



## Wireless Medical Sensor Customisable ASIC Platform

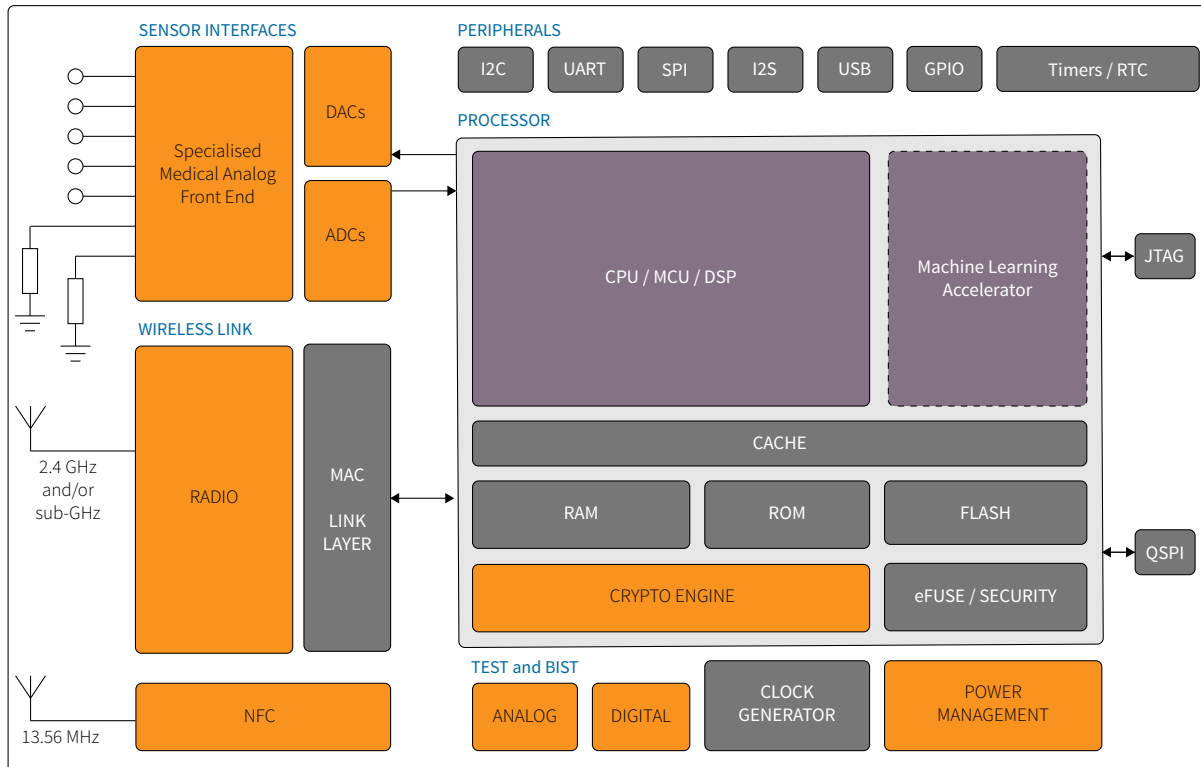
The eSi-MediSense is a customizable ASIC platform for ultra-low-power wireless vital signs and medical monitoring products. This versatile platform allows for fast time to market of medical and healthcare sensor wearables requiring sub GHz ISM band, BLE and/or NFC wireless connectivity. A high-performance configurable processor provides on-chip pre-processing of the sensor data with an optional machine learning accelerator providing the capability of performing AI at the edge.

The platform supports the accurate and reliable measurement of ECG, heart rate, respiration rate, and temperature. A flexible interface is also provided for electro chemical-based measurement such as amperometric, voltammetric, SpO2 oximeter or impedance measurements.

EnSilica's ASIC design team have the expertise to develop and integrate additional custom sensor interfaces with demanding performance requirements. External sensor chips can be interfaced using SPI or I2C and powered from the device's power management unit. The ASIC offers a high level of integration with minimum external components, low power consumption and a small footprint, and is designed to meet the relevant medical safety and performance requirements.

### Typical Application Areas

- Vital signs monitoring
- Disposable medical sensors
- Sports and healthcare devices



## Embedded Processor

- One or more CPU/DSP core configurations:
  - 1 or 2 Arm Cortex-M33/M55 CPUs
  - CEVA-BX1 DSP
- Optional machine learning accelerator (ML) such as Arm Ethos-U55 or CEVA NeuPro-S™

## Sensor Interfaces

- Single lead and multi-lead electrocardiogram (ECG)
- Clinical grade/professional medical accuracy
- R-R Heart rate
- Temperature sensor interfaces to ISO 80601-2-56
- SpO2 oximeter
- Bioimpedance channel capable of measuring respiration
- Multi-channel electrochemical impedance spectroscopy (EIS) measurement capability
- Electrodes 'Leads-Off' and 'Leads-On' detection
- Built-in self-test

## Wireless Connectivity

- ISM band radio
  - 2.4 GHz ISM band and MBANs
  - BLE 5.0, IEEE 802.15.4, IEEE 802.15.6 and proprietary physical layer support
  - Sub 1GHz: IEEE 802.15.6 and proprietary physical layer support
- Extensive range and reliable secure service
  - Input receiver sensitivity & transmit output power to provide >10m non-line-of-sight indoor wireless range from small form factor
  - 128-bit AES CCM
  - BLE Services & Profiles including HealthCare/ Medical and Sports & Fitness
- NFC-A tag
  - Simplified Bluetooth pairing
  - The sensor or diagnostic data can be read from a smartphone's NFC Reader

## Power Management and Clocking

- Sophisticated internal power management unit
- Supported voltages between 1.0V and 3.6V
- Multiple power states delivering a standby current of <1uA
- Minimal external components
- Operates from a single low-cost crystal

## Memory

- 700 KB embedded Flash
- Flash expandable via stacked die QSPI
- 128 KB SRAM as 8 banks of 16 KB with selectable modes for each power state
- 1 KB SRAM for retaining data in ultra-low power hibernate mode
- 32 Kb via programmable ROM

## Security and Cryptography

- Crypto accelerators: AES-256, SHA-512 and ECC-384
- True-random number generator (NIST 800-22)
- JTAG debug port disabled via eFuse

## International Safety Standards

- Designed to conform to: IEC 60601-1, IEC 60601-2-27 and IEC60601-2-49

## Software Support

- Range of RTOSs including FreeRTOS, ThreadX and Mbed OS
- Feature rich DSP software library for easy algorithm programming
- Full featured BLE stack
- Example BLE and NFC phone applications

## Packaging Options

- Low-pin count QFN or B/LGA,
- Bare die for flip-chip bumping directly on PCB

## IP Partners

