

CONCEPT

Eagle Software
LTspice software



Last time

- For newcomers, we built experiment boards
- We re-looked at the Arduino and the IDE
- We blinked an LED and sent some morse code
- We found out about the Direct Digital Synthesiser module Si5351
- We installed the programs and the Si5351 library
- We built a prototype VFO and an RTC and tested them



Tonight - PCB design!!!
Sit back and enjoy

Eagle software

PCBs, Schematics, Devices
Packages, Symbols and Gates



Eagle Software



- The most widely used PCB design software for amateur constructors
- Create virtual **Devices** (**Symbols** & **Packages**)
- Draw **Schematics**, convert them to **PCB layouts**
- Eagle “Board” files accepted by PCB makers, for example EuroCircuits



Download

- Go to
 - www.cadsoftusa.com/download-eagle/freeware/
- When you get it, practice hard, its quite daunting
- See GanymedeHam.blogspot.com for a handy 3 part course (see 2015 February blogs)



1



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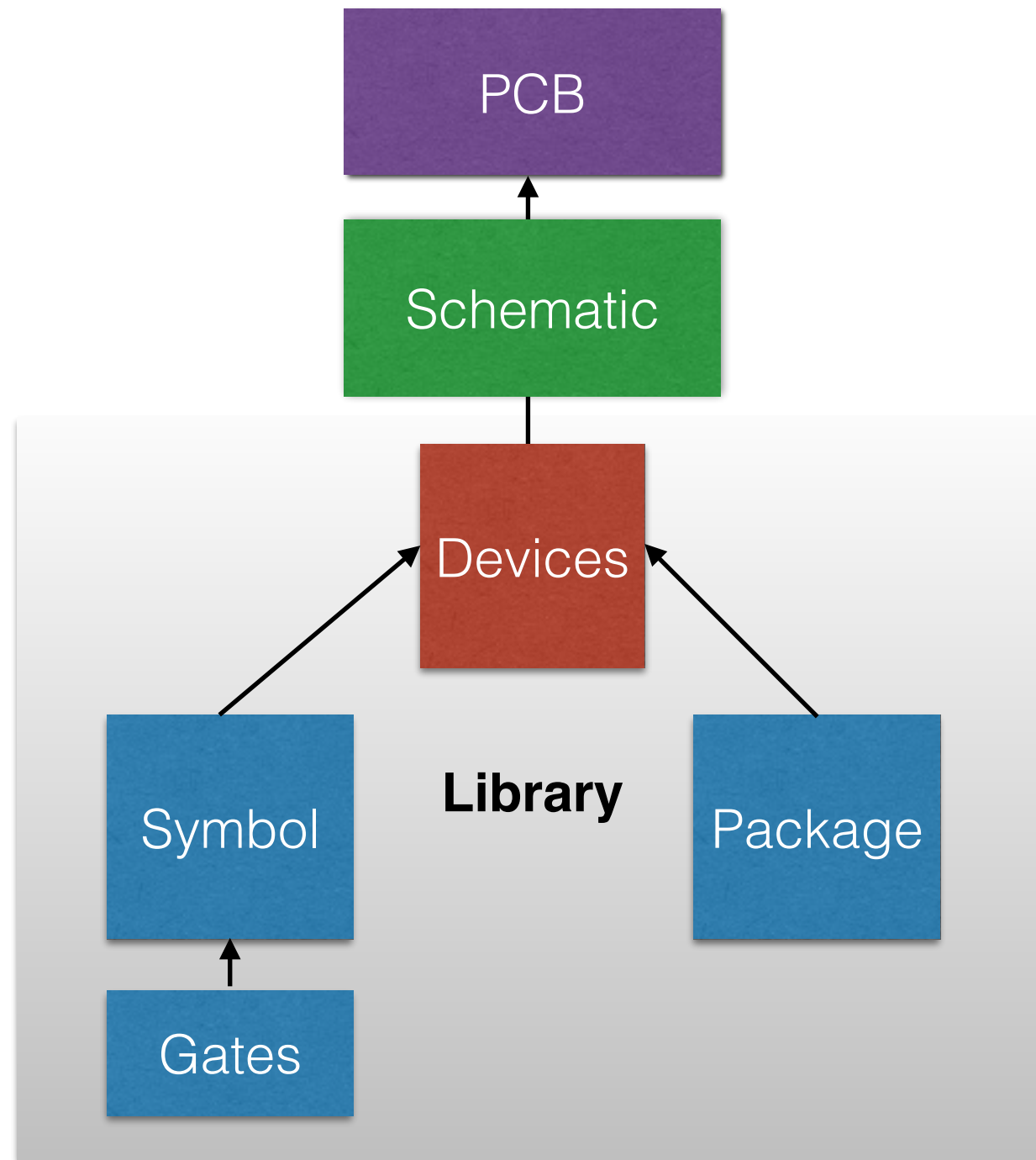
Eagle levels

