

World's First / World's Smallest / World's Thinnest
Super Integrated **EEG Biosensor** with a **Built-in MCU** for **Consumer Brain Wearables**



GS5001 EEG SoB - DTK

True Brain Signal Processor



All rights reserved. Copyright@G2G Solution, Inc. 2017

Overview



Today, consumer EEG wearables start appearing online store shelves as there are a growing number of the devices in the form of a stylish headset or headband. Unlike medical grade EEG devices, consumer EEG devices have typically used a single-channel biosensor or combinational multiplexing circuit with two or more electrodes. GS5001 is a fully integrated high-functioning 2-channel EEG system-on-a-Chip that is also built with a 32-bit microcontroller (MCU), as opposed to other conventional EEG sensor ICs, which allows system integrators or users to experience true brain signal processing and to be more flexible in creating smaller, thinner and low cost design beyond the typical hardware limitations.

GS5001 SoB DTK

The GS5001 System-on-Board (SoB) DTK provides a full range of brain signal processing techniques from signal detection, amplification, analog-to-digital conversion to data analysis, and data communication. It highlights the built-in 32-bit microcontroller (MCU), which is designed as an all-in-one system board without the need of separate external MCU and pertinent components.

It also supports three common methods of serial communication protocols like UART, SPI and I²C to communicate effectively and fully control attached devices. The portable configuration includes a battery for recharging and a Bluetooth for additional interface and connectivity options. The GS5001 SoB DTK offers a rich set of software functions such as analysis tools including a virtual oscilloscope, histogram, FFT, and data export for post-processing of raw EEG data.



Benefits and Applications

- Optimal reference option to build up customers' system-on-board
- Superb option to allow customers to have the benefits of reduced component count, less board space and reduced BOM costs.
- Best optimized for consumer brain wearables, such as multi-channel EEG headsets, EEG headbands and EEG Ear-Clip
- Ideally suited for portable, low-priced EEG monitoring devices
- Application branches: mhealth, brain wellness, education, entertainment, etc.

Quick Specifications

Model Number	GS5001 SoB
Revision Number	V1.0
Outline Dimension	30mm(W) x 45mm(L)
Weight	220 mg
Operating Voltage	3.6V(Typical 3.3V)
EEG Channel(s)	2 (up to 4)
Combinational Circuit	4-to-1 MUX
Standard Communication	URAT
Other Serial Comm.	SPI, I ² C
Max Power Consumption	< 5.7 mA
ESD Protection Rate (HBM)	2kV

Frequency & Sampling

Data Protocol	P2 Protocol
Frequency Width(bins)	Every 0.5 Hz
Frequency Range	0- 70 Hz
Sampling Frequency	256 Hz per 1 second
FFT Data Transition	512 data points at 2-second duration
Baud Rate	9,600, 19,200
	115,200 Baud rate

GS5001 SoB DTK Features

- 2 EEG channels with 1 REF contact
- Integrated MUX and a 12-bit ADC with 4-channel signal input
- Embedded RISC supports a 32-k byte e-Flash for the firmware storage and a 8-k byte SRAM MCU data-memory
- A fast restore function that reduces the duration of the otherwise long settling tails of the high-pass filters
- High performance of digital filtering technique with LPF and HPF
- Configurable to transfer data over the following interfaces: UART, I2C, SPI and GPIO
- Quick and easy wireless connection by a Bluetooth module located on the rear of DTK board
- 3.7V 110mAh rechargeable battery

Signal & Data Processing

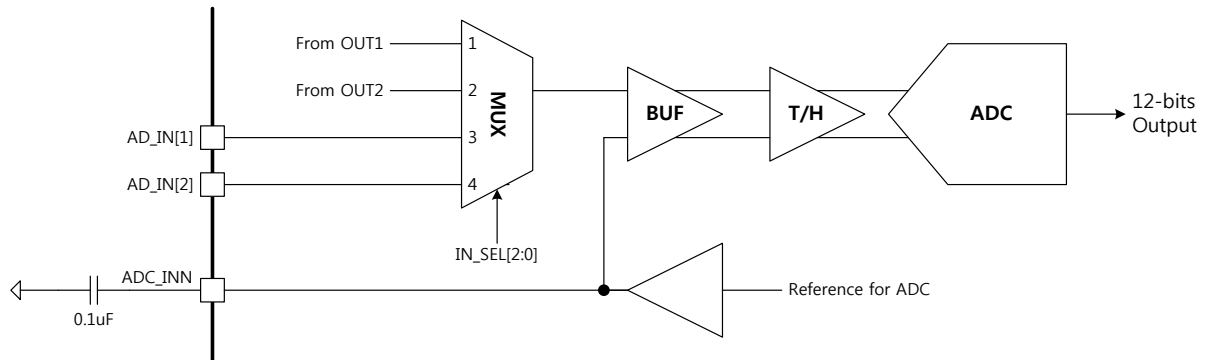
- Measures raw brainwave signals
- Processes, and display of all 6 types of brain signals with the following frequency bands:

Signal Waves	Frequency(Hz)
Delta band	0-4Hz
Theta band	4-8 Hz
Alpha band	8-13 Hz
SMR	12-15 Hz
Mid-Beta	15-20 Hz
Beta band	20-30 Hz
Gamma band	30-50 Hz

- Provides oscilloscope, histogram, FFT and data export for post-processing of raw EEG data.

