Electromyography (EMG) Sensor Data Sheet

EMG 100716

SPECIFICATIONS

> **Gain:** 1009
> **Range:** ±1.64mV (with VCC = 3.3V)
> **Bandwidth:** 25-480Hz
> **Consumption:** ~0.17mA
> **Input Voltage Range:** 2.0-3.5V
> **Input Impedance:** 7.5GOhm
> **CMRR:** 86dB

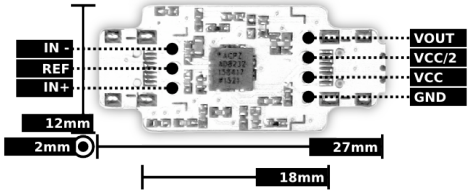

Fig. 1. Pin-out and physical dimensions.

FEATURES

> Bipolar differential measurement
> Pre-conditioned analog output
> High signal-to-noise ratio
> Small form factor
> Raw data output
> Easy-to-use

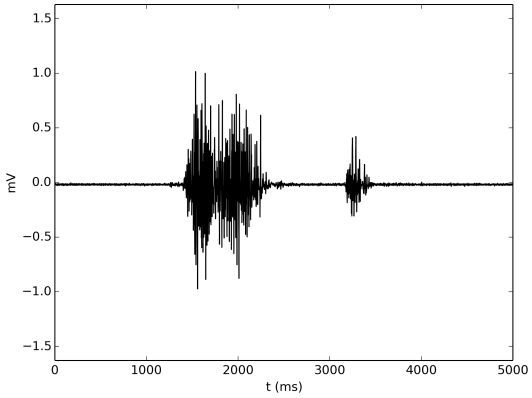

Fig. 2. Typical raw EMG data (acquired with BITalino (r)evolution) on the forearm for clenching (left) and ring finger flexing (right).

APPLICATIONS

> Human-Computer Interaction
> Robotics & Cybernetics
> Physiology studies
> Psychophysiology
> Biomechanics
> Biofeedback
> Muscle reflex studies
> Nerve conduction measurement
> Biomedical devices prototyping

GENERAL DESCRIPTION

Muscle activation is triggered by bioelectrical signals of very low amplitude sent from motor control neurons on our brain to the muscle fibers. Electromyography (EMG) enables the translation of these electrical signals into numerical values, enabling them to be used in a wide array of applications. Our sensor is especially designed for surface EMG, and works both with pre-gelled and most types of dry electrodes. The bipolar configuration is ideal for low-noise data acquisition, and the raw data output enables it to be used for human-computer interaction and biomedical projects alike.

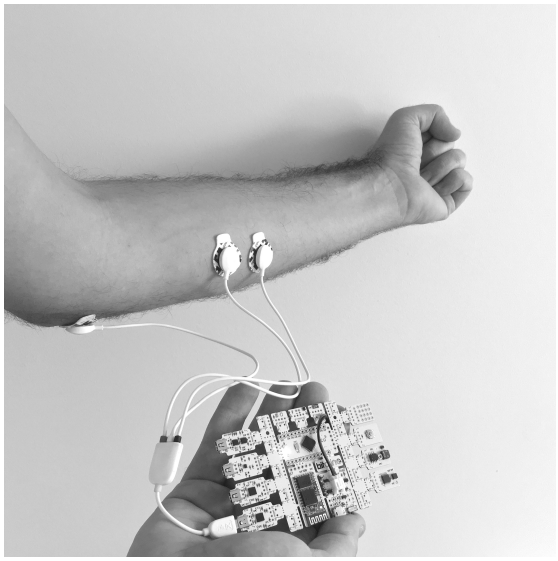

Fig. 3. Example electrode placement, with REF in a bone region (electrically neutral), and IN+ & IN- 20mm apart over the muscle belly (aligned with the muscle fibers).

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REV A

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

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TRANSFER FUNCTION

[-1.64mV, 1.64mV]

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

$$EMG(mV) = EMG(V).1000$$

$VCC = 3.3V$ (operating voltage)
$G_{EMG} = 1009$ (sensor gain)

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

ORDERING GUIDE

Part #	Description
SENS-EMG-NC	Electromyography (EMG) sensor without connectors
SENS-EMG-UCE6	Electromyography (EMG) sensor with UC-E6 sockets on both sides for seamless plug & play connection to a BITalino (r)evolution Plugged or Core
SENS-EMG-SHER	Electromyography (EMG) 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 ($n = 6$).