BNO080/BNO085
9-AXIS SYSTEM IN PACKAGE (SIP) IMU

Our BNO080/BNO085 SiP (System-in-Package) is perfect for robotics, AR/VR, HIDs (Human Interface Devices, such as remote controls) and other motion-sensing applications. Leveraging our advanced sensor fusion software and a Bosch Sensortec sensor, this powerful platform is highly flexible, and we'll work with your technology teams so you can easily configure it to bring out the best in your product.

The BNO085 delivers high performance, shortens development times and simplifies BOMs by combining a 9-axis sensor (AGM) with sensor fusion capabilities in a single package. By addressing popular sensor anomalies with proprietary algorithms that are continually perfected through rigorous testing, our motion sensors deliver more accurate dynamic heading than the competition. We've built a deep and flexible sensor platform so you can pick what works best for you – stay focused on innovating in other product areas while speeding time to market. Leave the sensor fusion to the experts.
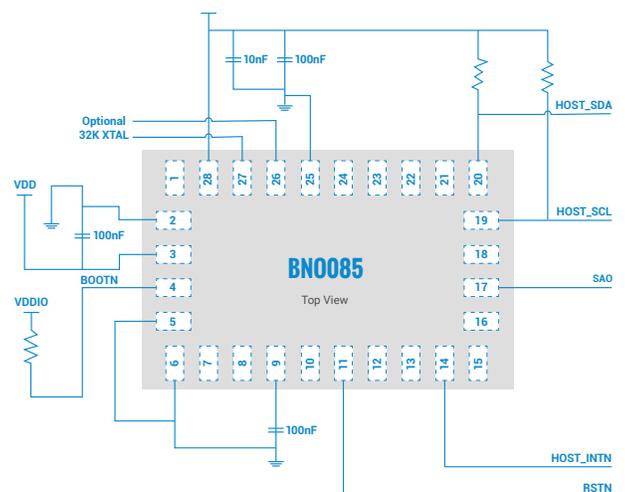
FEATURE HIGHLIGHTS

✅ MotionEngine™ 9-Axis and 6-Axis Sensor Fusion – Provides raw, calibrated sensor orientation data for more accurate heading and orientation

✅ Intelligent Power Management – Manages sensor states to conserve power without sacrificing quality of motion data

✅ Calibration – Supports both dynamic and factory-based calibration to deliver the highest performance

✅ Always-on Capabilities – Includes software to enable low power, step counter and gesture recognition

✅ Control via I2C, SPI or UART Interfaces – Freedom to optimize overall circuit design requirements

✅ Secondary I2C interface – Allows attachment of additional environmental sensors

✅ OS Independent – Driver example code available for ease of integration

✅ Compatibility – BNO085 is backwards compatible with BNO080, and both are a pin-for-pin replacement for Bosch Sensortec's BNO055 and BMF055

✅ Software Library Support – Includes support for external MotionElements software libraries for advanced applications such as 6DOF VR controllers and attitude monitoring (e.g., antennas) *BNO085 only

PHYSICAL ATTRIBUTES

SOFTWARE	motion engine	Hillcrest Lab's advanced sensor fusion software	
SENSORS	accel	gyro	mag
PROCESSOR		ARM Cortex-M0+	
INTERFACES	I2C	SPI	UART

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AR/VR	ROBOTICS
The BNO080/BNO085 delivers more accurate orientation information with low latency – even during rapid motion – eliminating motion sickness and other negative user experiences. Low power consumption, predictive motion, high output rate (1kHz), and compact size (5.2 x 3.8 x 1.1 mm^3) all make the BNO080/BNO085 ideal for VR/AR devices such as HMD (head mounted displays), glasses and controllers, where both power and space are at a premium.	The BNO080/BNO085 is optimized for service robots that employ Simultaneous Localization and Mapping (SLAM) or other "intelligent" navigation solutions, such as robotic vacuum cleaners.
Our MotionElements software combines camera data with the BNO085 sensor data to deliver a more cost-effective 6DOF controller experience.	Our combination of proprietary sensor fusion software and multi-axis sensors delivers superior heading performance, even when the robot runs over uneven surfaces, such as a floor transition from one material to another. Whether your robot cleaner relies mainly on an IMU for navigation or leverages an IMU to complement a LiDAR, VSLAM system or optical sensor (optical flow), our products will help you meet your requirements.
Features & Benefits	**Features & Benefits**
✓ 1KHz Sample Rate – Enables flawless, smooth head-tracking with low latency and support for time-warping for immersive experiences	✓ Accurate Heading Angle – Less than 0.5°/min typical error rate
✓ Predictive Head Tracking and AR/VR Stabilization – Adjusts angular position gradually over time to avoid "jumps" and compensate for system latency	✓ Tilt Independent Heading – Allows for proper heading output when surface is uneven
✓ Enhanced Controller Tracking (BNO085 only) – Utilizes camera data to significantly improve VR controller performance	✓ Bump Detection – Calibrated accelerometer output provides data to support a bump detection algorithm without having to use a separate sensor
✓ Tare – Allows for arbitrary mounting of the BNO080/BNO085 in the end product	✓ Inclination Detection – Provides full 3DOF robot orientation, allowing detection of surface and device issues
✓ Context and Activity Tracking – Step-based activity features for head-mounted devices, including stationary, running, walking and step count	

ABOUT HILLCREST LABS

Hillcrest Laboratories, Inc., a subsidiary of InterDigital, Inc. (NASDAQ: IDCC), is a leading global supplier of software, components and intellectual property to enable the intelligent use of sensors in consumer electronics, robotics and IoT devices. For more than 15 years, Hillcrest has delivered innovative solutions that combine sensors and sensor fusion technology to power a wide variety of consumer electronics, as well as commercial and industrial products. Hillcrest's advanced sensor fusion technology transforms human and machine movement into high-quality, application-ready information that enables developers and manufacturers to create everyday products that work with precision. Today, Hillcrest's proven MotionEngine® sensor fusion software is used in a wide variety of applications, including robotics, virtual reality (VR), augmented reality (AR), 3D audio, and handheld motion controllers.