type)	3 x 3 x 0.95 mm³
Geomagnetic sensor	
Measurement range	± 1000 µT
Resolution	0.3 µT
Acceleration sensor	
Stand-alone operation	supported
Resolution	10 bit
Programmable g-range	±2g / ±4g / ±8g / ±16g
Zero-g offset	±80 mg
Sensitivity tolerance	±4%

Target Applications

The BMC050 provides accurate tilt-compensated orientation information for navigation (GPS enhancement / map rotation), for location based services (LBS) or augmented reality and in combination with a pressure sensor for indoor navigation. Due to its small footprint, its low power consumption and its high level of functional integration, the BMC050 is ideally suited to fit into all kind of modern personal mobile devices, like mobile telephones, tablet PCs, notebooks, portable media players, etc.

Integrated interrupt engine

Acceleration sensor

▶ Data-ready (e. g. for processor synchronization)
▶ Any-motion (slope) detection (e. g. for wake-up)
▶ Tap sensing (e. g. for tap-sensitive UI control)
▶ Orientation change recognition (e. g. for portrait/landscape & face-up/face-down switching)
▶ Flat detection (e. g. for position sensitive switching)
▶ Low-g / high-g detection (e. g. for shock and free-fall detection)

Geomagnetic sensor
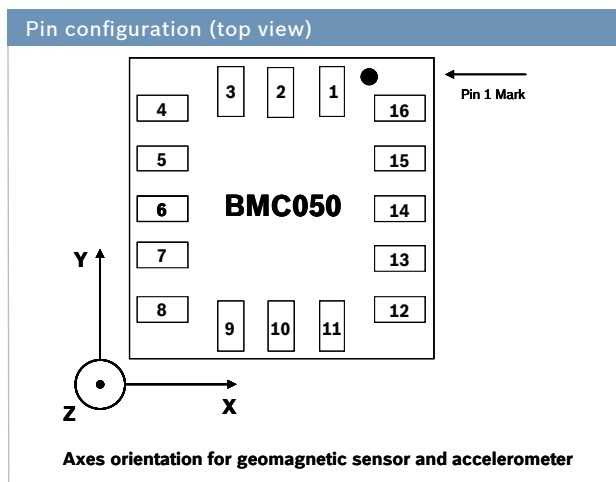
▶ Overflow detection
▶ Low-g / high-g threshold detection

eCompass software

Bosch Sensortec licenses proprietary leading-edge software supporting the BMC050 to provide high precision.

▶ Magnetic heading
▶ 3D device orientation
▶ Signal quality information
▶ In-use calibration

It includes automatic magnetic offset cancellation and accelerometer tilt-compensation.

For more details on software features and licensing conditions, please contact your Bosch Sensortec representative.

Pin configuration (top view)

Axes orientation for geomagnetic sensor and accelerometer

Pin #	Pin Name	Sensor	Description
1	INT2	Acc.	Interrupt output #2
2	PS1	Acc.	Protocol select #1
3	PS2	Mag.	Protocol select #2
4	INT3	Mag.	Interrupt output #3
5	CSB1	Acc.	Chip select #1
6	CSB2	Mag.	Chip select #2
7	GND	Mag. + Acc.	Ground
8	GND	Mag. + Acc.	Ground
9	DRDY	Mag.	Data ready
10	SDO	Mag. + Acc.	SPI: Data output
11	SDI	Mag. + Acc.	SPI: Data input, I^2C: Data
12	GND	Mag. + Acc.	Ground
13	V_{DD}	Mag. + Acc.	Supply voltage
14	V_{DDIO}	Mag. + Acc.	I/O voltage
15	SCK	Mag. + Acc.	Serial clock
16	INT1	Acc.	Interrupt output #1

Data & Specification subject to change without notice

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