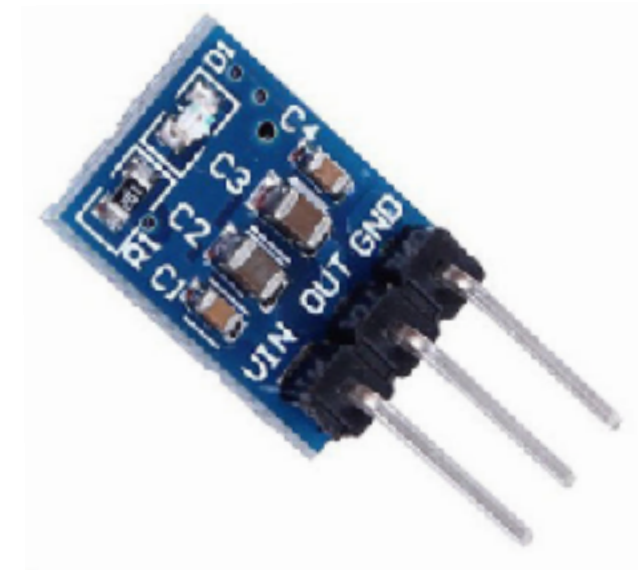
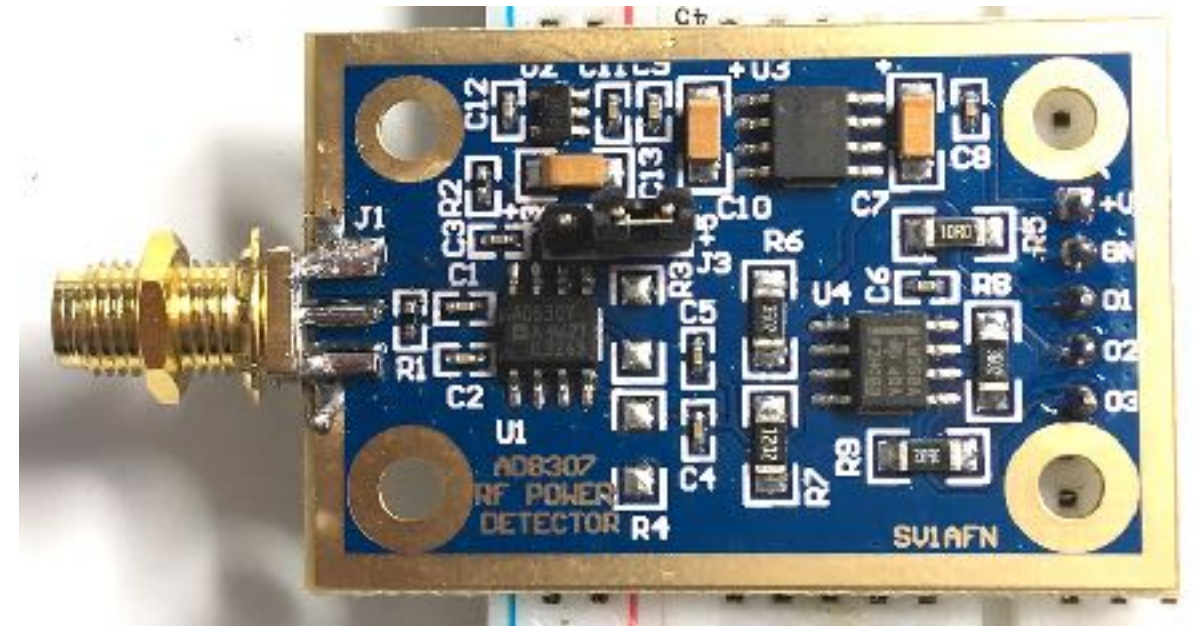


