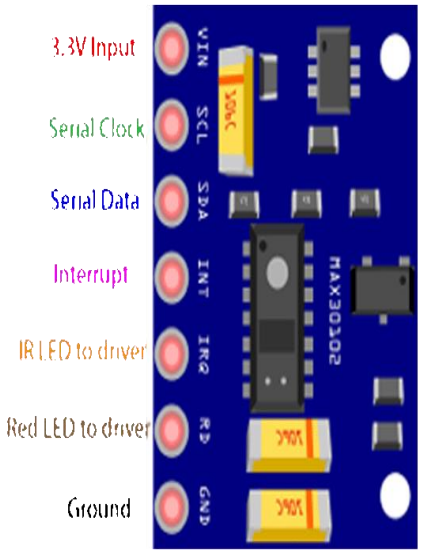
MAX30100 - Heart Rate Oxygen Pulse Sensor



MAX30100 Heart Rate Oxygen Pulse Sensor
MAX30100 Pinout

Description of MAX30100

MAX30100 is a multipurpose sensor used for multiple applications. It is a **heart rate monitoring** sensor along with a **pulse oximeter**. The sensor comprises two Light Emitting Diodes, a photodetector, and a series of low noise signal processing devices to detect heart rate and to perform pulse oximetry.

Features of MAX03100

Here are some of the features and specifications of the MAX03100 Heart Rate Oxygen pulse sensor.

1. Operating Voltage - 1.8V to 3.3V
2. Input Current - 20mA
3. Integrated Ambient Light Cancellation
4. High Sample Rate Capability
5. Fast Data Output Capability

Pin Configuration of MAX30100 Oximeter Module

Below is the pin configuration of the MAX30100 module. It is a 7 pin sensor module with an enabled I2C communication protocol to interact with the microcontroller.

Pin Type	Pin Function
VIN	Voltage Input
SCL	I2C - Serial Clock
SDA	I2C - Serial Data
INT	Active low interrupt
IRD	IR LED Cathode and LED Driver Connection Point(Leave floating in the circuit)
RD	Red LED Cathode and LED Driver Connection Point(Leave floating in the circuit)
GND	Ground pin

Note: There are two module versions of the MAX30100 sensor module. The one which we have showcased is the 7-pin version, whereas there is a 5-pin version as well which does not have IRQ and RD pin.

The 5-pin module is considered to be more accurate as the circuitry for the module is on the other side of the sensor.

Alternatives for MAX30100

Pulse 3+, Proto Central AFE4490, ROHM BH1792GLC, FSH 7060

Equivalent for MAX30100

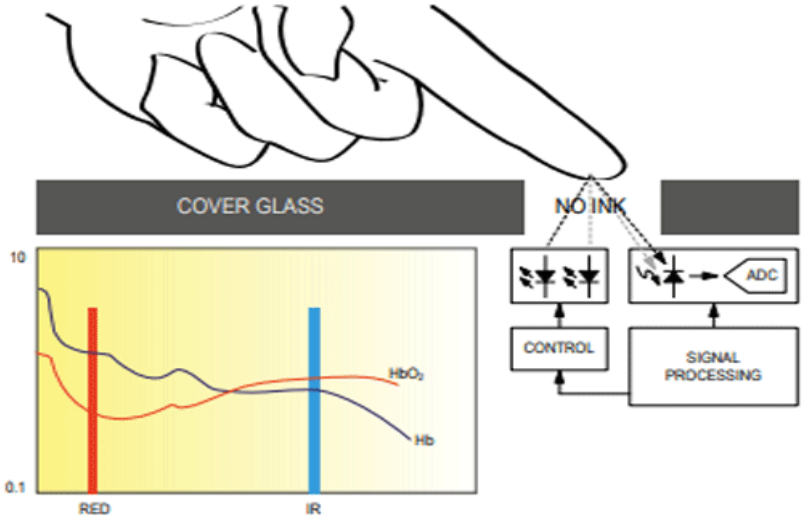
MAX30102

Note: More technical information can be found in the **MAX30100 Datasheet** linked at the bottom of this page.

