

hSensor Platform Enables Quick and Easy Design for Wearable Health and Fitness Applications

Introduction

Advances in semiconductor technology have made it so that nearly all of the human body signals traditionally monitored in a clinical environment can now be collected by a wearable product (Figure 1). These traditional signals include:

- Pulse/Heart Rate (HR)
- Peripheral Oxygen Saturation (SpO₂)
- Stress
- Electrocardiogram (ECG)
- Body Temperature



Figure 1. Wearable Health and Fitness

In addition to providing physicians with useful health information, wearable devices offer many benefits, such as player safety assessment, workout injury prevention, physical conditioning and performance metrics, and overall wellness awareness.

Wearables Development Challenge

To develop a presence in the expanding wearable health and fitness market, designers face a significant challenge in terms of the time, resources and technical knowledge re-

quired. The process of creating a custom board with human body sensors can be complex: designers must first develop custom hardware and firmware to validate their concepts and then build prototypes before starting field trials. A significant amount of time must be spent evaluating sensors and existing solutions. Maxim's hSensor Platform (Figure 2) provides an alternative approach which enables quick and easy evaluation of custom health applications, and reduces product development time by up to six months.

Applications

Key advantages of the hSensor development platform include the flexibility it offers designers to evaluate a wide variety of use cases, low power consumption and ultra-small form factor (25.4mm × 30.5mm)

Example use cases of the platform include:

- **Optical Sensor Solutions:** The high-sensitivity optical sensor detects heart rate and SpO₂ when incorporated into finger based devices
- **ECG Solutions:** The analog front end (AFE) can be configured for continuous monitoring or intermittent spot checks in several applications, such as:
 - Body-wearable patches which continuously monitor ECG for several days on a single coin cell
 - Chest strap solutions that stream heart rate measurements and ECG for fitness enthusiasts or high end fitness teams
 - Arrhythmia detection devices for monitoring by healthcare professionals
- **Temperature Solutions:** With 0.1°C factory calibrated temperature sensors, customers can design thermometry applications that continuously monitor human body temperature for ninety days on a single coin cell battery
- **Multi-Sensor Solutions:** Some or all of the sensors can be combined to develop unique applications. For instance, the ECG, optical and temperature sensors, can be combined to easily design remote patient monitors.

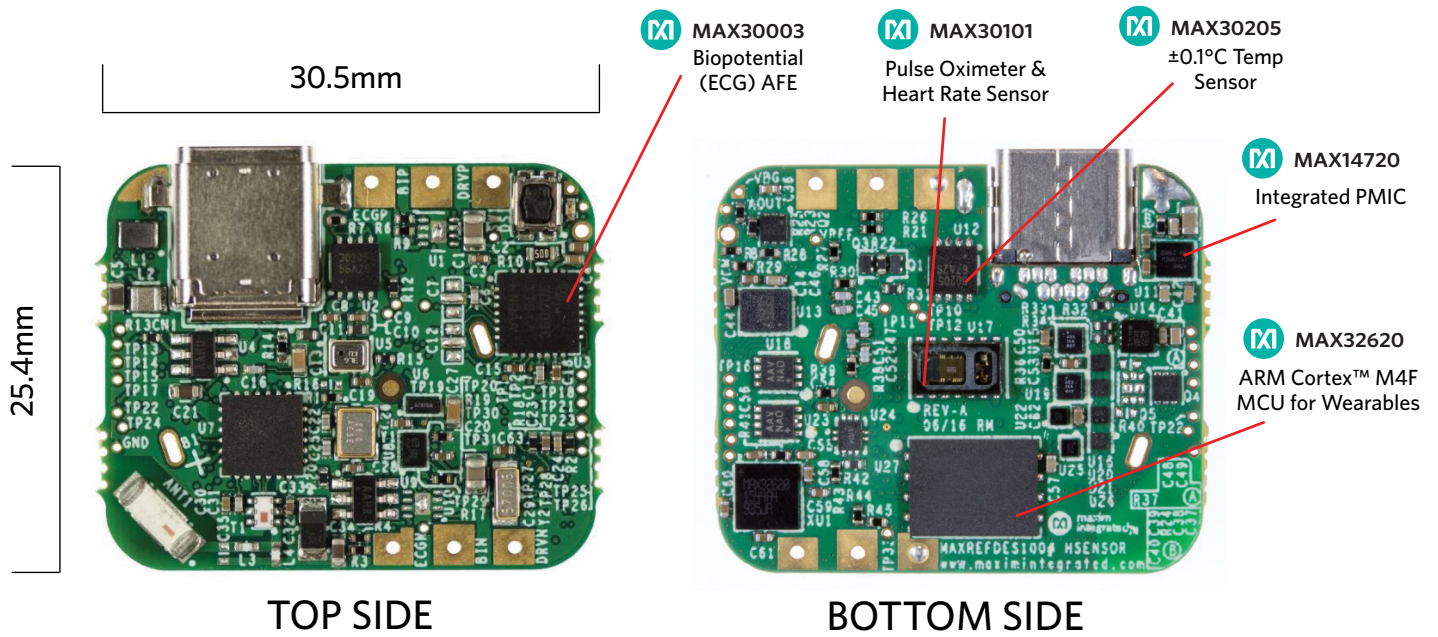


Figure 2. Maxim's hSensor Platform

Modes of Operation

The hSensor platform has two distinct modes of operation:

- In Wired Mode, data can be streamed directly from the device into a PC-based graphical user interface (GUI)
- In Wireless Mode, data is stored in flash memory on the device which can be subsequently downloaded for post-processing.

Summary

The hSensor Platform is available as a complete reference design reference design (MAXREFDES100). The hSensor board is accompanied by complete firmware with drivers, a debugger board, a graphical user interface, a USB cable and a battery holder. Algorithms may be loaded and adapted for specific applications. This reduces development time, enabling faster evaluations and significantly reducing time to market. The platform is supported on mbed® with firmware that can be optimized for specific use cases. The hSensor Platform is the only complete development platform available today for wearable health, wellness, and high-end fitness applications.

Learn more:

[MAXREFDES100: hSensor Platform](#)

[MAX30003: Ultra Low Power, Single-Channel Integrated Biopotential AFE](#)

[MAX30101: High-Sensitivity Pulse Oximeter and Heart-Rate Sensor](#)

[MAX30205: ±-0.1°C Factory Calibrated Clinical Grade Temperature Sensor](#)

[MAX32620: High-Performance, Ultra-Low Power Cortex-M4F Microcontroller for Wearable Devices](#)

[MAX14720: Integrated Power Management Solution for Wearables](#)

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