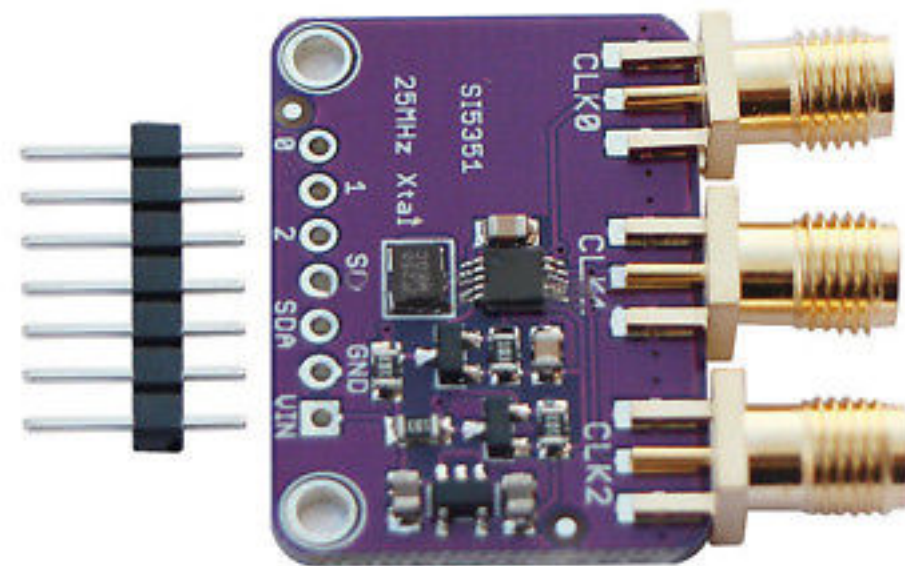


BARSicle

6. Arduino
DDS

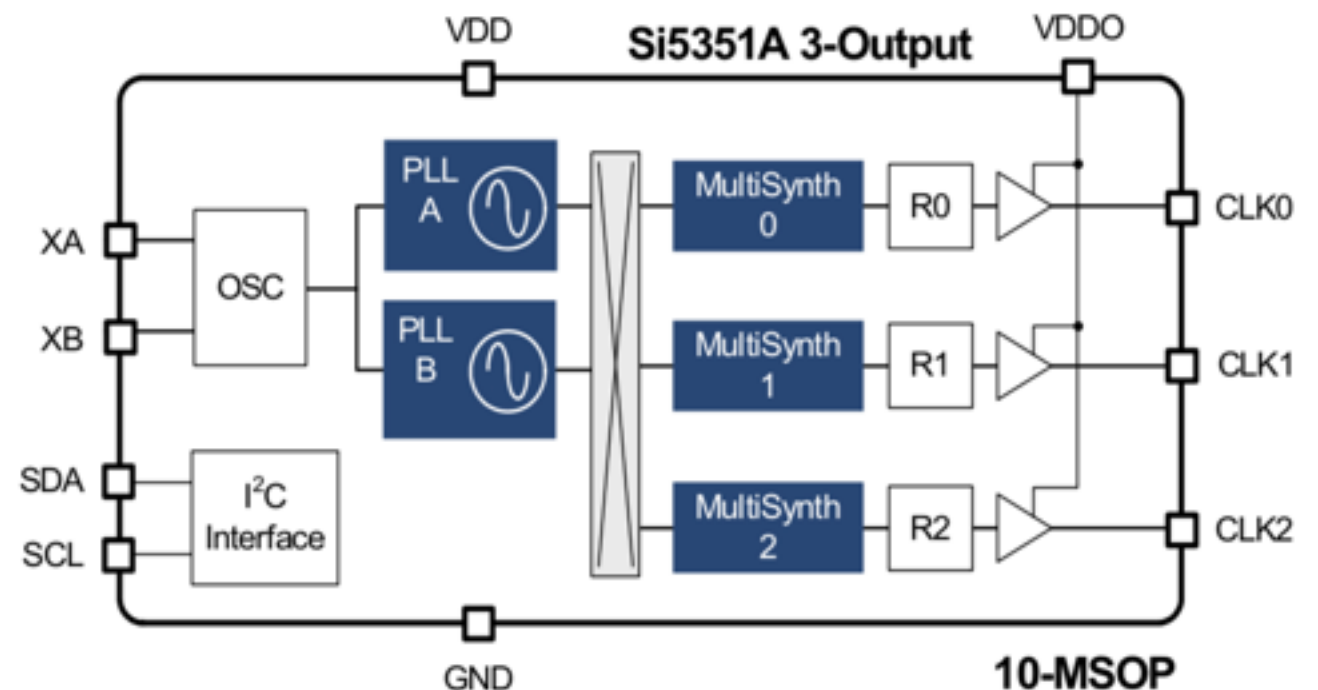
This is a DDS

- Frequency Synthesiser, using digital dividers