Eagle handles levels, in descending order:

- Schematic leading to PCB Design
- Devices or components (Packages & Symbols)
- Packages used on PCB layouts (physical dimensions)
- Symbols use on schematic drawings
- Gates, which are fundamental building blocks of symbols (e.g. the individual op-amps in a quad op-amp device)



The flow chart



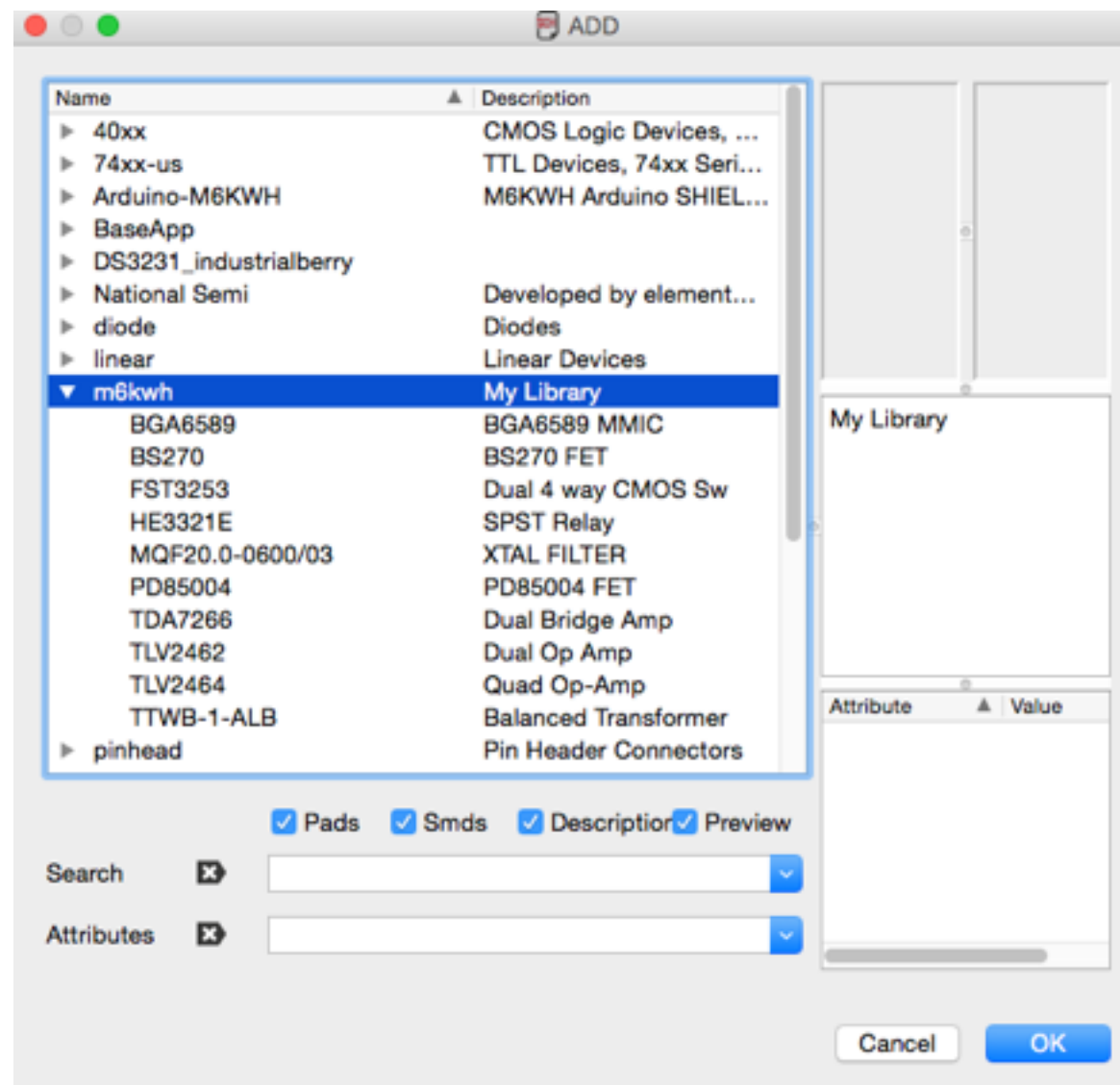
- Place and route Board
- Capture Schematic
- Chose Devices from Library
- Symbols & Packages
- Gates



Libraries

- Eagle provides many Libraries of Devices from suppliers
- More are on the web, or make your own

My library



Libraries and new Devices

If you can't find the component you need in existing libraries, you will have to design a Device.