# BARSiCle

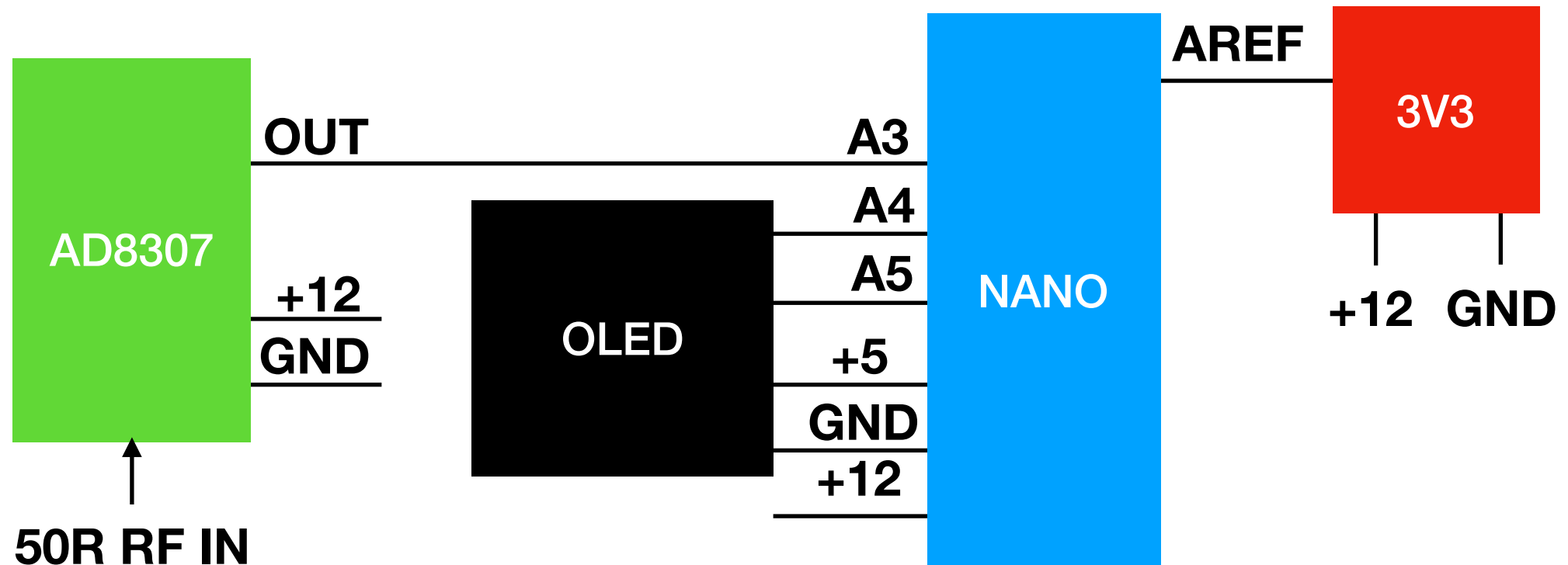
## 7. RF POWER/VOLT Meter

# AD8307 module SV1AFN

- 50R input impedance
- Max +20dBm input
- Selector 3.3 or 5V operation
- Output direct 25mV/dB, up to 2.5V out
- Amplified outputs  
50 & 100mV/db
- Separate 3V3 regulator for  
ADC reference