- 3 separate frequency SMA outputs, 50R @ 8mA drive
- 100kHz - 150MHz
- I2C bus
- Based on Si5351
- Arduino library *Etherkit_Si5351*



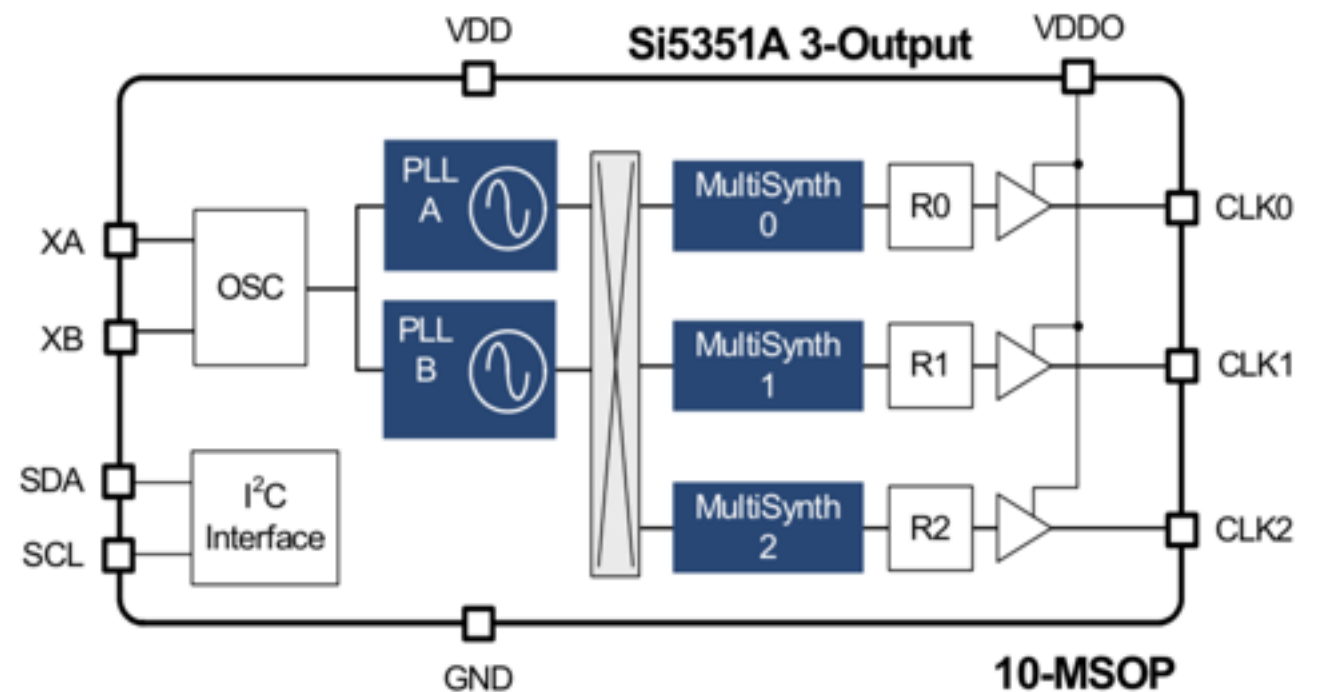
How does it work?

