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Specifications

Shimmer3/3R
GSR+ Unit



Key Features

3.5 mm jack connector for 2 extra channels of analog or digital data capture

One channel of scientifically reliable GSR data acquisition

EEPROM for board identification, with 2032 of its 2048 bytes free for user data

For biomedical-oriented research applications

4 digitally controlled measurement ranges which developers use to ensure accurate measurements across a variety of test subjects in real world deployments

Open system with no proprietary connectors, extensible software and data format

Introduction

The GSR+ unit provides connections and front-end amplification for one channel of Galvanic Skin Response (GSR) data acquisition (Electrodermal Resistance Measurement - EDR). The GSR+ also boasts an additional 3.5 mm connector for 2 extra channels of analog or digital data capture.

Product Overview

The GSR+ unit addresses challenges of mobility and provides high quality, scientifically reliable data. The GSR+ unit monitors skin conductance between 2 reusable electrodes attached to 2 fingers on one hand.

The 3.5 mm jack 3 V connector allows users to connect and power an external/third party device, supporting an extra 2 channels of analog or digital data acquisition.

Applications

Affective computing and cognitive factors

Connected/digital health solutions

Stress detection and analysis

Emotional engagement

Psychological arousal (excitement, mental effort, shock, etc.)

Marketing research

Weight and nutrition management

Supporting Software

Shimmer ConsensysPRO & ConsensysBASIC

Shimmer LabVIEW Instrument Driver

Shimmer MATLAB Instrument Driver

Shimmer Java / Android API

Shimmer C# API

Supporting Hardware & Accessories

Optical Pulse Probe (Finger) & Ear-Clip

Calibration Stand

Biophysical Leads

Straps, Documents, Charging Dock/Base, Case

Electrodes

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Technical Specifications

Current Draw	60µA[1]
Measurement Range[2]	8kΩ - 4.7MΩ (125µS - 0.2µS) +/- 10%, 22kΩ - 680kΩ (45µS - 1.5µS) +/- 3%
Frequency Range[3]	DC-15.9Hz
Input Protection	RF/EMI filtering; Current limiting; GSR inputs include defibrillation protection (survive only, not repeat)
Connections	
GSR Input 1 (Red), GSR Input 2 (Black)	Hospital-Grade 1mm Touchproof IEC/EN 60601-1 DIN 42802 jacks
Auxiliary Analog/Digital input	3.5mm 4-position jack
Bias Voltage across GSR Inputs	0.5V[4]
EEPROM memory	2048 bytes
Weight	30g (fully assembled with Shimmer3 and battery)
Dimensions	65 mm × 32 mm × 12 mm

[1] Calculated specification assuming that on-board EEPROM is inactive and no external sensor is attached and powered via the analog/digital input channels; exact value is subject to environmental and component variation.

[2] Error % is a tabulated average across the measurement range.

[3] Calculated specification, exact value subject to environmental and component variation.

[4] The bias voltage is 0.5V. However the circuit isn't a typical current source; it has been optimised for wearable operation. Whilst we don't publish full details of our circuit, it is worth noting that the body-bias current will shift with range selection. For example, at a typical "low" body resistance (120k or 8µS), the bias current on the body would be approx 5µA. That current will diminish as the conductance increases.

Shimmer3/3R Specifications

	Shimmer3R	**Shimmer3**
Processor	ST STM32U5A5 (32-bit Arm Cortex-M33), runs at 48 MHz 2.5 MB RAM, 4 MB flash	TI MSP430F5437A (16-bit), up to 24 MHz 16 KB RAM, 256 KB flash
Radio	Bluetooth Classic and Bluetooth Low Energy: Ezurio Vela IF820 module (453-00171C), integrated chip antenna	Class 2 Bluetooth: Roving Networks RN-42 (Classic), or Microchip RN4678 (Classic and Bluetooth Low Energy) on later units
Storage	microSD slot: microSDHC and microSDXC cards, FAT32 or exFAT Read by a PC through a *Shimmer Dock* or *Consensys Base*, or over USB-C as a removable drive Files can be listed, read and deleted over Bluetooth	microSD slot: microSD and microSDHC cards up to 32 GB, not microSDXC; an 8 GB SanDisk card is supplied Full-speed transfer to a PC through a *Shimmer Dock* or *Consensys Base*
Battery and power	3.7 V rechargeable lithium battery, 400 mAh, with a safety circuit Battery voltage monitoring, on a converter of its own Soft power control of the Bluetooth radio and the sensor supplies	3.7 V rechargeable lithium battery: 450 mAh, or 400 mAh on current units, with a safety circuit Battery voltage monitoring Soft power control of the Bluetooth radio and the microSD card Designed for EN 60601-1 compliance
Integrated sensors	3-axis low-noise accelerometer and 3-axis gyroscope (ST LSM6DSV) 3-axis wide-range accelerometer (ST LIS2DW12) 3-axis magnetometer (ST LIS2MDL) Pressure and temperature sensor (Bosch BMP390, or BMP581 on later units)	3-axis low-noise accelerometer 3-axis wide-range accelerometer 3-axis gyroscope 3-axis magnetometer Pressure and temperature sensor

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