Electrocardiography (ECG)
Sensor Data Sheet

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

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

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.

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

[-1.5mV, 1.5mV]

\[
ECG(V) = \left(\frac{ADC}{2^n} - \frac{1}{2}\right) \cdot \frac{V_{CC}}{G_{ECG}}
\]

\[
ECG(mV) = ECG(V) \cdot 1000
\]

\[
V_{CC} = 3.3V \text{ (operating voltage)}
\]

\[
G_{ECG} = 1100 \text{ (sensor gain)}
\]

\[
ECG(V) \text{ – ECG value in Volt (V)}
\]

\[
ECG(mV) \text{ – ECG value in millivolt (mV)}
\]

\[
ADC \text{ – Value sampled from the channel}
\]

\[
n \text{ – Number of bits of the channel}^1
\]

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**ORDERING GUIDE**

<table>
<thead>
<tr>
<th>Part #</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SENS-ECG-NC</td>
<td>Electrocardiography (ECG) sensor without connectors</td>
</tr>
<tr>
<td>SENS-ECG-UCE6</td>
<td>Electrocardiography (ECG) sensor with UC-E6 sockets on both sides for seamless plug &amp; play connection to a BITalino (r)evolution Plugged or Core</td>
</tr>
<tr>
<td>SENS-ECG-SHER</td>
<td>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</td>
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</tbody>
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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 \((n = 6)\).