- PLLs multiply clock to high frequency internal clock
- Any output can lock to PLLA or PLLB
- Output up to 160MHz, and down to 8kHz with “R0-2” dividers
- Software calibration to a few Hz



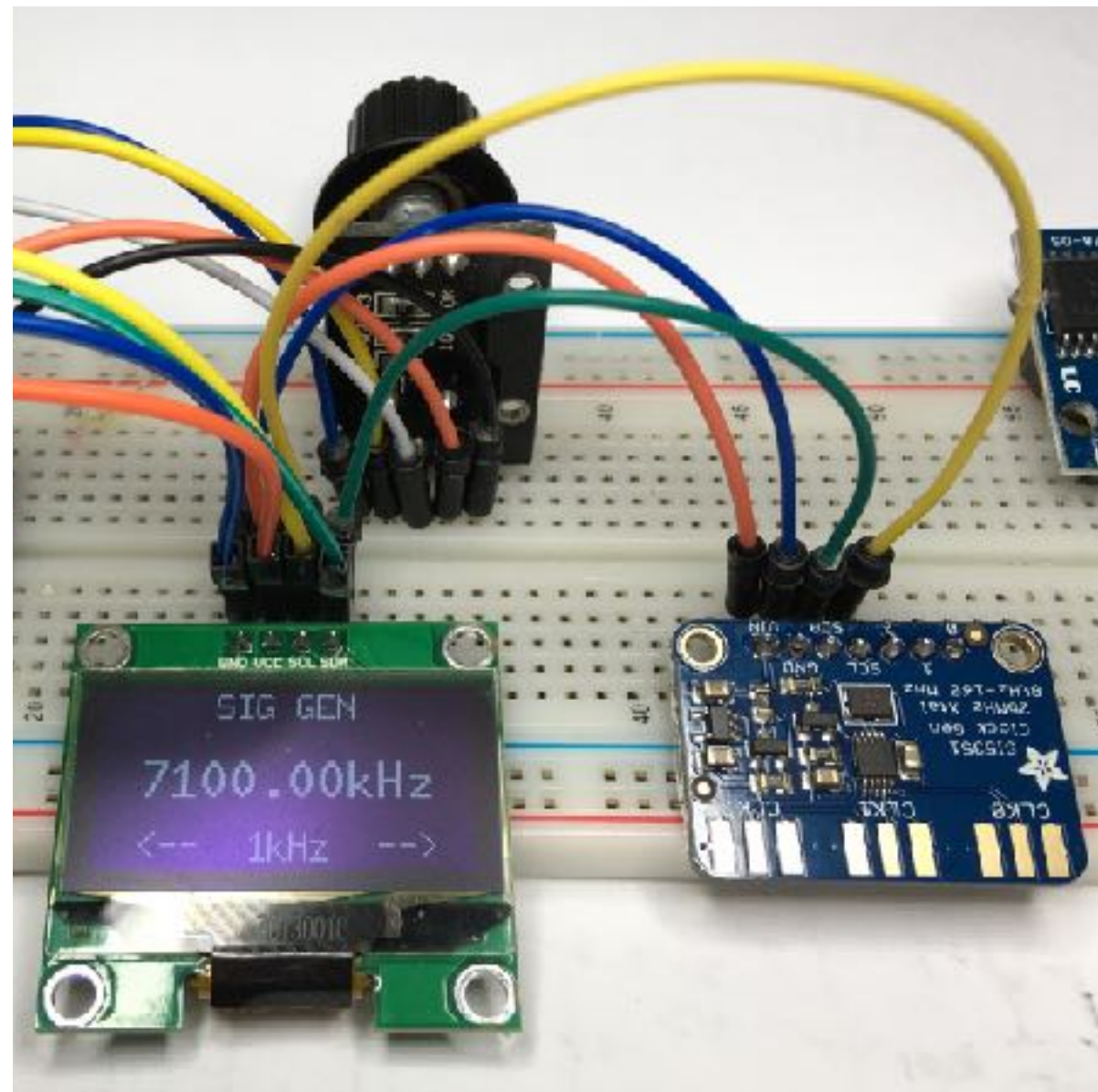
How does it work?

