## Project goals

* Build a low-cost, low power, small digital module to measure mussel heart rate through the shell.
* Module will be built to be connected to 4-conductor cable to supply V+, GND, and I2C signal lines SCL and SDA, so that it can be connected and powered from a microcontroller.
* Powered off of 5V or 3.3V power supply, but module will have 1.8V converter to deal with interfacing with MAX3010x sensor logic pins.

## Sensor chip options (MAX3010x family):

* MAX30101
  + $5.02 each at digikey, MAX30101EFD+-ND
* MAX30102
  + $7.37 each at digikey, MAX30102EFD+-ND
  + Has a slightly narrower-spec’d ADC clock rate, and carries a ESD resistance rating of 2.5kV and latchup immunity of ± 250mA, which the other chips do not quote
  + Pin 7 in a NC on this chip because it lacks a green LED, while the 30101 and 30105 use pin 7 as the green LED driver pin.
* MAX30105
  + $4.51 each at digikey, MAX30105EFD+-ND
  + Sold as a particle sensor and smoke detector, but should be functionally identical to the MAX30101, and the Sparkfun MAX3010x library already can use this chip to read heart rate when run in Red+IR or IR-only mode.

## MAX3010x chip notes

* Recommends a 1µF capacitor minimum (10µF recommended) near the VLED+ input pins on the chip. Also a 4.7µF capacitor on the VDD input.
* Slower sample rates permit higher ADC resolution (15-18 bits) when coupled with different pulse widths for the LEDs. To get the full 18bit resolution at 1000 samples per second, you can use up to 411µs pulsewidth, but you could not get 1600 samples per second at 411µs pulsewidth. (See Table 12 of datasheet).
* If using the INT pin, you need to put a 4.7kohm pullup resistor on it.
* On the 30101 and 30105, it is possible to use the red, IR, or green LEDs for heart rate measurements.

