Electrocardiography (ECG) Sensor Data Sheet

ECG 011020

SPECIFICATIONS

> **Gain:** 1100
> **Range:** ±1.5mV (with VCC = 3.3V)
> **Bandwidth:** 0.5-40Hz
> **Consumption:** ~0.17mA
> **Input Voltage Range:** 2.0-3.5V
> **Input Impedance:** 7.5GOhm
> **CMRR:** 86dB

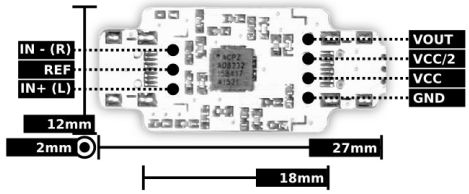

Fig. 1. Pin-out and physical dimensions.

FEATURES

> Bipolar differential measurement
> Pre-conditioned analog output
> High signal-to-noise ratio
> Small form factor
> Raw data output
> Easy-to-use
> "On-the-person" and "off-the-person" use

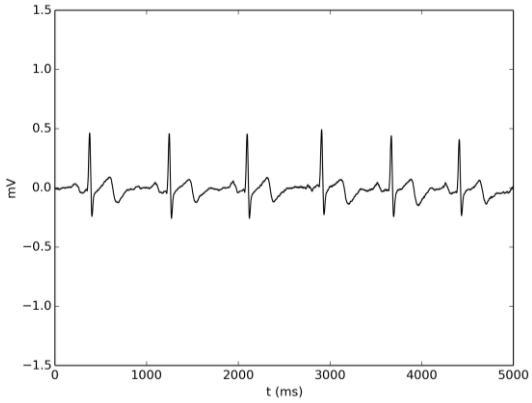

Fig. 2. Typical raw ECG data (acquired with BITalino (r)evolution) using an Einthoven triangle configuration.

APPLICATIONS

> Heart rate & heart rate variability
> Human-Computer Interaction
> Biometrics
> Affective computing
> Physiology studies
> Psychophysiology
> Biofeedback
> Biomedical devices prototyping

GENERAL DESCRIPTION

Heartbeats are triggered by bioelectrical signals of very low amplitude generated by a special set of cells in the heart (the SA node). Electrocardiography (ECG) enables the translation of these electrical signals into numerical values, enabling them to be used in a wide array of applications. Our sensor allow data acquisition not only at the chest ("on-the-person"), but also at the hand palms ("off-the-person"), and works both with pre-gelled and most types of dry electrodes. The bipolar configuration is ideal for low noise data acquisition.

Fig. 3. Example of a 1-lead placement with IN+ & IN- on the collarbones and REF on the iliac crest.

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REV B

BEWARE: DIRECT OR INDIRECT COUPLING TO THE MAINS MAY RESULT IN SHOCKING HAZARD

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TRANSFER FUNCTION

[-1.5mV, 1.5mV]

$$ECG(V) = \frac{\left(\frac{ADC}{2^n} - \frac{1}{2}\right) \times VCC}{G_{ECG}}$$

$$ECG(mV) = ECG(V) \times 1000$$

$VCC = 3.3V$ (operating voltage)
$G_{ECG} = 1100$ (sensor gain)

$ECG(V)$ – ECG value in Volt (V)
$ECG(mV)$ – ECG value in millivolt (mV)
ADC – Value sampled from the channel
n – Number of bits of the channel[1]

ORDERING GUIDE

Part #	Description
SENS-ECG-NC	Electrocardiography (ECG) sensor without connectors
SENS-ECG-UCE6	Electrocardiography (ECG) sensor with UC-E6 sockets on both sides for seamless plug & play connection to a BITalino (r)evolution Plugged or Core
SENS-ECG-SHER	Electrocardiography (ECG) sensor with a Molex Sherlock 4-pin socket on one side and a Molex Sherlock 3-pin socket on the other for easy power and signal cable connection or pin breakout using PCB wires

[1] The number of bits for each channel depends on the resolution of the Analog-to-Digital Converter (ADC); in BITalino the first four channels are sampled using 10-bit resolution ($n = 10$), while the last two may be sampled using 6-bit ($n = 6$).