# Wiring



- AD8307 module

- GND -> GND
- VCC -> +12V
- OUT -> A3
- Selector 5V operation

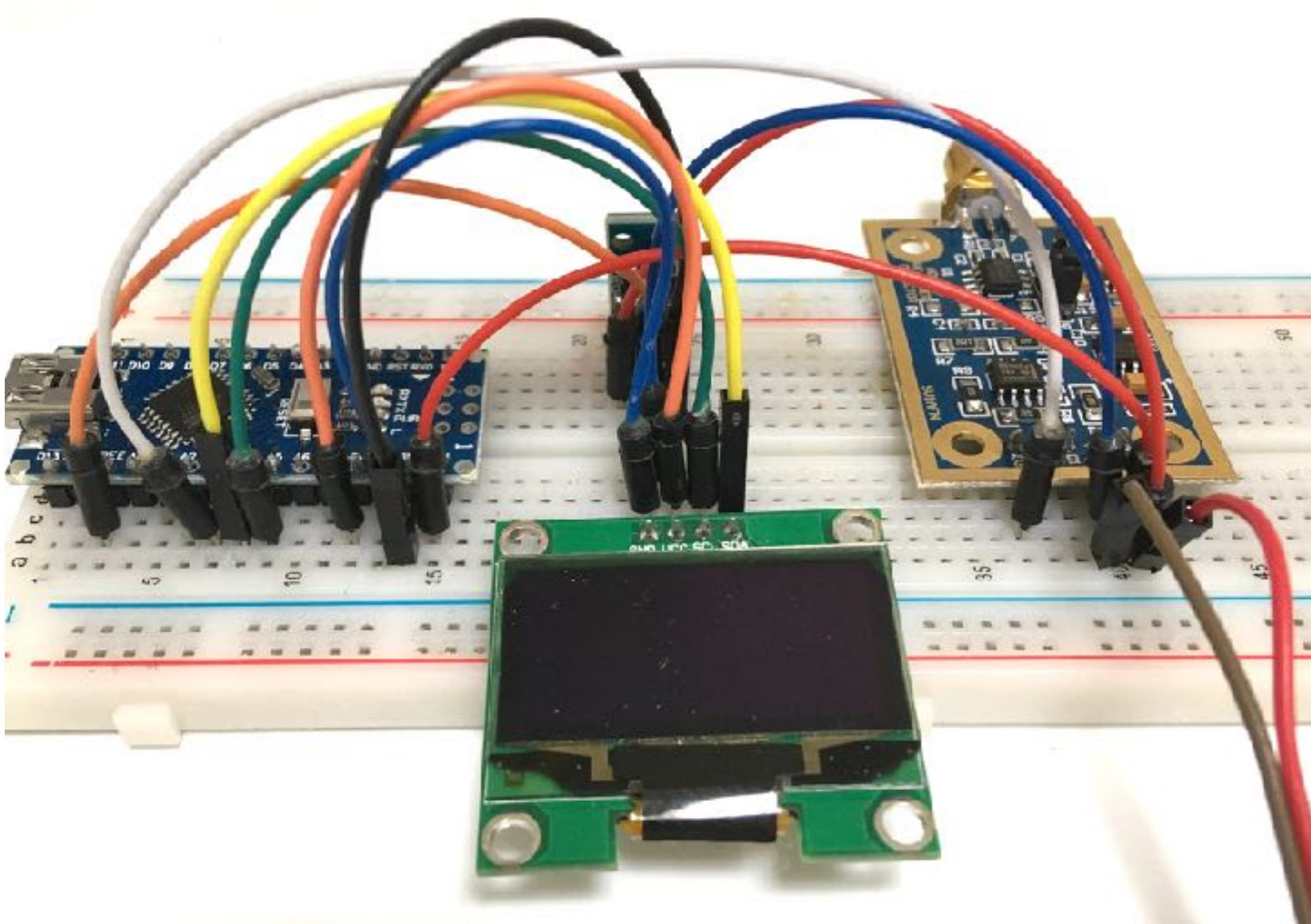
- OLED

- GND -> GND
- VCC -> +5V
- SCL -> A5
- SDA -> A4

- 3V3 REG

- GND -> GND
- Vin -> +12
- Vout -> AREF

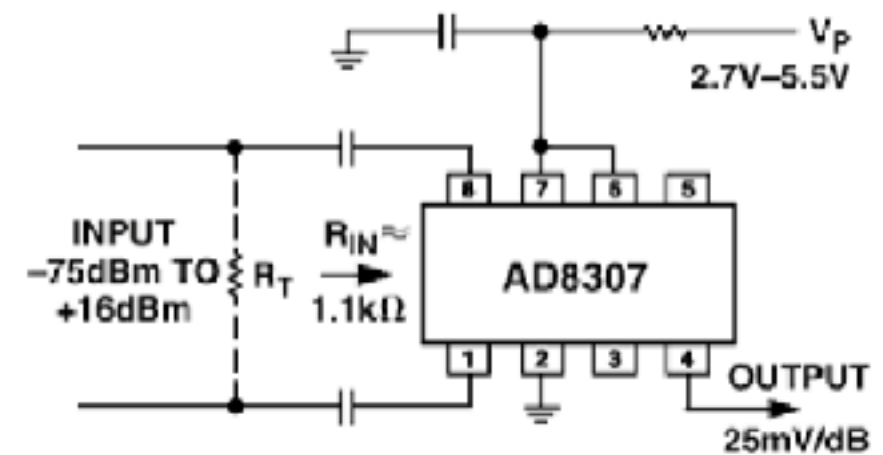
