BMC056
eCompass (6-axis digital compass)

Bosch Sensortec

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General description

BMC056 is a low power and low noise 6-axis digital compass. It measures the earth's geomagnetic field as well as dynamic and static acceleration in all three dimensions and outputs tilt-compensated heading or orientation information. BMC056 is housed in a package with a footprint of 3 x 3 mm² and 0.95 mm height. The integrated accelerometer provides all functionalities of Bosch Sensortec's leading-edge 12bit digital accelerometer, including a 32 frame FIFO buffer for storing acceleration data.

Due to its advanced power management, BMC056 is ideally suited for virtual reality and navigation applications, motion tracking, shock and vibration detection in handhelds like mobile phones, tablet PCs, notebooks, portable media players, man-machine interfaces and game controllers.

BMC056 target applications

▶ Augmented reality applications and location-based services
▶ Indoor and outdoor navigation, e.g. map rotation or step counting (pedometry)
▶ Motion tracking
▶ Gesture recognition e.g. tap and double tap sensing, Display profile switching
▶ Gaming
▶ Air mouse applications, pointing devices

Sensor features

The eCompass comprises a 3-axis geomagnetic sensor based on Bosch's proprietary FlipCore™ technology and a 3-axis 12 bit accelerometer. The accelerometer provides the device orientation for tilt compensated heading output. At the same time it features all functions of a state-of-the art standalone accelerometer. Like its predecessor BMC050, Bosch Sensortec's BMC056 comes in a 3 x 3 x 0.95 mm³ 16-pin LGA package.

BMC056	Technical details
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 (x-,y-axis)
	± 2500 µT (z-axis)
Resolution	0.3 µT
Acceleration sensor	
Stand-alone operation	supported
Resolution	12 bit
Programmable g-range	±2g / ±4g /
	±8g / ±16g
Zero-g offset (typ.)	±80 mg
Sensitivity tolerance	±4 %
Interrupt engine	
Accelerometer interrupts	Orientation/ flat detection, any motion, tap/ double tap, sensing, low-/ high-g threshold, slow motion / no motion detection, data ready
Magnetometer interrupts	magnetic data ready, magnetic threshold detection
FIFO data buffer accelerometer	32 sample depth for each axis

The BMC056 features I²C and SPI (3-wire/4-wire) digital, serial interfaces and a powerful interrupt engine. Parameters like g-ranges or low-pass filter settings as well as all interrupt settings can easily be programmed via the digital interfaces.
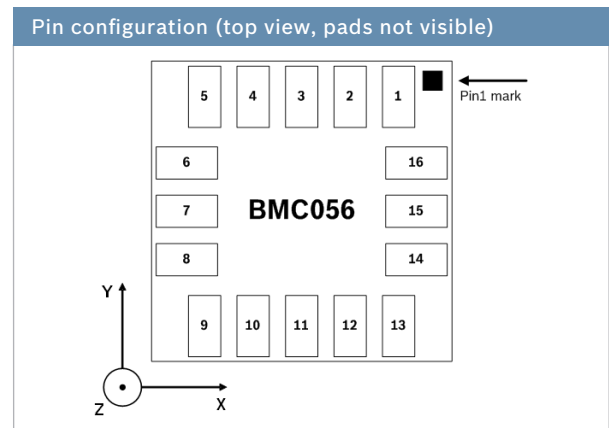
New features of BMC056

Backed by Bosch's huge technology and IP portfolio, Bosch Sensortec now introduces BMC056 in the premium eCompass segment. The enhanced interrupt engine features a set of new hard-wired functions making a BMC055 a more power efficient and easy to design-in product. The new FIFO memory allows storing 32 samples of each axis and offers use-case specific FIFO operation modes.

Pin #	Name	Sensor	Description
1	V$_{DDIO}$	Mag.+Acc.	I/O voltage
2	INT3	Mag.	Interrupt output #3
3	DNC/ CTG	Mag.	Do not connect or connect to ground
4	SCK	Mag.+Acc.	Serial clock
5	GND	Mag.+Acc.	Ground
6	SDI	Mag.+Acc.	SPI: Data in, I²C: Data
7	SDO	Mag.+Acc.	SPI: Data out I²C: Slave address select
8	DRDY	Mag.	Data ready
9	INT2	Acc.	Interrupt output #2
10	CSB2	Mag.	Chip Select #2
11	INT1	Acc.	Interrupt output #1
12	GND1	Mag.+Acc.	Ground
13	NC	-	Not internally connected
14	V$_{DD}$	Mag.+Acc.	Supply voltage
15	PS	Mag.+Acc.	Protocol select

eCompass Software

Bosch Sensortec licenses proprietary leading-edge software package supporting BMC056, which has been tailored to ideally complement with the Bosch MEMS hardware. It features in-use calibration and self-monitoring and includes automatic magnetic offset cancellation and accelerometer tilt-compensation in order to provides a magnetic robust heading. For more details please contact your Bosch Sensortec representative.

▶ Fast in-use offset calibration
▶ Hard- and soft-iron calibration
▶ Magnetic heading
▶ 3D device orientation
▶ Signal quality information
▶ M4G – gyroscope emulation

Pin configuration (top view, pads not visible)

Data & Specification subject to change without notice   Doc.-Number: BST-BMC056-FL000-00 / Version_1.0_092012