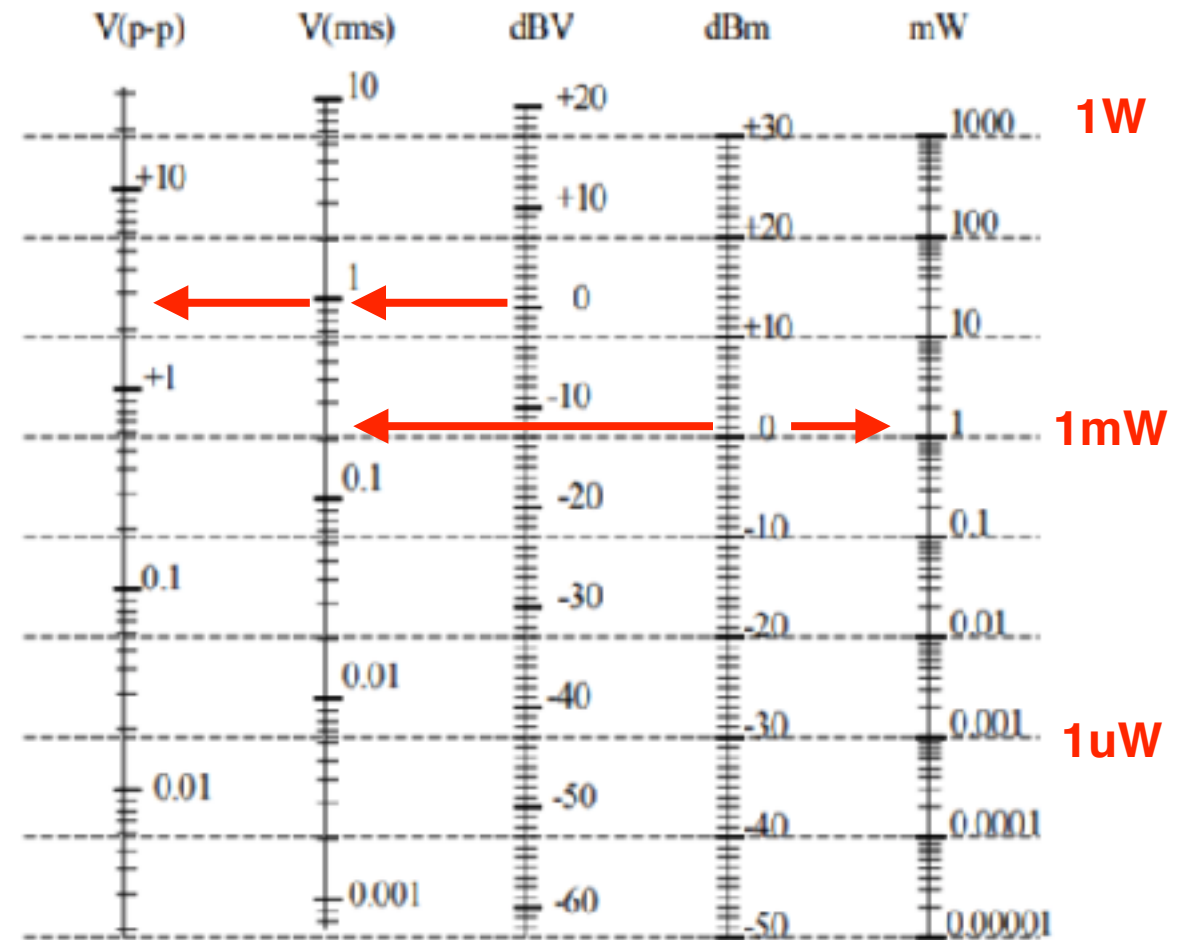


RF Power Meter



RF Power

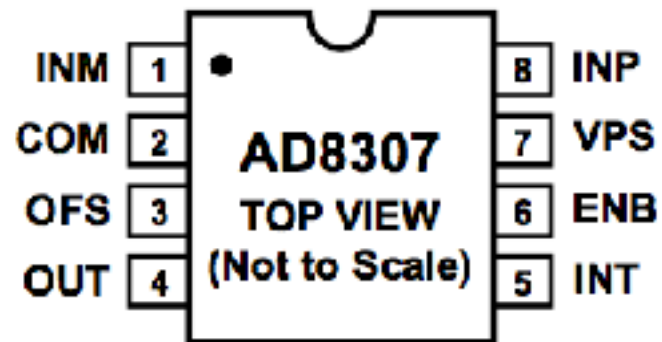
- Sine-wave power
 - Power $P = V^2 / R$
- $\text{dB} = 10 \log (P1/P2)$,
 - dBm, power relative to 1mW into 50R
 - $\text{dBm} = 10 \log(P/0.001\text{W})$
 - $0\text{dBm} = 1\text{mW} \sim 0.22\text{Vrms}$
 - $\times 2 \text{ power} = +3\text{dB}$
- $\text{dB} = 20 \log (V1/V2)$
 - $0\text{dBV} = 1\text{Vrms} = 2.8\text{Vp-p}$



At $Z_0 = 50R$

dBm	Power	RMS	Pk-Pk
10	10mW	0.7V	2V
20	100mW	2.2V	6.3V
30	1W	7V	20V
40	10W	22V	63V
50	100W	70V	200V

AD8307



- AN8307 log detector
- Linear over 80dB range
- Output voltage 0.25-2.5V (-70 to +20dB)
- Intercept -84dB
- Slope 25mV/dB