- PLL + high resolution MultiSynth Fractional divider
- 25 MHz xtal load 8pF
- 3.3V @ 35mA, 3 outputs
- Module has 5V <-> 3.3V converters, I2C bus
- @ 8mA output 10dBm into 50R



Wiring

- Si5351
 - VIN -> +5V
 - GND -> GND
 - SDA -> A4
 - SCL -> A5
- Output on CLK0



Si5351.h

- Ethernet_Si5351 is a library with lots of functions to control the DDS
- The main ones we will use are

```
#include "si5351.h"

Si5351 dds;

void setup() {

    dds.init(SI5351_CRYSTAL_LOAD_8PF, 0, CORRECTION);

    dds.drive_strength(SI5351_CLK0, SI5351_DRIVE_2MA);

    dds.output_enable(SI5351_CLK0, 1);

    dds.set_freq(frequency, SI5351_CLK0);
}
```

- Note frequency is in cHz (1/100th Hz)

Output a frequency

- *File > Sketchbook > My_FREQ*

```
#include "si5351.h"

define CORRECTION 00000

uint64_t myFreq;

Si5351 dds;

void setup() {
  dds.init(SI5351_CRYSTAL_LOAD_8PF, 0, CORRECTION);

  dds.drive_strength(SI5351_CLK0, SI5351_DRIVE_2MA);

  dds.output_enable(SI5351_CLK0, 1);

  myFreq = 710000000;

  dds.set_freq(myFreq, SI5351_CLK0);
}

void loop() {
}
```



**Check the output
Check to calibration on
Shack radio**

Our SigGen code

step

```
void loop() {
    unsigned char result;

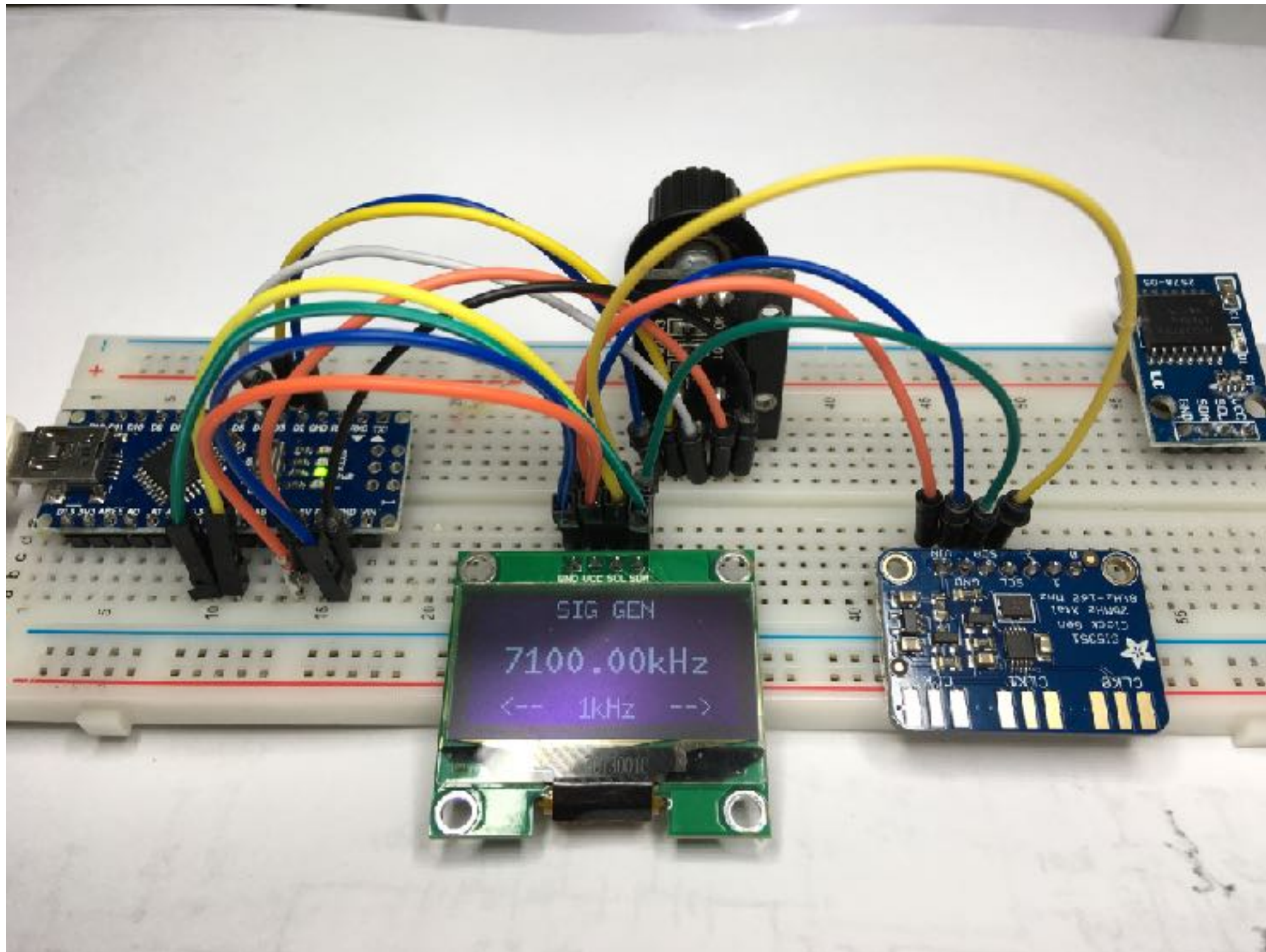
    if (button()) {                                // button pressed?
        if (freqStep == 100000000) freqStep = 1000; // update step
        else freqStep = freqStep * 10;
        dispUpdate();                               // display
    }
```

