

# Synopsys and Bosch

Bosch Achieves First-Pass Silicon Success for Consumer Sensor Application with Synopsys DesignWare NVM IP



*We found the DesignWare NVM IP to be very easy to integrate and adopt. Selecting Synopsys IP is one of our risk-reduction techniques. DesignWare NVM IP allows us to minimize work on the memory interface and accelerate integration into the IC.”*



**Horst Symanzik**

Director of IC Engineering, Bosch Sensortec

## Business

Bosch Sensortec is trusted by the world's most innovative companies as a partner in enhancing the consumer experience through MEMS sensor solutions. With a focus on high-volume products, they bring a wealth of experience to their consumer electronics customers — meeting the most demanding requirements for quality and reliability.

## Challenges

- ▶ Minimize NVM IP footprint in high-volume sensor IC
- ▶ Achieve the lowest possible power consumption for mobile/portable applications
- ▶ Meet stringent standards for quality and reliability to avoid field failures
- ▶ Accelerate time-to-market by selecting mature, easy-to-integrate NVM IP

## Synopsys Solution

- ▶ DesignWare® AEON Reprogrammable Trim NVM IP

## Benefits

- ▶ Achieved first-pass silicon success and accelerated time-to-market by more than one month
- ▶ Minimized NVM IP footprint to support goal of providing industry's smallest accelerometer of 1.2 x 1.5 mm<sup>2</sup>

- ▶ Reduced power consumption due to NVM IP's low supply voltage and low supply current
- ▶ Met an aggressive schedule with help from an experienced support team while adhering to the high quality standards of their parent company and customers

## Overview

Bosch Sensortec develops integrated sensors for consumer applications such as mobile phones, tablet computers, and wearable devices. The sensors are used for orientation, movement detection, and navigation, and require calibration data to be stored and reprogrammed as needed. For the demanding mobile market, the sensors offer low power consumption in a small die size.

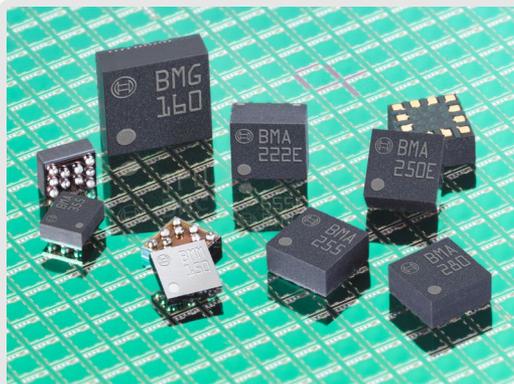
To meet those targets, Bosch Sensortec needed to avoid common reliability issues that can arise with memory use in ICs, specifically loss of memory data under certain circumstances. It was critical for Bosch Sensortec to maintain their industry leadership and focus on their core competencies instead of focusing on integrating the NVM IP. To support these goals, Bosch Sensortec required a reliable solution that would minimize integration effort and function as required. After evaluating several IP vendor options for these stringent criteria, Bosch Sensortec selected Synopsys DesignWare NVM IP due to their previous

positive experiences and the IP's small area and low power consumption. Bosch Sensortec found that DesignWare NVM IP is at the forefront of its technology, showing excellent results in area use that is a generation ahead of the competition.

### High-Quality DesignWare IP

For Bosch Sensortec, quality is paramount. However, minimizing area and power consumption are also key criteria for their sensor applications. Only Synopsys DesignWare AEON Trim NVM IP offered the combination of small area, low power consumption, and reprogrammability in a mature, high-quality IP product that Bosch Sensortec required.

Bosch Sensortec's experiences using the IP showed excellent qualification results and stability in mass production. "In a typical IC, about 30 percent of field returns are related to memory issues, but by using Synopsys NVM IP we did not have that problem. A major advantage of DesignWare IP has been that there are no reliability issues in our very high-volume production quantities," said Horst Symanzik, Director of IC Engineering, Bosch Sensortec.



**Bosch Sensortec Accelerometers and Gyroscopes**

"Our prior production experiences with Synopsys NVM IP demonstrated that the IP is very robust and offers excellent quality, leading us to select it again for our latest project," said Symanzik. "For us, using DesignWare IP is key to reducing risk."

### Expert and Responsive Support

Bosch found that integrating the DesignWare NVM IP was very easy, especially with the models provided and accurate product documentation. When integrating the IP, Bosch saved more than one man-month due to the IP's ease of integration during design and verification. Generating simulation read and write data was also seamless.

When assistance was needed to transfer the IP to a new foundry and complete the required qualification steps, Synopsys' knowledgeable and responsive technical support was ready to help. "Bosch's history in the automotive industry sets a high bar for quality for all of Bosch's subsidiaries and business units, including Bosch Sensortec," said Symanzik. "The Bosch quality department often requests specialized qualification results, and Synopsys' support team was very helpful in providing and explaining the data so that we could complete our successful IP integration and product development."

"We truly appreciate the quality of Synopsys' IP, documentation, and technical support," said Symanzik. "We are already evaluating DesignWare NVM IP for our next project and have confidence that Synopsys will continue to meet our IP and support requirements."

*"For our most demanding applications, DesignWare IP is the clear choice. Our sensors must meet stringent requirements for area, power consumption, quality, and reliability, and DesignWare NVM IP from Synopsys fits the bill every time."*

**Horst Symanzik**

Director of IC Engineering, Bosch