## Arduino library:

* <https://github.com/sparkfun/SparkFun_MAX3010x_Sensor_Library>

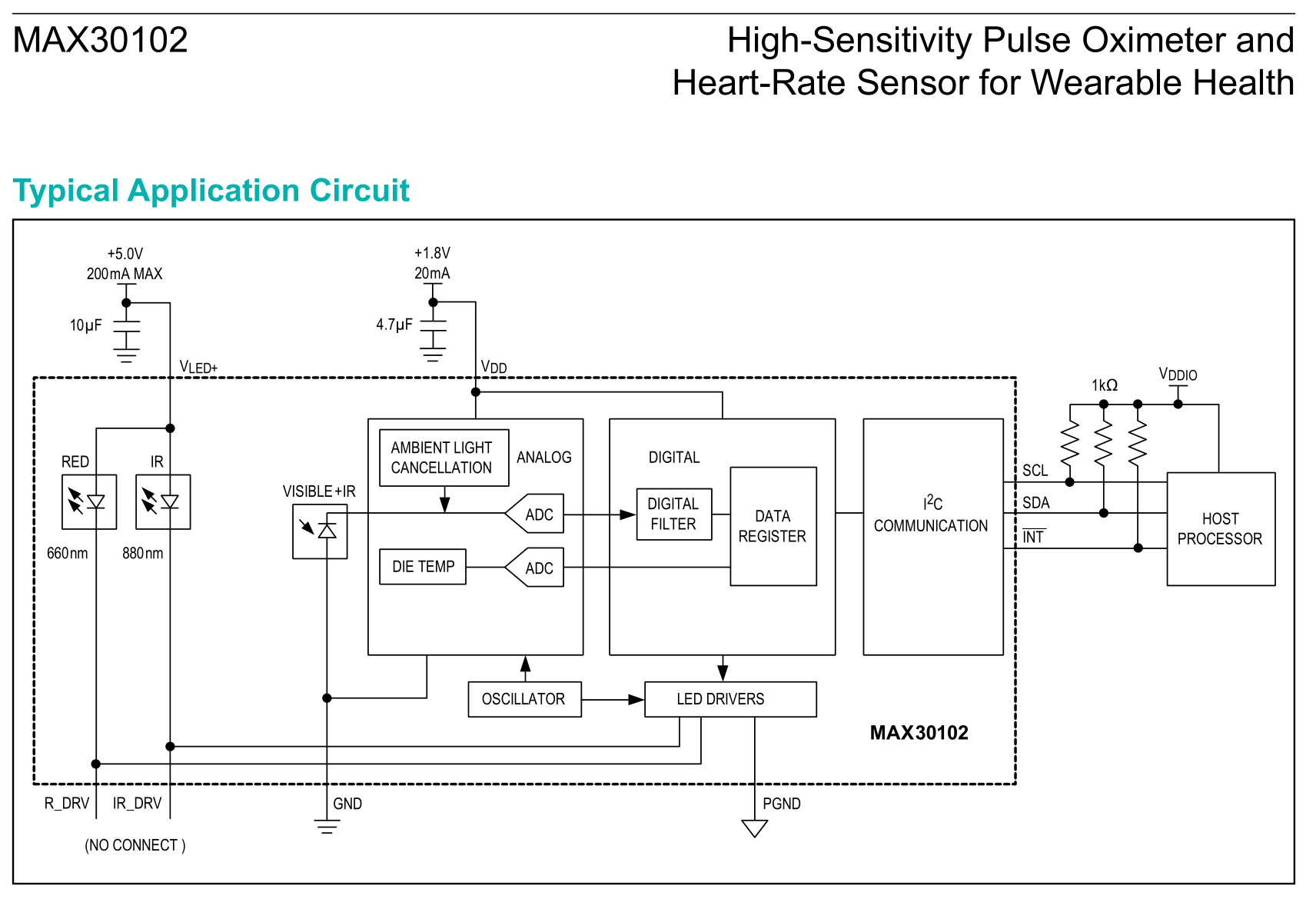


Figure . MAX30102 heart rate sensor application circuit. Note the capacitors on both VLED+ and VDD.

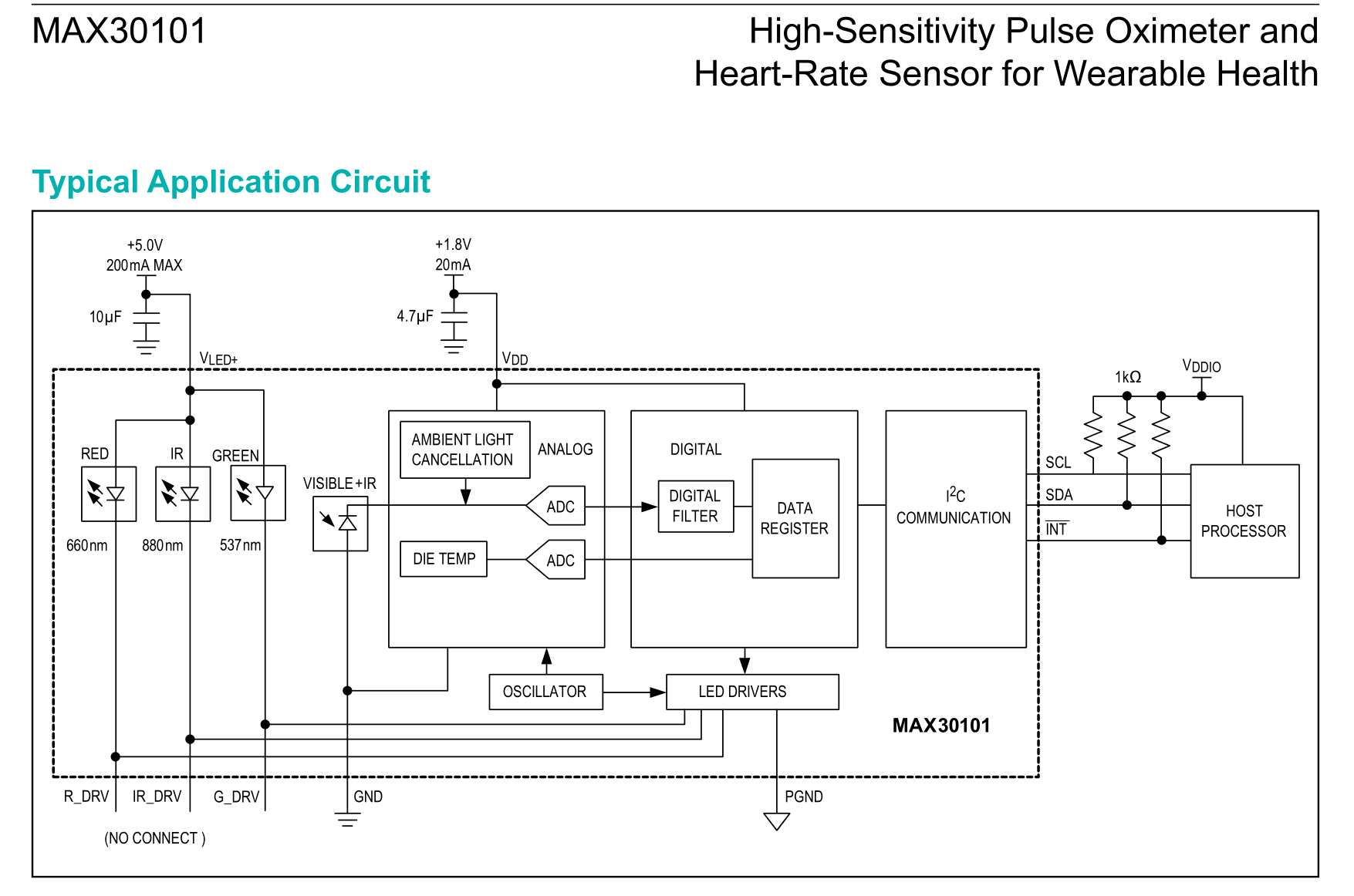


Figure . MAX30101 heart rate sensor application circuit, with the green LED that MAX30102 doesn’t have. Note the capacitors on VLED+ and VDD.