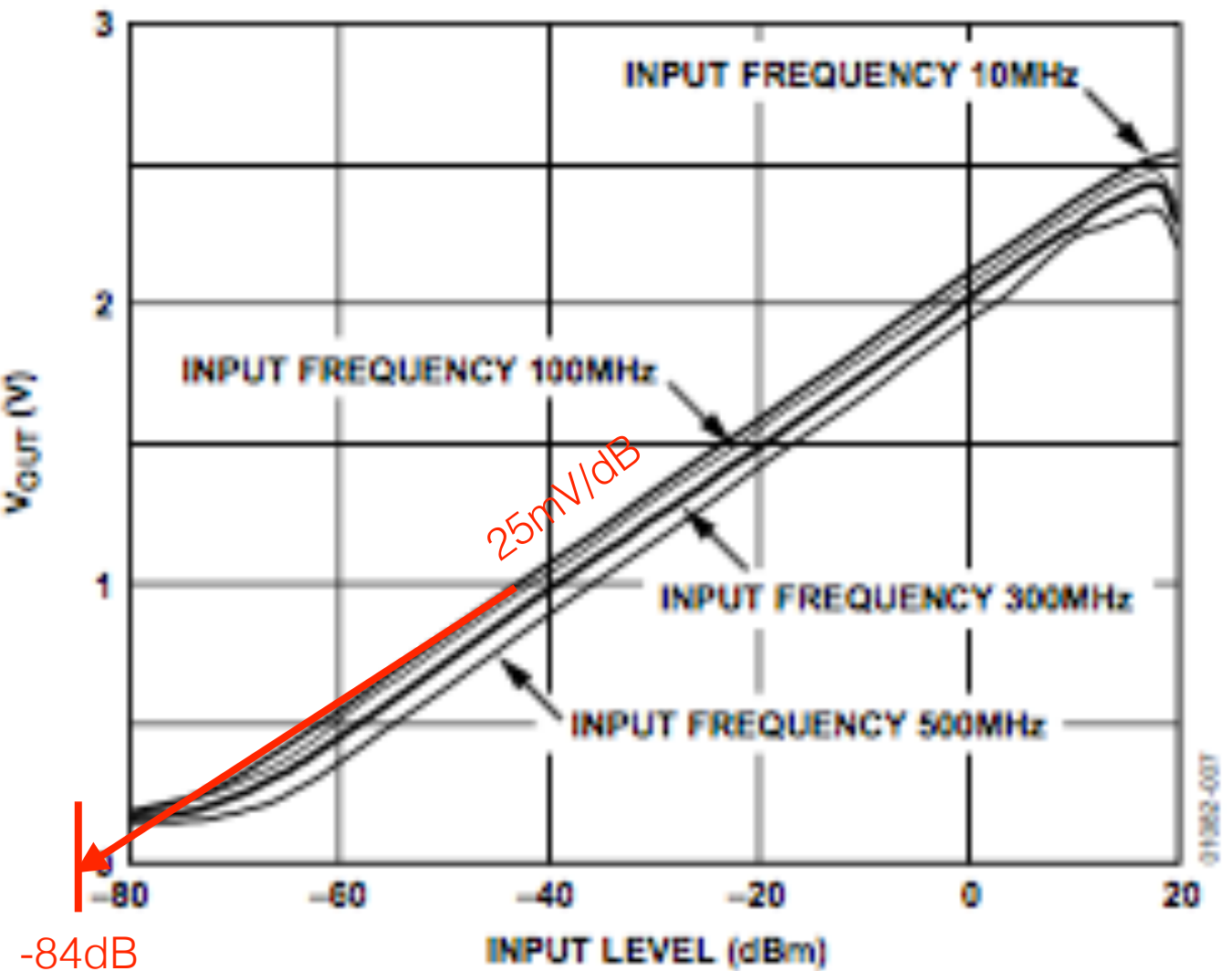
