

BMC150

eCompass (6-axis digital compass)

Bosch Sensortec



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General description

Housed in an LGA package with a footprint of merely $2.2 \times 2.2 \text{ mm}^2$ and 0.95 mm height, BMC150 is an extremely small 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 and orientation information. The integrated accelerometer provides all functionalities of Bosch Sensortec's leading-edge 12bit digital accelerometer, including a 32 frame FIFO buffer storing acceleration data. Due to its small package size and its advanced power management, BMC150 is ideally suited for virtual reality and navigation applications or motion tracking in handhelds like mobile phones, tablet PCs, notebooks, portable media players, man-machine interfaces and game controllers. With an increased magnetic measurement range, BMC150 offers high PCB placement flexibility to the developer of handheld devices.

BMC150 target applications

- ▶ Augmented reality applications and location based services
- ▶ Indoor and outdoor navigation, e.g. map rotation or step counting
- ▶ 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 and can be operated independently.

BMC150	Technical details
Digital interfaces	I ² C, SPI (3/4wire) 4 interrupt pins
Current consumption	
regular mode	540 µA @10Hz
low power mode	190 µA @10Hz
Supply voltage	1.62V ... 3.6V
Supply voltage I/O	1.20V ... 3.6V
Operating temperature	-40°C ... +85°C
Package (LGA type)	2.2x2.2x0.95 mm ³
Geomagnetic sensor	
Measurement range	± 1300 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

Bosch Sensortec's BMC150 comes in a 2.2 x 2.2 x 0.95 mm³ 14pin LGA package. With respect to its predecessor the BMC050, the footprint of BMC150 could be reduced by almost 50%. BMC150 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 BMC150

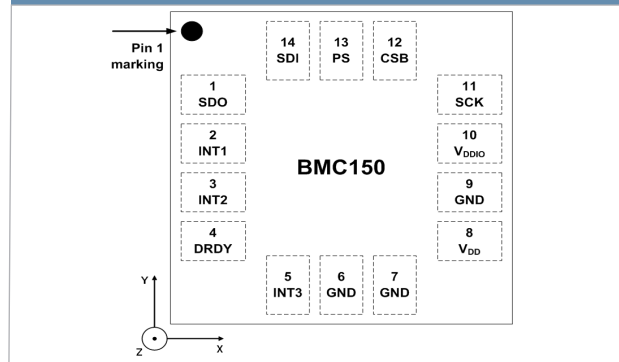
Backed by Bosch's huge technology and IP portfolio, Bosch Sensortec now introduces BMC150 in the premium eCompass segment. Since most permanent magnets on the target PCB such as speaker magnets or camera modules are magnetized perpendicular to the PCB plane a high magnetic measurement is needed in z-direction. Its stunning package dimensions in combination with the high magnetic range of $\pm 1300\mu\text{T}$ (x-, y- axis) and $\pm 2500\mu\text{T}$ (z- axis) allow very flexible placement of the eCompass on the PCB. The enhanced interrupt engine with respect to BMC150 features a set of new hard-wired functions making it 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 for the accelerometer.

eCompass Software

Bosch Sensortec licenses proprietary leading-edge software package supporting BMC150, 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 provide 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)



Pin	Name	Sensor	Description
1	SDO	Mag+Acc	SPI: Data out
2	INT1	Acc	Interrupt output 1
3	INT2	Acc	Interrupt output 2
4	DRDY	Mag	Data ready
5	INT3	Mag	Interrupt output 3
6	GND	Mag+Acc	Ground
7	GND	Mag+Acc	Ground
8	VDD	Mag+Acc	Supply voltage
9	GND	Mag+Acc	Ground
10	VDDIO	Mag+Acc	I/O voltage
11	SCK	Mag+Acc	Serial clock
12	CSB	Acc	Chip Select
13	PS	Mag	Protocol select
14	SDI	Mag+Acc	SPI: Data in, I ² C: Data

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