Working of the MAX30100 Oximeter

Working of an oximeter:

The sensor consists of a pair of Light-emitting diode which emits monochromatic red light at a wavelength of 660nm and infrared light at a wavelength of 940 nm. These wavelengths are particularly chosen as at this wavelength oxygenated and deoxygenated hemoglobin have very different absorption properties. As shown in the graph below, it can be seen that there is a difference between HbO2(oxygenated Hb) and Hb(deoxygenated Hb) when subjected to these specific wavelengths.

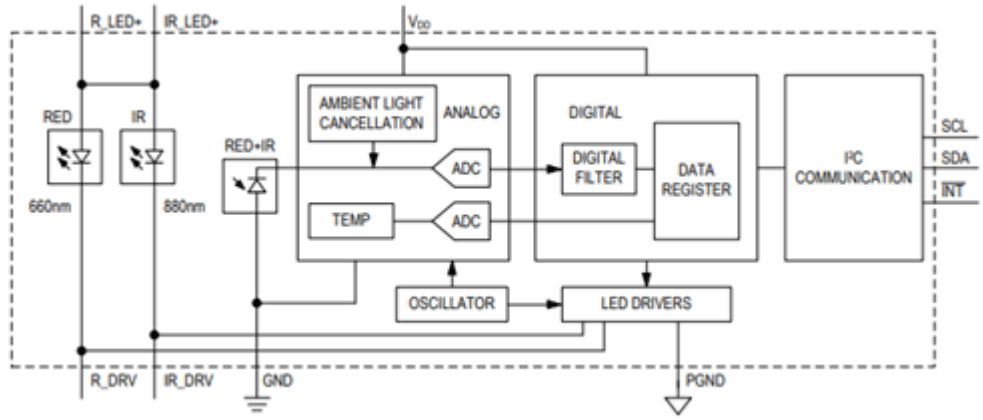


Sensor part:

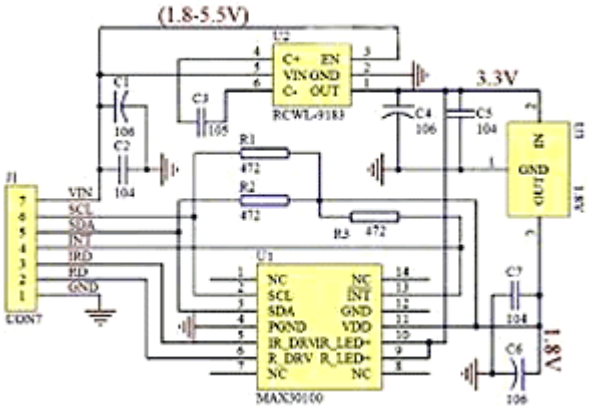
There are two parts to the sensor, an emitting diode, and a photoreceiver. As the photodiode emits the light, it falls over the finger which has to be placed steadily. The light emitted gets absorbed by the oxygenated blood and the rest of the light is reflected through the finger and falls over the detector whose output data is then processed and read through a microcontroller.

Functional Block and the Circuit Diagram of MAX30100 Module

Below is the functional block for the MAX30100 module. The module consists of two LEDs (IR and RED) both of specific wavelengths, along with a photodetector to detect the received light.



The output from the photodiode is sent to the analog-to-digital converter from which the digital data is sent from a filter to the digital data register. The data can be collected from the register and can be sent to the microcontroller following the I2C communication protocol.



The image above showcases the internal circuitry of the MAX30100 module and can be used as a reference circuit while designing your own custom module.

Applications of MAX30100

Here are some of the applications where MAX30100 can be used:

1. Medical Oxygen measurement devices
2. Wearable Devices
3. Fitness Assistant systems