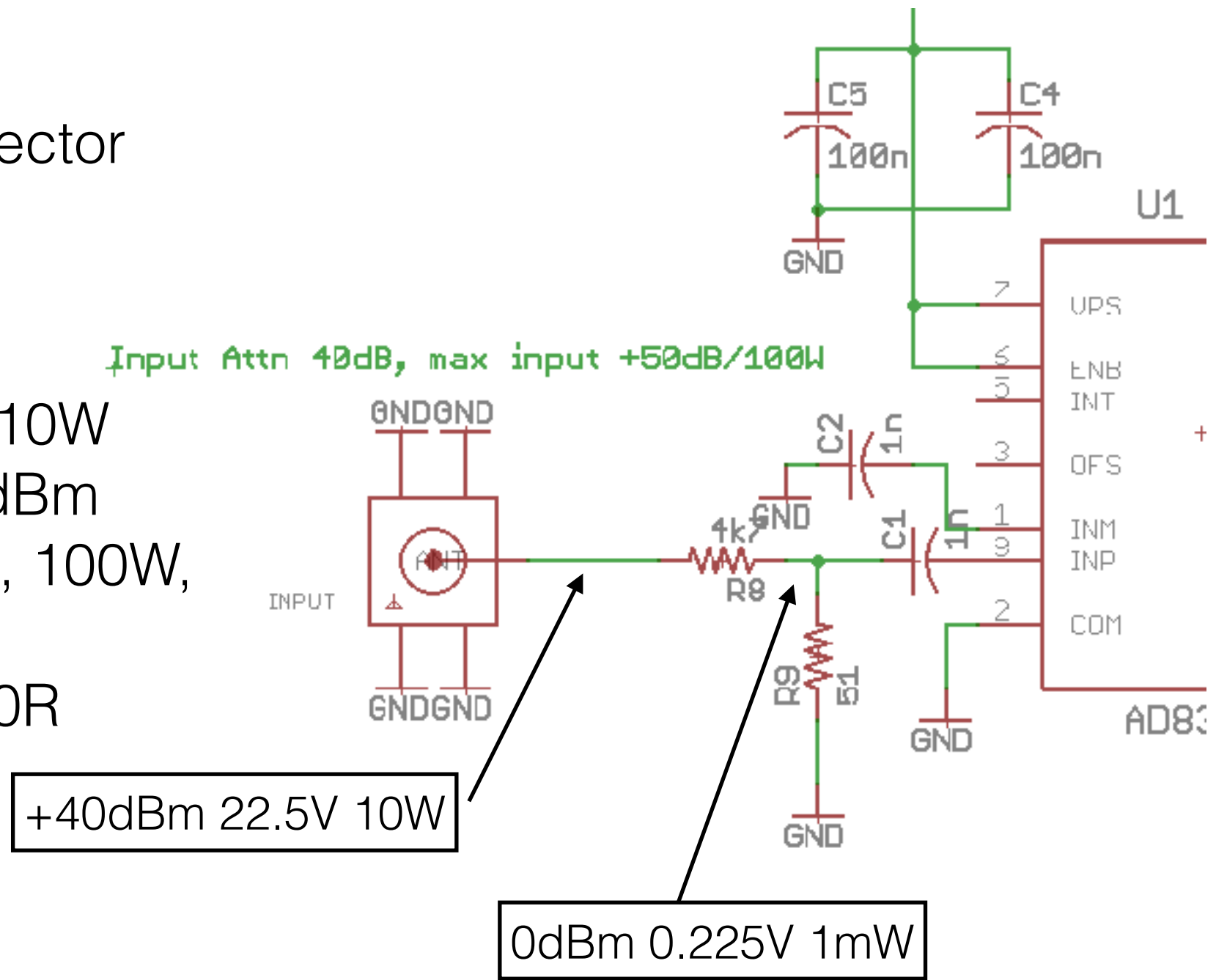


