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[http://duinopeak.com/wiki/index.php?title=AD8232\\_Single\\_Lead\\_Heart\\_Rate\\_Monitor\\_AD8232%E5%8D%95%E5%AF%BC%E8%81%94%E5%BF%83%E7%8E%87%E6%B5%8B%E9%87%8F](http://duinopeak.com/wiki/index.php?title=AD8232_Single_Lead_Heart_Rate_Monitor_AD8232%E5%8D%95%E5%AF%BC%E8%81%94%E5%BF%83%E7%8E%87%E6%B5%8B%E9%87%8F)

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The AD8232 is an integrated front end for heart rate monitoring by signal conditioning of cardiac biopotential signals.

An integrated signal conditioning module for ECG and other biopotential measurement applications. The device is designed to extract, amplify, and filter weak biopotential signals in the presence of noise from motion or remote electrode placement. This design enables ultra-low-power analog-to-digital converters (ADCs) or embedded microcontrollers to easily acquire output signals.

The AD8232 uses a bipolar high-pass filter to eliminate motion artifacts and electrode half-cell potentials. The filter is tightly coupled to the instrumentation amplifier to achieve a single stage of high gain and high-pass filtering, saving space and cost.

The AD8232 uses a usage-free operational amplifier to create a three-pole low-pass filter that eliminates additional noise. Users can choose the cut-off frequency of all filters to meet the needs of different types of applications.

To improve common-mode rejection of system line frequencies and other undesirable interferences, the AD8232 includes an

amplifier for driven lead applications such as right-hand drive (RLD).

The AD8232 includes a fast recovery feature that reduces the long tail of the already long build-up of a high-pass filter. If there is a sudden signal change in the amplifier rail voltage, such as lead disengagement, the AD8232 automatically adjusts to a higher filter cut-off. This feature allows the AD8232 to recover quickly, so that a valid measurement can be obtained as soon as possible after the lead is connected to the electrode of the measurement object.

The performance is guaranteed with a temperature range of 0 ° C to 70 ° C and an operating temperature range of -40 ° C to +85 ° C.

apply

1. Fitness and sports heart rate monitoring
2. Portable ECG
3. Remote health monitoring
4. Gaming peripherals
5. Biopotential signal acquisition

Pin Number Pin Name Description1 HPDRIVE Qualcomm Driver Output.

The HPDRIVE should be connected to the capacitor in the first

high-pass filter. The AD8232 drives this pin to keep HPSENSE at the same level as the reference. 2 +IN instrumentation amplifier positive input. +IN is usually attached to the left arm (LA) electrode. 3 -IN Negative input of the instrumentation amplifier. -IN is usually connected to a right arm (RA) electrode. 4 RLDFB right leg drives feedback input. The RLDFB is the feedback pin of the right-leg drive circuit. 5 RLD right leg drives the output. The drive electrode (usually the right leg) should be connected to the RLD pin. 6 SW Quick Recovery Switch Pin. This pin should be connected to the output of the second high-pass filter. 7 OPAMP+ op amp non-inverting inputs. 8 REFOUT reference buffer output. The instrumentation amplifier output refers to this potential. REFOUT should be used as a virtual ground for any point in the circuit where a reference signal is required. 9 OPAMP- op amp inverting input. 10 OUT op amp output. This output provides a conditioned heart rate signal. OUT can be connected to the input of the ADC. 11 LOD- lead off comparator output. In DC lead drop-off detection mode, LOD- is in a high state when disconnected from the -IN electrode, and vice versa is in a low state. In AC lead-off detection mode, the LOD- is always low. Lead shedding comparator output. In DC lead drop-off detection mode, when the +IN electrode is disconnected, the LOD+ is in a

high state and vice versa. In AC lead drop-off detection mode, LOD+ is in a high state when the -IN or +IN electrodes are disconnected, and low when both electrodes are connected. 12 LOD+13 SDN shutdown control inputs. Drive SDN low to enter low-power shutdown mode. 14 AC/DC lead off mode control inputs. For DC lead drop-off mode, the AC/DC pin should be driven low. For AC lead drop mode, the AC/DC pin should be driven high. 15 FR Quick Recovery Control Input. Driving the FR to a high level enables a fast recovery mode; Otherwise, it should be driven low. 16 GND Power Ground. 17+VS power pins. 18 REFIN reference buffer input. The REFIN (High Impedance Input Pin) can be used to set the level of the reference buffer. 19 IAOUT instrumentation amplifier output pins. 20 HIGH-PASS DETECTION INPUT OF THE HPSENSE INSTRUMENTATION AMPLIFIER. The HPSENSE should be connected to the R and C junctions where the DC-blocking circuit transition frequency is set. EP Exposed Pads. Exposed pads should be GND or remain unconnected. **Description:** The AD8232 SparkFun Single Lead Heart Rate Monitor is a cost-effective board used to measure the electrical activity of the heart. This electrical activity can be charted as an ECG or Electrocardiogram and output as an analog reading. ECGs can be extremely noisy, the AD8232 Single Lead Heart Rate Monitor acts as an op amp to help obtain a clear signal from the PR and QT Intervals easily. The AD8232 is an integrated signal conditioning block for ECG and other biopotential measurement applications. It is designed to extract, amplify, and filter small biopotential signals in the presence of noisy conditions, such as those created by motion or remote electrode placement.

The AD8232 Heart Rate Monitor breaks out nine connections from the IC that you can solder pins, wires, or other connectors to. SDN, LO+, LO-, OUTPUT, 3.3V, GND provide essential pins for operating this monitor with an Arduino or other development board. Also provided on this board are RA (Right Arm), LA (Left Arm), and RL (Right Leg) pins to attach and use your own custom sensors. Additionally, there is an LED indicator light that will pulsate to the rhythm of a heart beat. Biomedical Sensor Pads and Sensor Cable are required to use the heart monitor and can be found in the *Recommended Products* section below.

**Note:** This product is *NOT* a medical device and is not intended to be used as such or as an accessory to such nor diagnose or treat any conditions.