Heart Rate Monitor Kit With AD8232 ECG Sensor Module

The Heart Rate Monitor Kit with AD8232 ECG sensor module Kit For Arduino is a cost-effective board use to measure the electrical activity of the heart. This electrical activity can be chart 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 ECG module AD8232 heart ECG monitoring sensor module is an integrated signal conditioning block for ECG and other bio-potential measurement applications.

The ECG Module AD8232 Heart ECG Monitoring Sensor Module Kit for Arduino is designed to extract, amplify, and filter small bio-potential 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 too. SDN, LO+, LO-, OUTPUT, 3.3V, GND provide essential pins for operating this monitor with an Arduino or other development board.

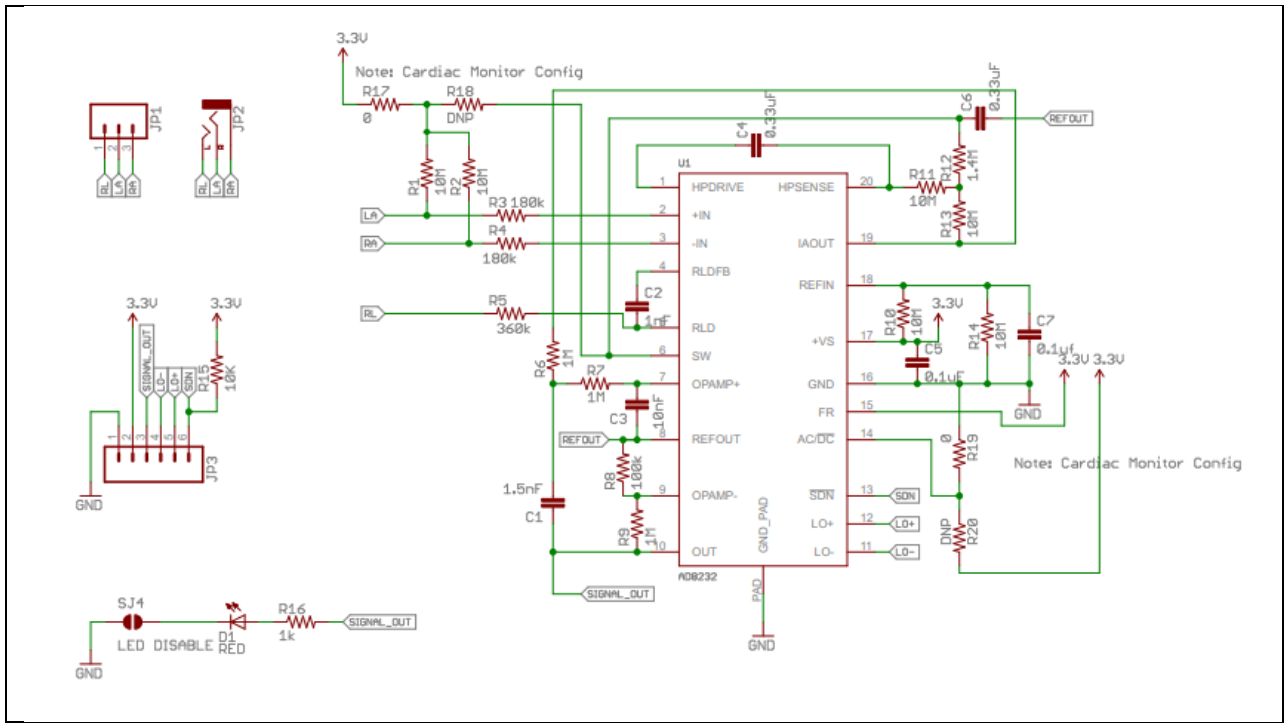
FEATURES:

- 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.
- Single Lead Heart Rate Monitor is a cost-effective board used to measure the electrical activity of the heart.
- AD8232 is an integrated signal conditioning block for ECG and other biopotential measurement applications.
- 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.
- This electrical activity can be charged as an ECG or Electrocardiogram and output as an analog reading.
- Leads-Off Detection.
- Shutdown Pin.
- LED Indicator.
- Analog Output.
- 3.5 mm Jack for Biomedical Pad Connection.