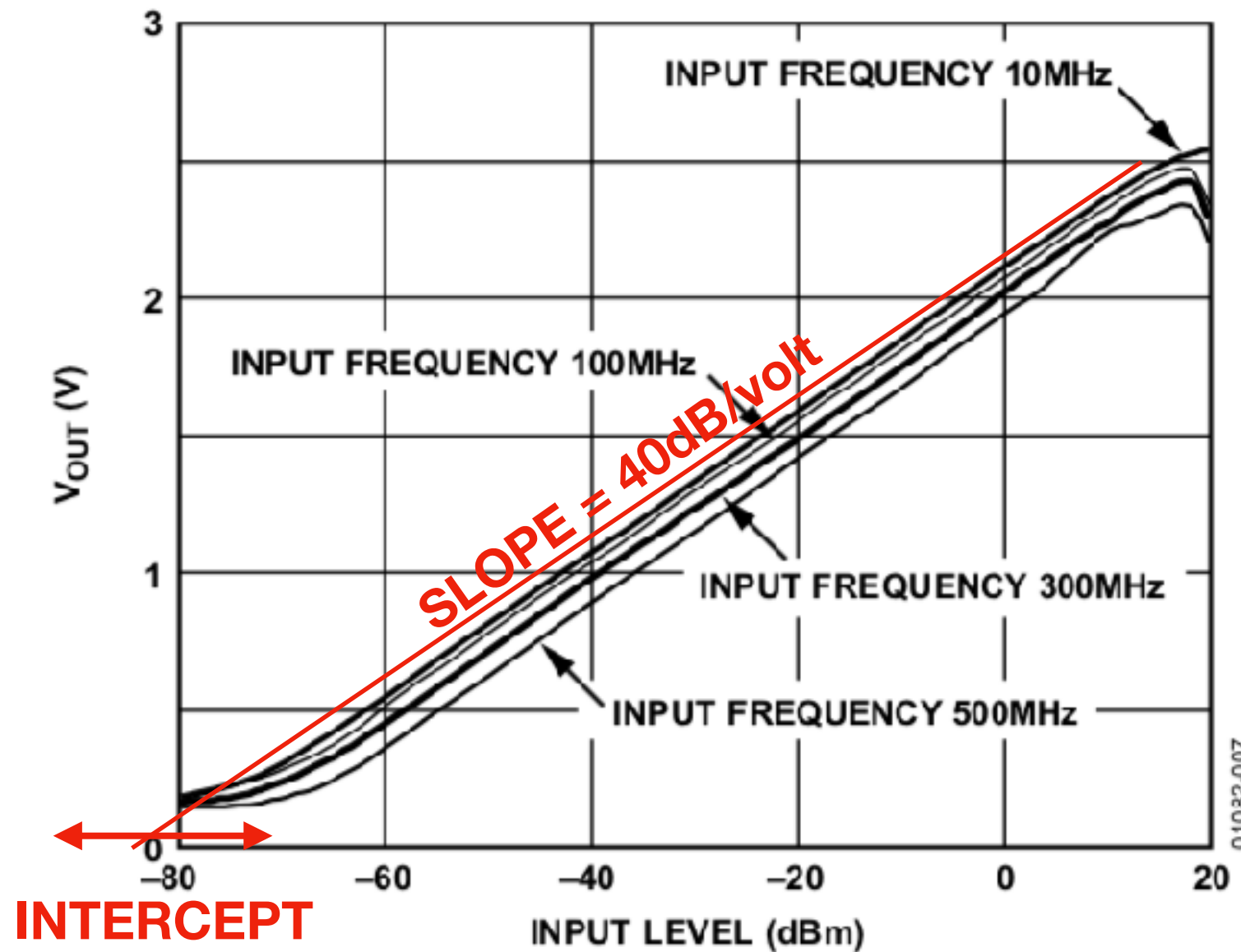
# Breadboard





# Low Cost, DC to 500 MHz, 92 dB Logarithmic Amplifier

AD8307



$R_t = 53R$ , gives input imp 50R



# Calculations

## Maths

- Read ADC (int 0-1023)
  - $V_{in} = \text{input} * \text{Ref volts} / 1023$
- Convert to RF dBm, watts, volts

