BMI260

Accurate, low-power Inertial Measurement Unit (IMU)

GENERAL DESCRIPTION

BMI260 is an ultra-low power IMU that combines precise acceleration and angular rate measurement with intelligent on-chip motion-triggered interrupt features. The 6-axis sensor combines a 16-bit triaxial gyroscope and a 16-bit triaxial accelerometer in a compact 2.5 x 3.0 x 0.8 mm^3 LGA package.

BMI260 TARGET APPLICATIONS

- Advanced gesture / activity and context recognition
- Optical and electronic image stabilization (OIS/EIS)
- Simultaneous localization and mapping (SLAM)
- Location based services
- Augmented / virtual reality (AR/VR)
- Indoor navigation / pedestrian dead reckoning (PDR)

BMI260 TARGET DEVICES

- Smartphones, cameras, tablets and smart pens
- Game controllers, remote controls and pointing devices
- Smart TV, smart earphones and hearables
- Augmented and virtual reality glasses
- Toy drones and toy helicopters

SENSOR FEATURES

BMI260 is the next-generation IMU targeting fast and accurate inertial sensing in smartphone and human machine interface (HMI) applications. The IMU provides highly accurate step counting, motion detection and is pin-to-pin compatible with the BMI160. BMI260 features Bosch's automotive-proven gyroscope technology. Significant improvements in BMI260 include, but are not restricted to, the overall accelerometer performance, i.e. an extremely low zero-*g* offset and sensitivity error, low temperature drifts, robustness over PCB strain and a low noise density.

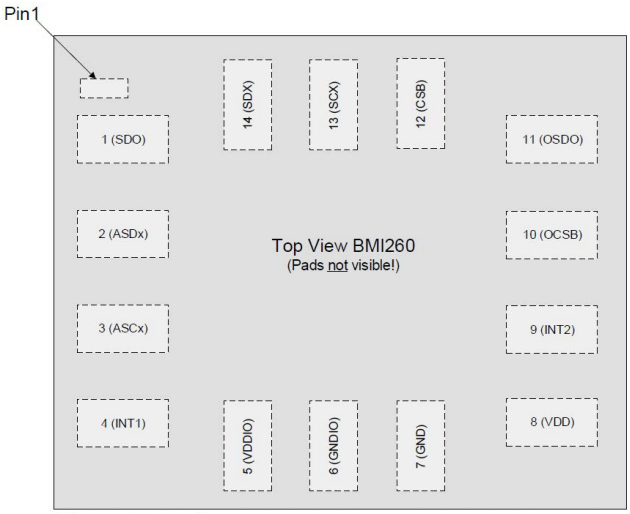
On top, BMI260 features the industry's first self-calibrating gyroscope using motionless CRT (Component Re-Trimming) functionality to compensate MEMS typical soldering drifts, ensuring post-soldering sensitivity errors down to ± 0.4%.

Other key features of BMI260 include Hardware and TimeSync functions. BMI260 also supports a low-latency secondary interface with accelerometer and gyroscope data output, freely configurable for SPI or I2C interface operation and measurement range. Dual SPI configuration enables BMI260 to serve two SPI-based modules supporting stereo or 3D camera operation.

TECHNICAL SPECIFICATIONS (TYP)

BMI260 data	Accelerometer (A) Gyroscope (G)
Digital resolution	(A): 16-bit or 0.06 mg/LSB (G): 16-bit or 0.004 dps/LSB
Programmable measurement range & Sensitivity	(A): ±2 g: 16384 LSB/g to (A): ±16 g: 2048 LSB/g (G): ±125 dps: 262.1 LSB/dps to (G): ±2000 dps: 16.4 LSB/dps
Zero-g/Zero-rate offset	(A): ±20 mg (G): ±0.5 dps
Sensitivity Error	(A): ± 0.4% (G): ± 0.4% (with CRT)
Temperature range	-40 ... +85 °C
Temperature behaviour (TCO; TCS)	(A): ±0.25 mg/K; ±0.004 %/K (G): ±0.02 dps/K; ±0.02 %/K
Noise density	(A): 160 µg/√Hz (G): 0.008 dps/√Hz
Offset vs PCB strain	(A): ±0.01 mg/µε (G): ±1.5 mdps/µε
Filter BW (programmable)	(A): 5 Hz ... 684 Hz (G): 11 Hz ... 751 Hz
Output Data Rate (ODR)	(A): 12.5 Hz ... 1.6 kHz (G): 25 Hz ... 6.4 kHz
Digital inputs/outputs	2x SPI; 2x I2C; AUX I/F; OIS I/F 2x digital interrupts
Supply voltage	1.7 ... 3.6 V_{DD} 1.2 ... 3.6 V_{DDIO}
Current consumption	685 µA at full ODR (aliasing-free)
Package size	2.5 x 3.0 x 0.8 mm^3 14 pin LGA

Pin configuration



Pin-out top view

Pin description

Pin No.	Name
1	SDO, Serial data output in SPI 4W
2	ASDx, Aux interface / OIS interface
3	ASCx, Aux interface / OIS interface
4	INT1, Interrupt Pin 1
5	VDD_{IO}, Digital I/O supply voltage (1.2 ... 3.6V)
6	GND_{IO}, Ground for I/O
7	GND, Ground for digital & analog
8	VDD, Power supply analog & digital (1.71 ... 3.6V)
9	INT2, Interrupt Pin 2
10	OCSB, OIS interface
11	OSDO, OIS interface
12	CSB, Chip select for SPI mode
13	SCx, SPI/I^2C serial clock (SCK/SCL)
14	SDx, Serial data I/O

BMI260 is pin-to-pin compatible with BMI160.

SYSTEM COMPATIBILITY

BMI260 is designed for best fit into modern embedded CE devices and provides a primary digital interface (I^2C and SPI) and a freely configurable secondary digital interface (I^2C and SPI).

BMI260 has a wide range for V_{DD} and V_{DDIO} supply voltages. The performance and current consumption are stable over the entire supply range. Typical current draw for BMI260's accelerometer and gyroscope at full ODR of 6.4 kHz is under 700 µA. By enabling high output data rates with low current consumption, smartphone manufacturers can avoid an unpleasant aliasing effect – an effect that causes different signals to become indistinguishable when sampled at lower ODRs.

BMI260's low latency, minimal group delays and high-precision time stamps on µs level substantially improve photo/video quality in the context of optical and electronic image stabilisation (OIS/EIS). Using the BMI260 on the mainboard in dual interface operation mode enables congruent HMI and OIS functions, such as stabilized panorama photo panning and action video tagging.

BMI260 provides an intelligent power management system enabling motion-triggered always-on features to run inside the ultra-low power domain of the IMU. The host application processor wakes up only on dedicated occasions, enabling a maximized idle period for the main processor.

BMI260 features an improved embedded step counter and step detector, an improved secondary interface for AUX or OIS operation and manual or automatic in-use offset compensation. As BMI160's successor, BMI260 supports all legacy interrupts:
- any-motion
- significant motion
- no/slow-motion
- flat detection
- tap sensing
- high-g and low-g detection (shock and freefall)

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