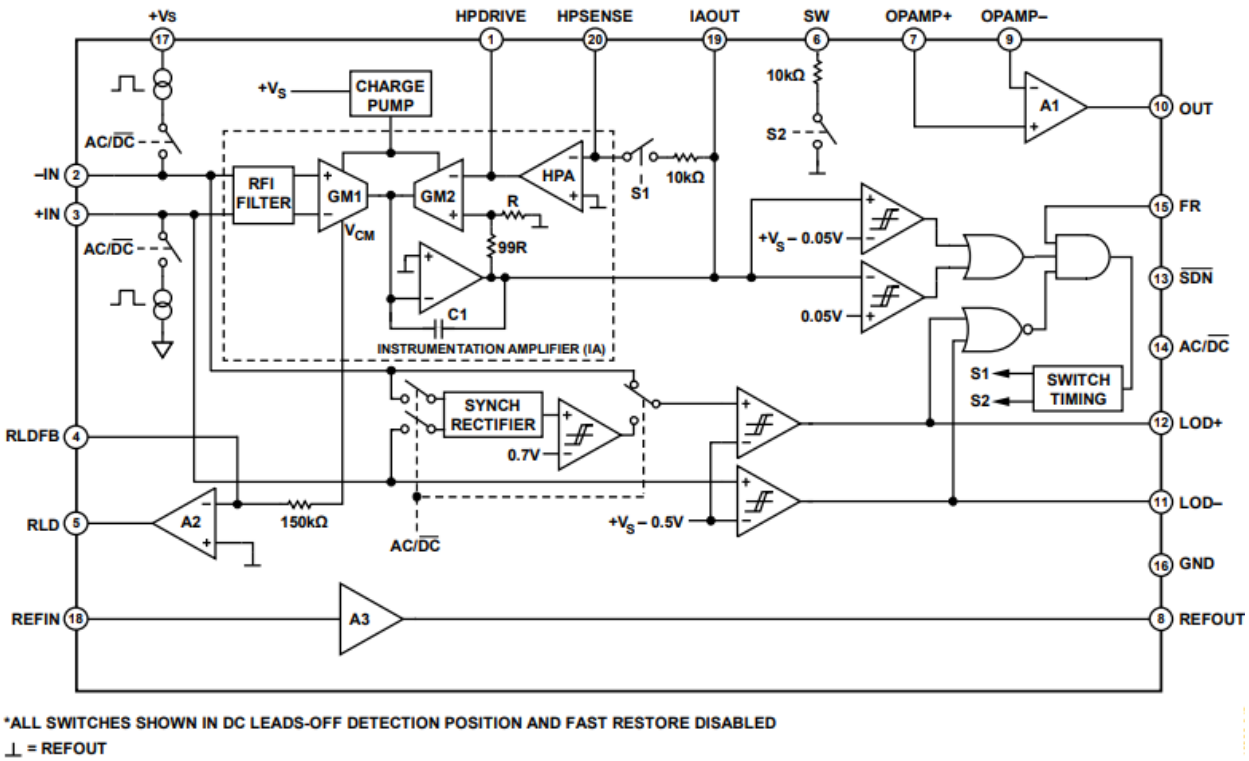
SPECIFICATIONS:

- Operating Voltage (VDC): 3.3
- Operating Temperature (°C): -40 to 90
- Dimension(LxWxH): 36x30x18
- Weight(gm): 5

SCHEMATIC DIAGRAM:



FUNCTIONAL DESCRIPTION:

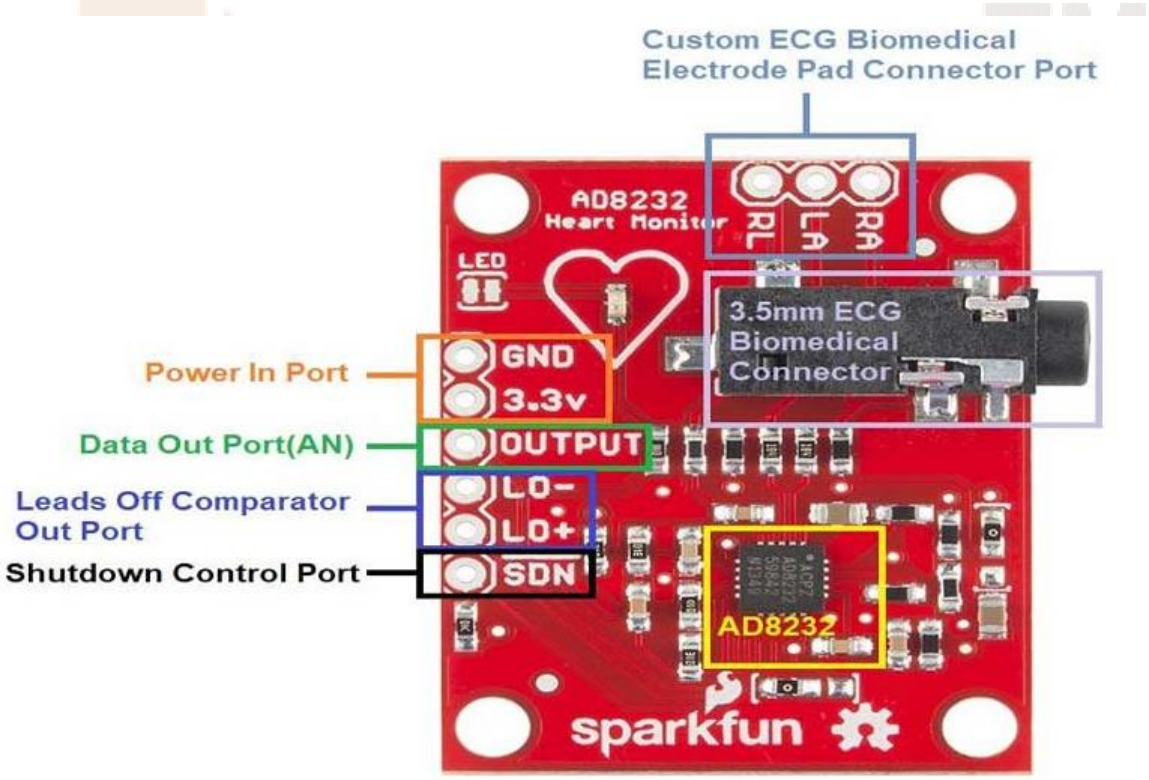


*ALL SWITCHES SHOWN IN DC LEADS-OFF DETECTION POSITION AND FAST RESTORE DISABLED
⊥ = REFOUT

- 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. This design allows for an ultralow power analog-to-digital converter (ADC) or an embedded microcontroller to acquire the output signal easily
- The AD8232 can implement a two-pole high-pass filter for eliminating motion artifacts and the electrode half-cell potential. This filter is tightly coupled with the instrumentation architecture of the amplifier to allow both large gain and high-pass filtering in a single stage, thereby saving space and cost. An uncommitted operational amplifier enables the AD8232 to create a three-pole low-pass filter to remove additional noise. The user can select the frequency cutoff of all filters to suit different types of applications.
- To improve common-mode rejection of the line frequencies in the system and other undesired interferences, the AD8232 includes an amplifier for driven lead applications,

such as right leg drive (RLD). The AD8232 includes a fast restore function that reduces the duration of otherwise long settling tails of the high-pass filters. After an abrupt signal change that rails the amplifier (such as a leads off condition), the AD8232 automatically adjusts to a higher filter cutoff. This feature allows the AD8232 to recover quickly, and therefore, to take valid measurements soon after connecting the electrodes to the subject.