$$0\text{dBm} = 1\text{mW}/50\text{R}$$

$$\text{dBm} = (V_{in} * \text{slope}) - \text{intercept}$$

$$P(\text{mW}) = 10 ^ { (\text{dBm}/10) }$$

$$P(\underline{W}) = 10 ^ { ((\text{dBm} - \underline{30}) / 10) }$$

$$\text{volts} = \text{SQRT}(\text{watts} * 50)$$

## Code

```
ADCin = analogRead(A3);

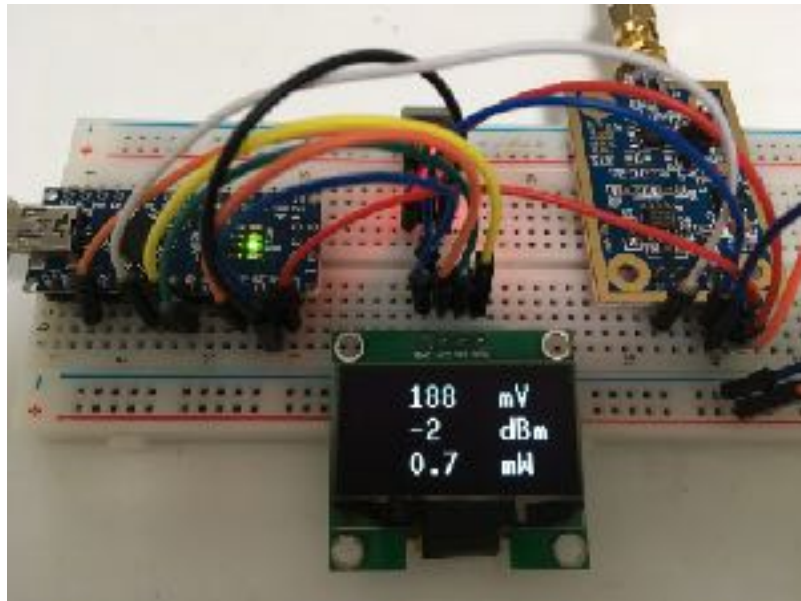
Vin = (ADCin * AREF) / 1023.0; // AREF 3v3

dBm = (Vin * SLOPE) - INTERCEPT ; // calc dBm

watts = pow(10.0, (dBm - 30) / 10.0);

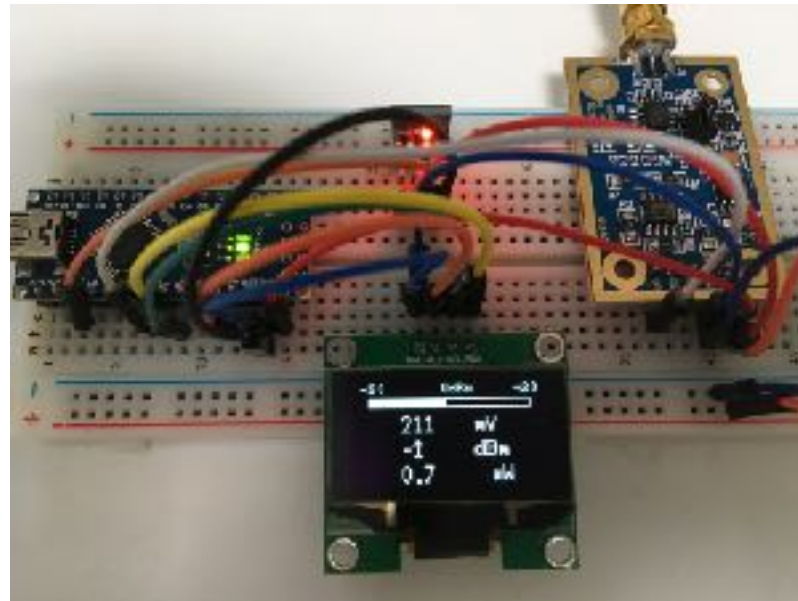
volts = sqrt(watts * 50); // 50R load
```

# 3 sketches



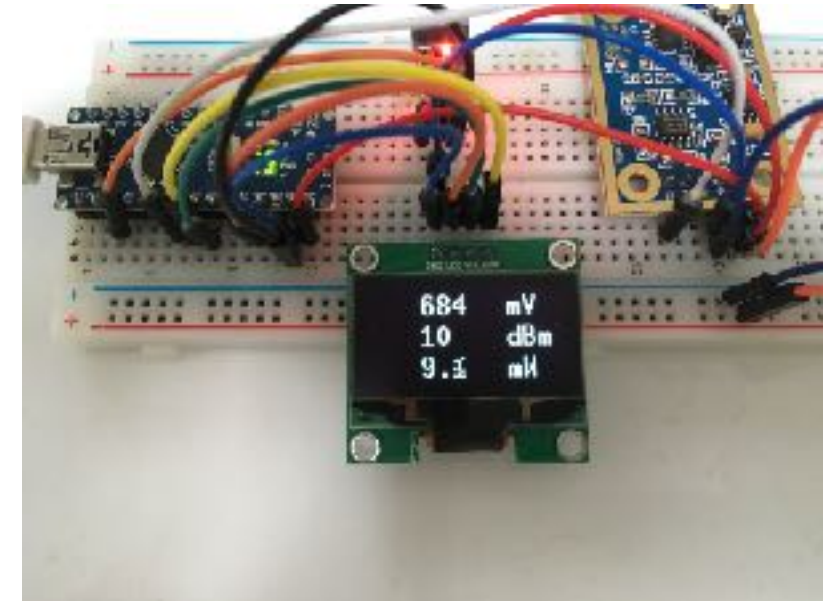
**Basic RF power meter**  
**-20 to +20dB**  
**50R input**