tune

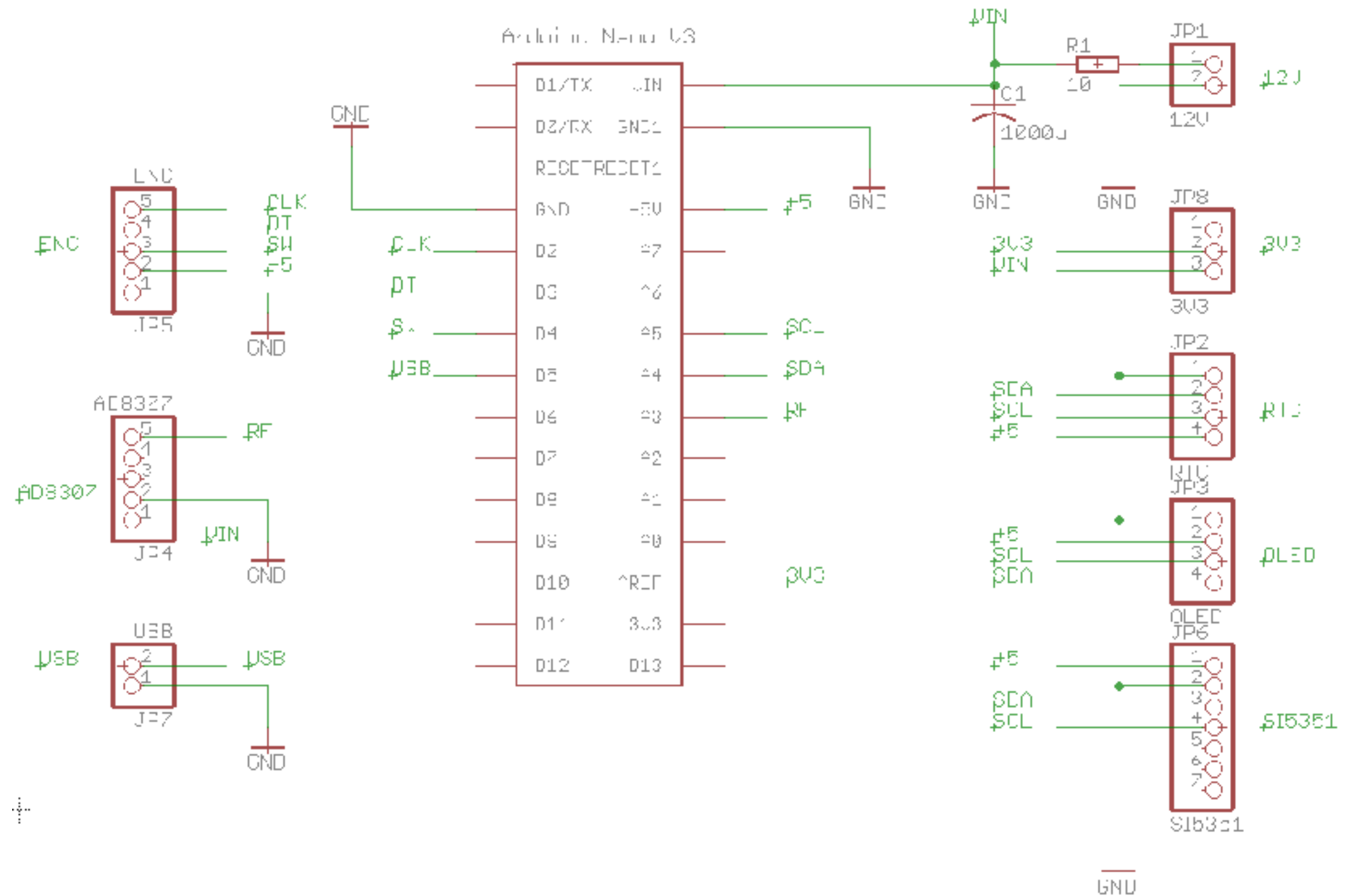
```
    result = enc.process();                        // read encoder
    if (result == DIR_CW && freqChz < FREQMAX) {    // freq up
        freqChz += freqStep;
        freqOut(freqChz);                          // tune
        dispUpdate();
    }
    if (result == DIR_CCW && freqChz > FREQMIN) {    // freq down
        freqChz -= freqStep;
        freqOut(freqChz);                          // tune
        dispUpdate();
    }
}

void freqOut(uint64_t f) {                         // output frequency, CLK0
    dds.set_freq(f, SI5351_CLK0);
}
```