Combinational Circuit Idea

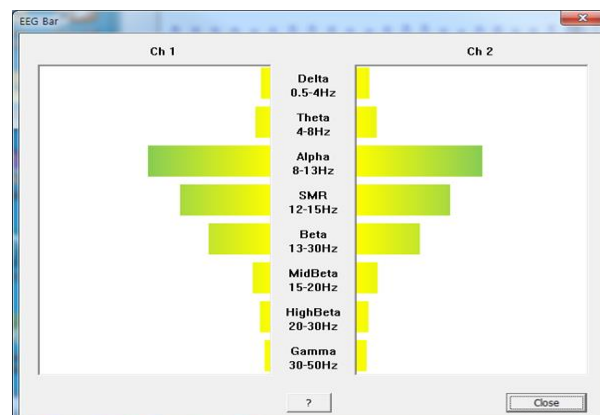
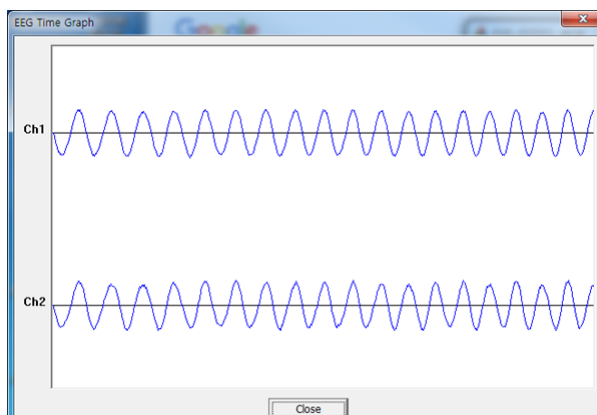
GS5001 SoB DTK enables system integrators to organize combinational circuits with a 4-to-1 multiplexer (4-CH MUX). It can help to convert external two analog signals additionally and eventually consist of multi-channel EEG/ECG biosensor configuration.



Configurable Test Tools and Support

The GS5001 SoB DTK includes quick and easy evaluation software; a user-friendly built-in analysis tools, including oscilloscope, histogram and FFT displays; simple input configurations; and the ability to export data in txt-formatted test files for post processing.

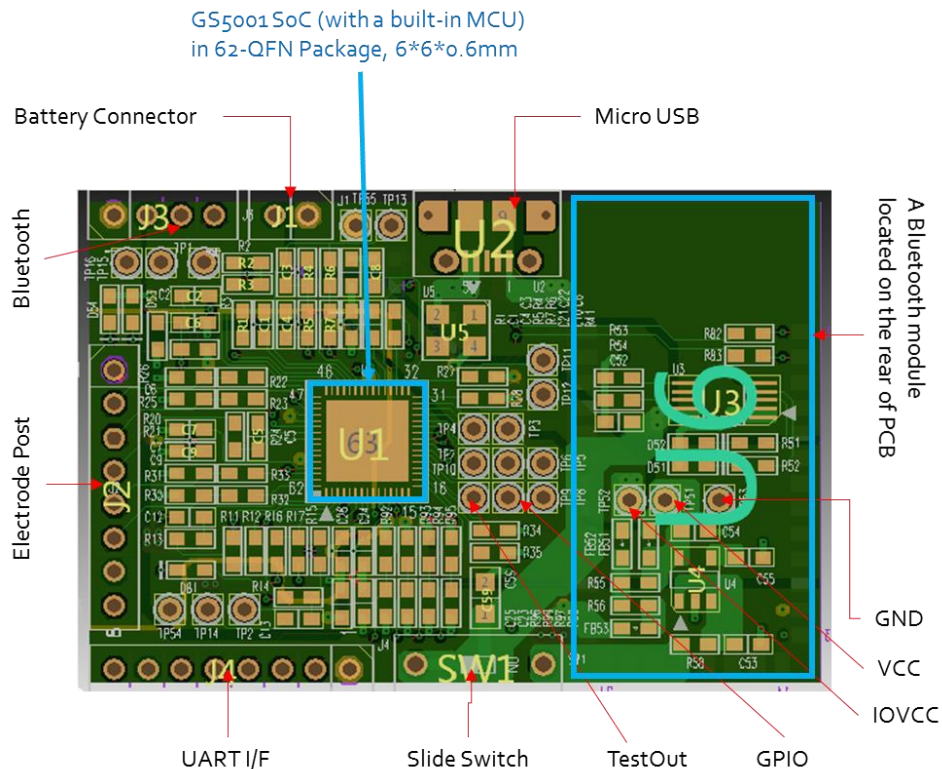
PC App.



Mobile App.



DTK PCB Placement



Custom Board Support

- GS5001 SoB DTK (Evaluation board)
- Test Application Programs (PC & Mobile)
- Quick User Manual
- Reference Circuit



G2G Solution, Inc. (<http://www.g2gsol.com>), is a Korea-based fabless semiconductor company specialized in On-cell touch controller, Touch Display Driver Integration (TDDI), Fingerprint ID and other fascinating chip solutions for smartphones, tablets, notebooks and other high-end MID's. The company is currently making a marked headway in the biometric solution industry by rolling out the world's first EEG SoC with a 32-bit MCU, which is dedicated to Consumer Brain Wearables. For inquiries, sales@g2gsol.com