**RF\_METER**



**Power meter with bar chart**  
**-20 to +20dB**  
**50R input**

**RF\_METER\_BAR**

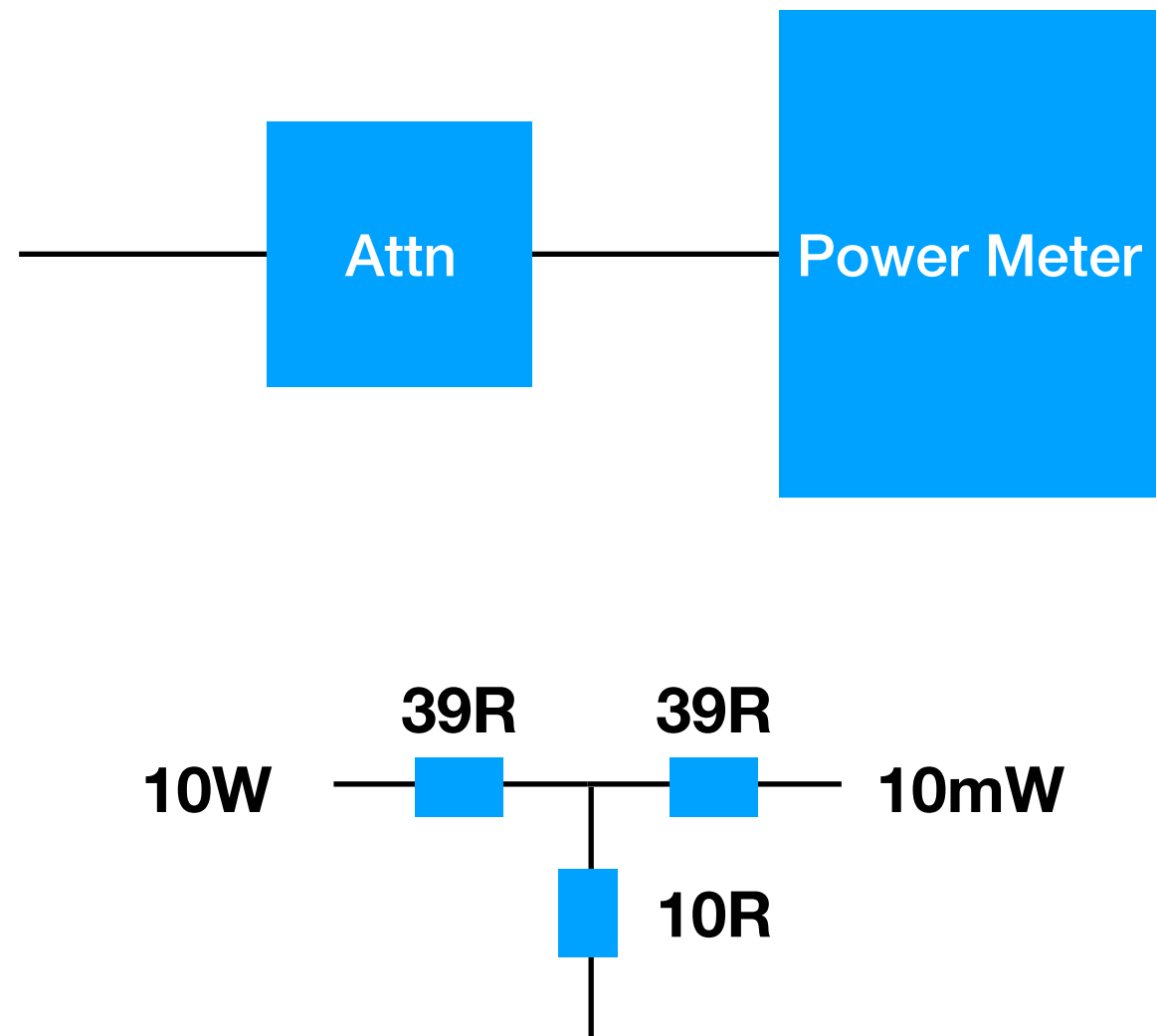


**RF power meter**  
**with +40dB gain**  
**for use with**  
**voltage tap**

**RF\_METER\_40dB**

# Power measurement

- Module can measure up to almost +20dBm = 100mW
- Use external attenuators for higher powers. Must be 50R I/O and able to handle power dissipation