Sig Gen

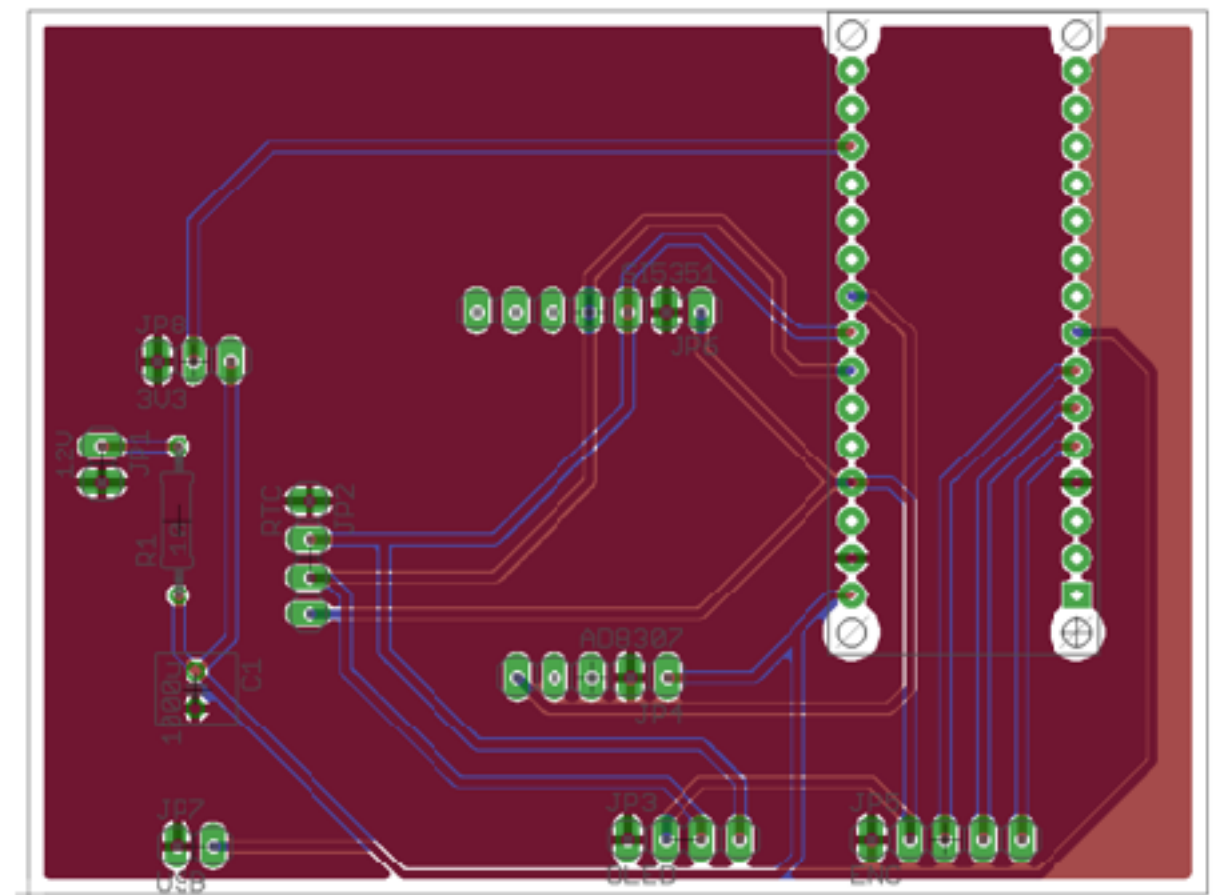
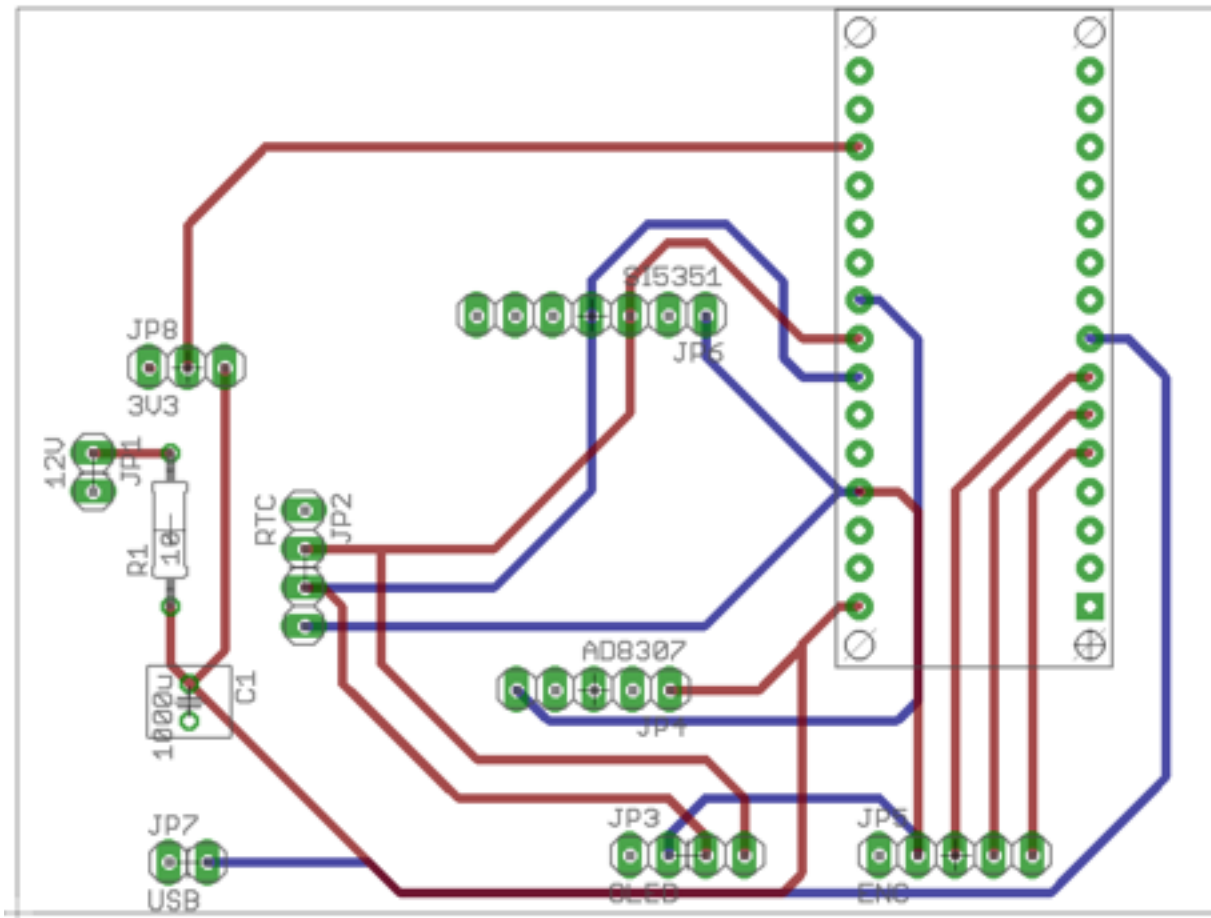


Arthur N. Newman 63



Board

Dual purpose SigGen or RF Power



**Check out your Sig Gen with
your shack receiver.**

**Is it calibrated?
Harmonics?**

**Go to Arduino IDE
File > Examples > Etherkit_Si5351
for calibration and other very useful sketches**