WORKING PRINCIPLE:

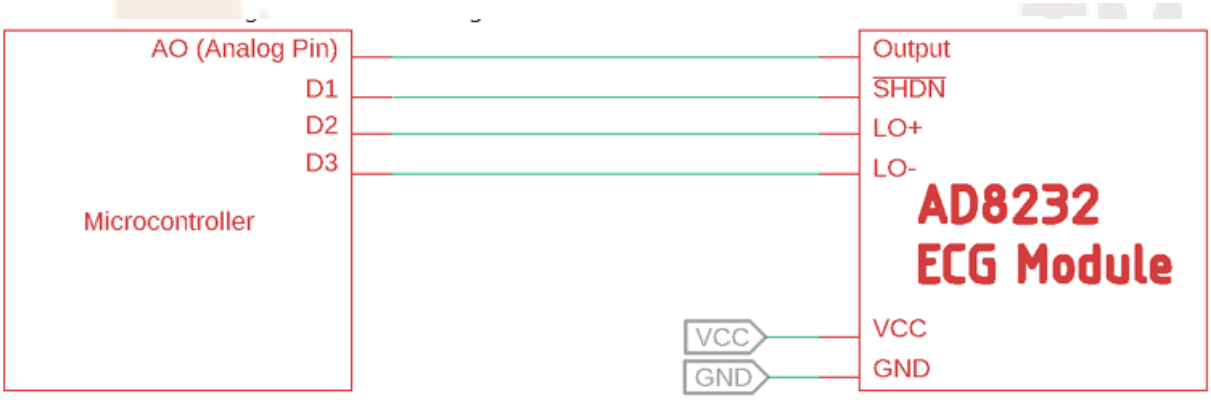


- The AD8232 ECG Module is a cost-effective board used to measure the electrical activity of the heart. This electrical activity can be charted as an ECG or Electrocardiogram and output as an analog reading.
- Additionally, this board includes pins like the right arm (RA), left arm (LA) & right leg (RL) pins to connect custom sensors. An LED indicator in this board is used to indicate the heartbeat rhythm of humans. The AD8232 ECG module comprises a function like quick restore used to decrease the length of long resolving tails of the HPFs.

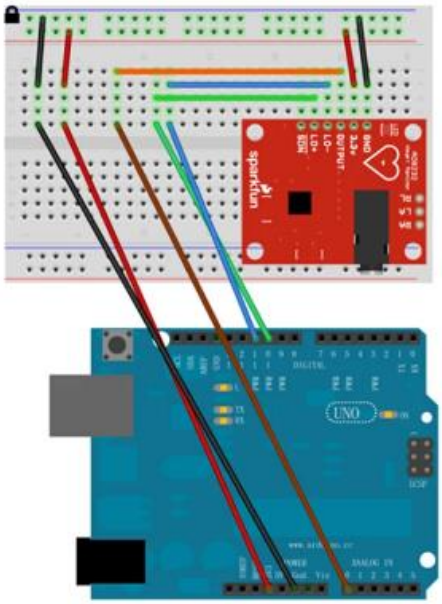
INTERFACING DIAGRAM:

AD8232 ECG module can be easily interfaced with any microcontroller unit. It requires one analog pin for getting the output of the sensor and three digital pins for control related operations.

Follow the below image for the interfacing related information.



CONNECTION DIAGRAM:



PIN FUNCTION:

Arduino	**Rate Monitor Module**
3.3V	3.3V
Pin 10	L0+
Pin 11	L0-
Analog 0	Output
Gnd	Gnd

AD8232 ECG Module:

Pin Name	**Description**
GND	Power Supply Ground
3.3v	Power Supply 3.3v
Output (ADC)	Operational Amplifier Output. The fully conditioned heart rate signal is present at this output. OUT can be connected to the input of an ADC.
LO-	Leads Off Comparator Output. In dc leads off detection mode, LO− is high when the electrode to −IN is disconnected, and it is low when connected
LO+	Leads Off Comparator Output. In dc leads off detection mode, LOD+ is high when the +IN electrode is disconnected, and it is low when connected
SDN	Shutdown Control Input. Drive SDN low to enter the low power shutdown mode.
RA (Right Arm)	RED Biomedical electrode pad RA(input). Instrumentation Amplifier Negative Input. −IN is typically connected to the right arm (RA) electrode

LA (Left Arm)	YELLOW Biomedical electrode pad LA(input). Instrumentation Amplifier Positive Input. +IN is typically connected to the left arm (LA) electrode
RL(Right Leg)	GREEN Biomedical electrode pad RL(input). Right Leg Drive Output. Connect the driven electrode (typically, right leg) to the RLD pin
3.5mm ECG Biomedical Electrode Connector Jack	Combine Biomedical Electrode pad Connector of RA, LA, RL

For AD8232 :

Pin No	Pin Name	Description
1	HPDRIVE	High-Pass Driver Output. Connect HPDRIVE to the capacitor in the first high-pass filter. The AD8232 drives this pin to keep HPSENSE at the same level as the reference voltage.
2	+IN	Instrumentation Amplifier Positive Input. +IN is typically connected to the left arm (LA) electrode.
3	−IN	Instrumentation Amplifier Negative Input. −IN is typically connected to the right arm (RA) electrode.
4	RLDFB	Right Leg Drive Feedback Input. RLDFB is the feedback terminal for the right leg drive circuit.
5	RLD	Right Leg Drive Output. Connect the driven electrode (typically, right leg) to the RLD pin.
6	SW	Fast Restore Switch Terminal. Connect this terminal to the output of the second high-pass filter.
7	OPAMP+	Operational Amplifier Noninverting Input
8	REFOUT	Reference Buffer Output. The instrumentation amplifier output is referenced to this potential. Use REFOUT as a virtual ground for any point in the circuit that needs a signal reference.
9	OPAMP−	Operational Amplifier Inverting Input
10	OUT	Operational Amplifier Output. The fully conditioned heart rate signal is present at this output. OUT can be connected to the input of an ADC.
11	LOD−	Leads Off Comparator Output. In dc leads off detection mode, LOD− is high when the electrode to −IN is disconnected, and it is

		low when connected. In ac leads off detection mode, LOD− is always low.
12	LOD+	Leads Off Comparator Output. In dc leads off detection mode, LOD+ is high when the +IN electrode is disconnected, and it is low when connected. In ac leads off detection mode, LOD+ is high when either the −IN or +IN electrode is disconnected, and it is low when both electrodes are connected.
13	$\overline{SDN}$	Shutdown Control Input. Drive $\overline{SDN}$ low to enter the low power shutdown mode.
14	AC/$\overline{DC}$	Leads Off Mode Control Input. Drive the AC/$\overline{DC}$ pin low for dc leads off mode. Drive the AC/ $\overline{DC}$ pin high for ac leads off mode
15	FR	Fast Restore Control Input. Drive FR high to enable fast recovery mode; otherwise, drive it low.
16	GND	Power Supply Ground.
17	+VS	Power Supply Terminal.
18	REFIN	Reference Buffer Input. Use REFIN, a high impedance input terminal, to set the level of the reference buffer.
19	IAOUT	Instrumentation Amplifier Output Terminal.
20	HPSENSE	High-Pass Sense Input for Instrumentation Amplifier. Connect HPSENSE to the junction of R and C that sets the corner frequency of the dc blocking circuit.
	EP	Exposed Pad. Connect the exposed pad to GND or leave it unconnected

APPLICATIONS:

- Fitness and exercise heart rate monitoring
- Portable ECG
- Remote health care
- Gaming peripherals
- Biological signal acquisition

PACKAGE INCLUDES:

- 1 x Ecg module AD8232 heart ECG monitoring sensor module.
- 1 x Sensor cable.
- 3 x Electrode Pads.