- Or can use “tap”

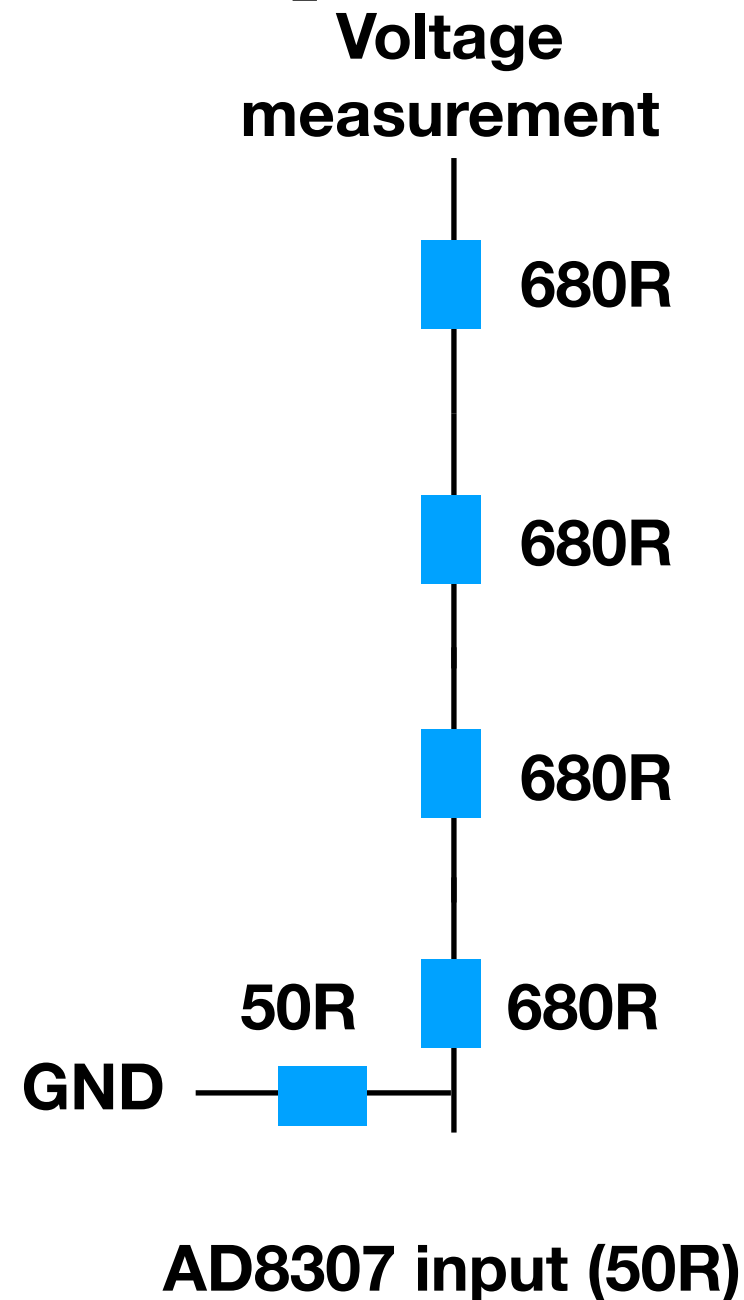




# Voltage tap

- Tap off TX <-> ATU line, 50R
- -40dB (100W gives 10mW)  
(10000:1 PWR, 1000:1 VOLT)
- measurement software version  
(+40dB gain), easy to change  
code

$$\text{dBm} = (\text{Vin} * \text{SLOPE}) - \text{INTERCEPT} + \text{ATTN};$$



**File Open > Sketchbook > My\_RF\_METER\_40dB**

# DCRX Design

# DCRX input BPF

