

EEG/ECOG/ECG/EMG/EOG/... high performance biosignal acquisition

# g-USBamp generation 3.0

USB BIOSIGNAL AMPLIFIER

- Highlights**
- real DC-coupled EEG/ECOG/ECG/EMG/EOG biosignal amplifier with wide-range inputs
  - 24-bit high resolution ADCs, up to 38.4 kHz sampling with simultaneous S&H for all channels
  - internal floating point DSP for digital preprocessing and signal filtering
  - 16 input channels per unit, units can be stacked to set up multi-channel systems
  - internal amplifier calibration and automatic electrode impedance check
  - 4 independent ground potentials per unit to avoid interference between different signal types
  - various software solutions available (driver/API, recording software, MATLAB/SIMULINK/LabVIEW ...)
  - CE and FDA certified medical device for non-invasive and invasive recordings
  - USB 2.0 interface



Multiple units of *g-USBamp* can be stacked to set up a multi-channel system. All channels are sampled synchronously.



*g-USBamp* works with any type of passive electrodes and strip or grid ECoG electrodes. The *g.GAMMASys* active electrode system can be used as well. Single cell recordings can be performed in combination with *g.tec*'s spike sensor system.



*g-USBamp* can be used with a medical power supply or with a rechargeable battery pack for up to 10 hours of independent operation.



*g.tec* is an official **MATLAB** partner.  
(The MathWorks, Inc., Natick, MA.)

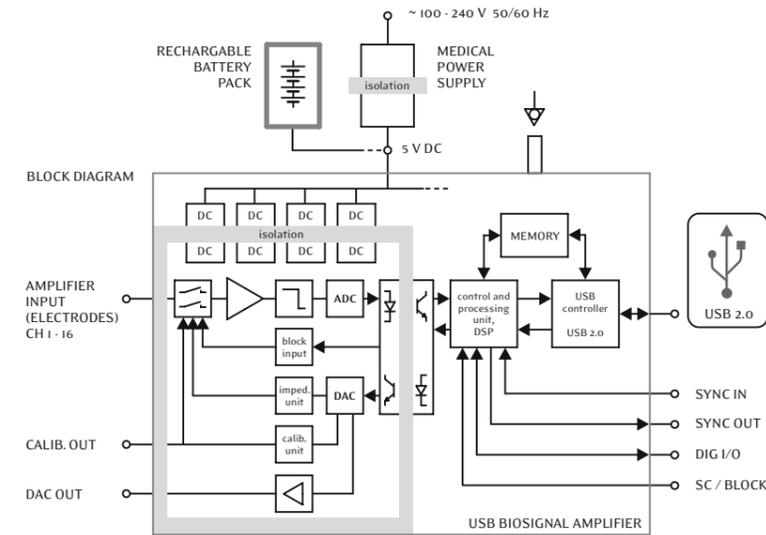
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certified medical device  
notified body **CE 0636**

**FDA** medical device  
clearance **k060803**



rear side view



## g-USBamp

USB BIOSIGNAL AMPLIFIER

- Sensitivity:** < 30 nV (LSB) - ± 250 µV
- Amplifier type:** real DC coupled
- 16 x ADC:** 24 bit (38.4 kHz internal sampling per channel)
- 2 x DAC:** 12 bit
- Input channels:** 16 mono- / 8 bi-polar (per device, software-selectable)
- Noise level:** < 0.3 µV RMS (0.1 - 10 Hz)
- Input impedance:** > 100 MΩ
- Input connectors:** standard safety connectors and system connectors
- Weight:** 1000 g
- Size:** 197 x 155 x 40 mm
- Applied part:** type CF
- Safety class:** II
- Directive of medical products:** 93/42/EWG
- Standards:** EN60601-1: 1996 (+A1 +A2 +A12 +A13)  
EN60601-2-26: 2004  
EN60601-1-2: 2003  
EN60601-2-25 +A1: 2001  
EN60601-2-40: 1998

*g-USBamp* is equipped with 8 TTL-trigger inputs which are sampled synchronously with all input channels. Also additional digital I/Os are accessible via a rear-side socket. The SC (short cut) input allows to disconnect the electrode sockets from the amplifiers during electrical or magnetical stimulation in order to reduce artifacts.

### Software options:

#### API / device driver:

This option enables the integration of the hardware into an existing data recording or processing system by the user or to program applications in C++ or other Windows-based programming languages. *g-USBamp* is also supported by BCI 2000.

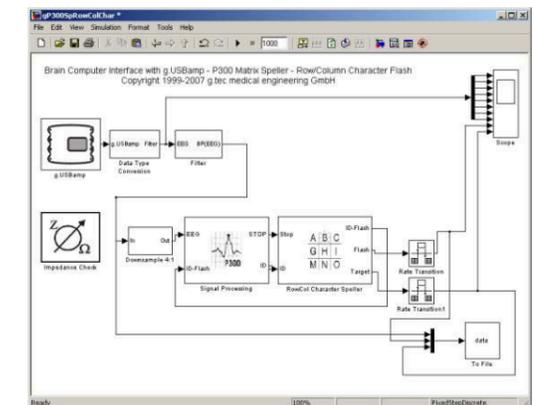
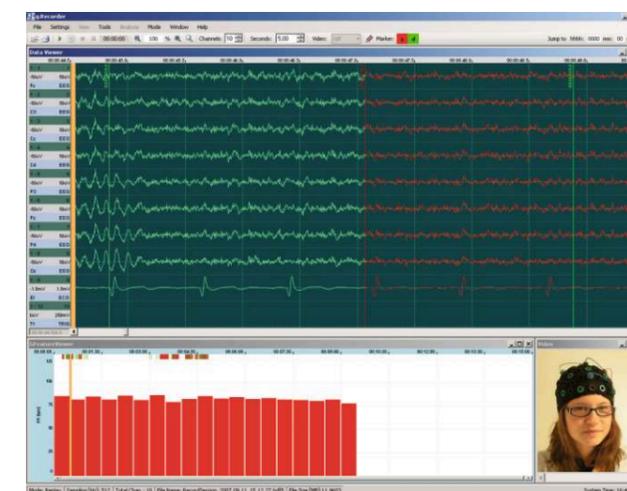


#### The MATLAB-API:

With the MATLAB API the MATLAB Data Acquisition Toolbox can be used to get full access to the recording buffer and to use the whole functionality of *g-USBamp*. The Data Acquisition Toolbox enables a quick and easy implementation of data visualization, processing and storage applications under MATLAB.

#### High-Speed Online Processing for SIMULINK (or LabVIEW):

Online/real-time biosignal processing and recording with the maximum system speed! *g-USBamp* appears as a block usable in any SIMULINK model. The design of the hardware-interrupt controlled driver allows immediate starting of the model without prior compilation. Also *g.tec*'s specialized *g.RTanalyze* blockset can be used for real-time parameter extraction and data classification. The example shows a BCI system (P300-spelling device) with *g-USBamp* realized in a SIMULINK model.



#### g-Recorder:

Our recording software supports all data acquisition devices provided by *g.tec*. Comfortable system configuration, data visualization and storage make *g-Recorder* a perfect tool for teaching, research and clinical investigation. *g-Recorder* also supports video-EEG and online biosignal parameter monitoring.

For offline biosignal analysis please see *g.BSanalyze*. This software package includes powerful toolboxes for EEG analysis, high-resolution EEG, ECG (heart rate and HRV analysis) and single beat ECG analysis as well as for biosignal classification.

