Electroencephalography (EEG) Sensor Data Sheet

SPECIFICATIONS
> Gain: 40000
> Range: ±37.5μV (with VCC = 3V)
> Bandwidth: 0.8-49Hz
> Consumption: ~3mA
> Input impedance: >100GOhm
> CMRR: 100dB

FEATURES
> Single-channel differential sensor
> Discrete elastic head band
> Pre-conditioned analog output
> High signal-to-noise ratio
> Shielded miniaturized cables
> Medical-grade raw data output
> Ready-to-use form factor

APPLICATIONS
> Evoked potentials analysis
> Neurofeedback
> Sleep studies
> Human-Computer Interaction
> Neurophysiology studies
> Psychophysiology

GENERAL DESCRIPTION
Our electroencephalography (EEG) sensor has been especially designed for both classic and localized EEG measurement. When a cap is too intrusive, only a limited number of channels are needed, or you’d like to synchronously record EEG and non-EEG biosignals, this is the perfect solution. The bipolar configuration, with two measurement electrodes detects the electrical potentials in the specific scalp region with respect to a reference electrode, which should be placed in a region of low muscular activity. The resulting signal is the amplified difference between these two signals, eliminating the common unwanted signals detected by the surfaces. Its convenient form factor enables a discrete placement in regions such as the forehead, occipital, and others. Examples:
[Link to examples]

Fig. 1. The sensor is provided with a convenient elastic head band to help secure the electrodes in place.

Fig. 2. Typical raw EEG data (acquired with biosignals).

Fig. 3. Example sensor placement for localized EEG.
**PLACEMENT RECOMMENDATIONS**

- Reference electrode placement
- Sensor electrodes must be 1cm-3cm apart
- Place the sensor on the electrodes
- Place the elastic band covering the snaps

**USAGE RECOMMENDATIONS**

**With noise influence**

EEG signal acquisition must be performed in a low electromagnetic noise environment.

A room without power supplies and with the lights off is on appropriate environment to perform the signal acquisitions.

**Our results in a noise controlled room:**

- Eyes open
- Signal acquired in a noisy environment
- Eyes closed

**Noise input**

The electromagnetic noise enters through the snaps and the cable which connects the sensor to the snaps.

This is a result of not using shielding structures.
**TRANSFER FUNCTION**

\[-37.5 \mu V, 37.5 \mu V\]

\[
EEG(V) = \left( \frac{\text{ADC}}{2^n} - \frac{1}{2} \right) \cdot VCC
\]

\[
EEG(\mu V) = EEG(V) \cdot 1 \times 10^6
\]

\( VCC = 3V \) (operating voltage)

\( G_{EEG} = 40000 \) (sensor gain)

**EEG(V)** – EEG value in Volt (V)

**EEG(\mu V)** – EEG value in microvolt (\( \mu V \))

**ADC** – Value sampled from the channel

\( n \) – Number of bits of the channel

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**PHYSICAL CHARACTERISTICS**

\[ W_1 \times L_1 \times H_1: \ 1.0\times1.8\times0.4cm \]

\[ W_2 \times L_2 \times H_2: \ 1.5\times2.3\times0.4cm \]

\[ A_1: \ 105.0\pm0.5cm \]

\[ A_2: \ 2.5\pm0.5cm \]

\[ A_3: \ 10.0\pm0.5cm \]

\[ D: \ 0.4cm \]

\[ S: \ White, \ Black, \ Blue, \ Green, \ Red, \ Yellow, \ Gray, \ or \ Brown \]

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\[ 1 \] The number of bits for each channel depends on the resolution of the Analog-to-Digital Converter (ADC); in biosignalsplux the default is 16-bit resolution (\( n = 16 \)), although 12-bit (\( n = 12 \)) and 8-bit (\( n = 8 \)) may also be found.
## Electroencephalography (EEG) Sensor Data Sheet

### ORDERING GUIDE

<table>
<thead>
<tr>
<th>Reference</th>
<th>Package Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>EEG1</td>
<td>Electroencephalography (EEG) sensor with standard physical characteristics and a random cable sleeve color</td>
</tr>
</tbody>
</table>
| EEG1-A1-A2-A3-S | Electroencephalography (EEG) sensor built with custom lengths A1, A2 and/or A3 (all in cm), and custom sleeve color S; for standard physical characteristics in A1, A2, A3, or S use 0. Examples:  
  > EEG1-200-0-0-0: Otherwise all-standard EEG sensor except for a 200cm cable A1  
  > EEG1-0-0-0-Yellow: Otherwise all-standard EEG sensor except for a yellow cable sleeve  
  > EEG1-50-10-10-Red: Fully custom EEG sensor with a 50cm cable A1, 10cm electrode cables A2 & A3, and a red cable sleeve |