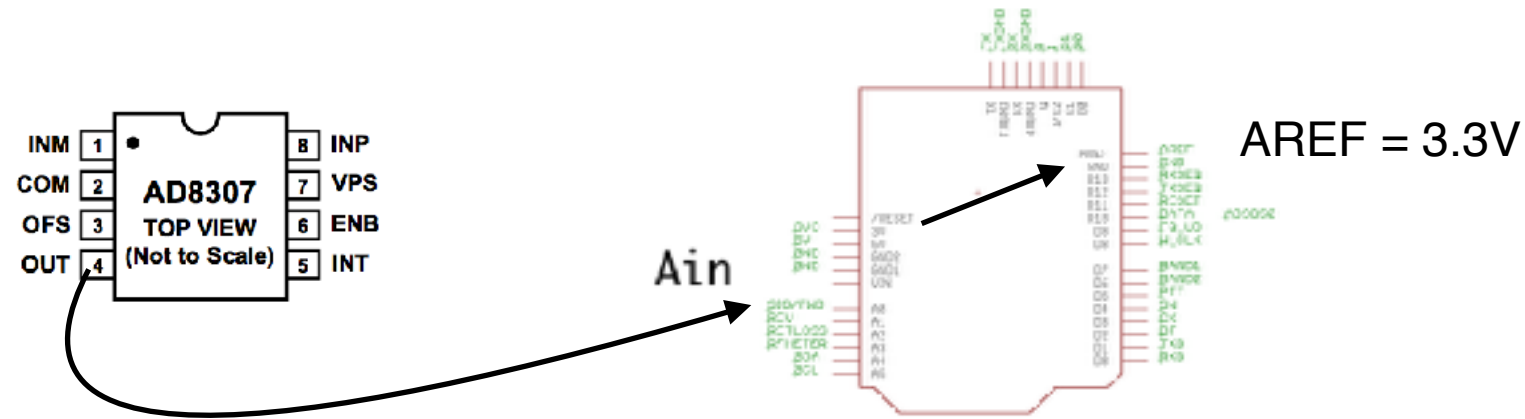
Figure 7. V_{OUT} vs. Input Level (dBm) at Various Frequencies

RF meter

- AN8307 log detector
- Input attenuator
-40dB
- Input $\sim 5k$
- Display 1uW to 10W
-30dBm to +40dBm
- Max in +50dBm, 100W,
70V
- Switch to add 50R
dummy load

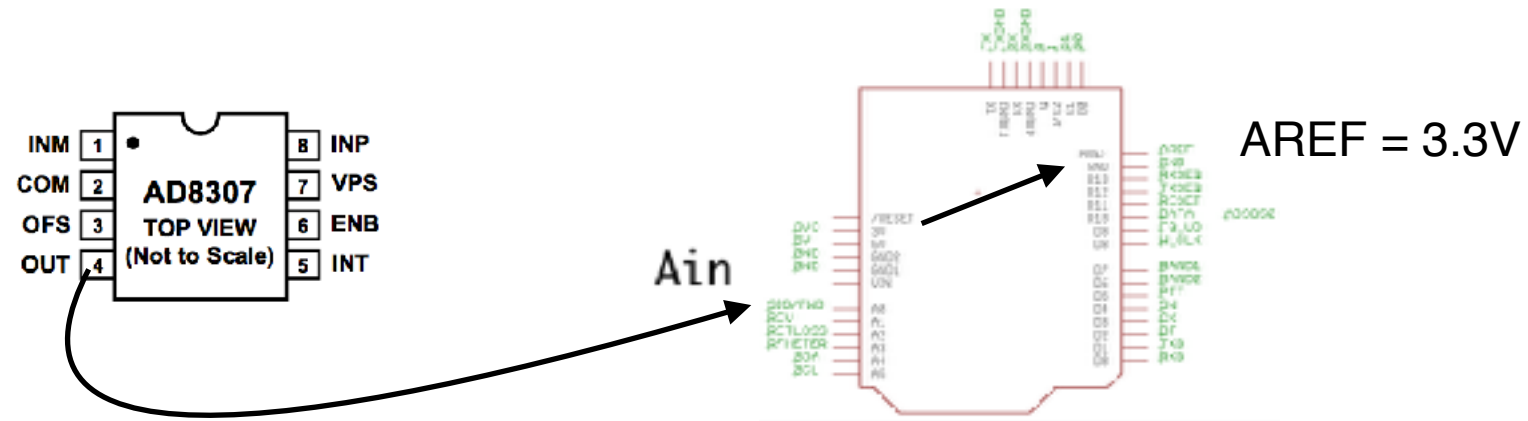


Arduino C language maths



```
// intercept (dBm), slope (mW/dB), source impedance,  
// attenuator (dB), bar display scale  
// input attenuator is 4k7/51R  
#define INTERCEPT -84.0  
#define SLOPE 25.0  
#define ATTN 40.0  
#define IMP 50  
#define BARSCALE 100/80  
  
// read input, convert to mV  
aIn = analogRead(DCIN); // returns int 0-1023  
mV = (double)(map(aIn, 0, AMAX, 0, AREF)); // AREF in mV, calculate & convert to double  
  
// calculations for display  
dBm = (mV / SLOPE) + INTERCEPT + ATTN; // in doubles  
mW = pow(10.0, (dBm / 10.0)); // in double, out double, 0dBm = 1mW  
Vrms = sqrt((mW / 1000.0) * IMP); // in double, out double  
bL = (dBm * BARSCALE) + 50 ; // -40 - 0 - 40dBm, 0.1uW - 1mW - 10W
```


Bar graph



```
#include "Oled_128X64_I2C.h"
```

```
//====PICTURE LOOP
```

```
void dispUpdate() {
```

```
    oled.firstPage();
```

```
    do {
```

```
        //--BAR--
```

```
        dispMsgS(0, 0, "  -40          0dBm      +40");
```

```
        dispMsgS(0, 8, "  0.1uW      1mW      10W");
```

```
        dispBar(15, 18, 5, bL);
```

```
// . . . V/mV, dBm, W/mW/uW
```

```
    } while (oled.nextPage());
```

```
}
```