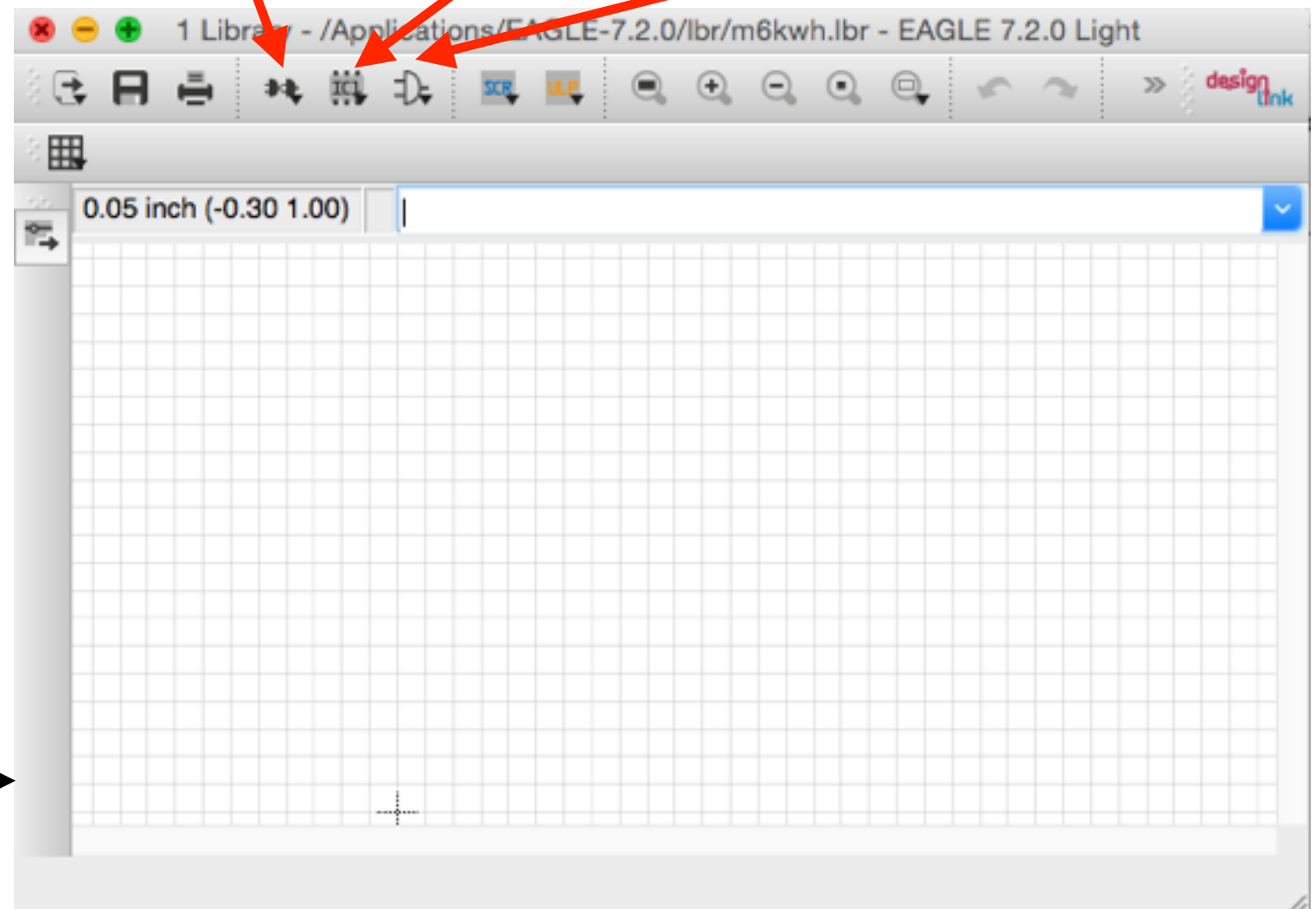
First create a new library for your components.

- Control Panel, File > New > Library
- Library > Description, enter a description of your library
- File > Save As...

With the Library open you will have this window

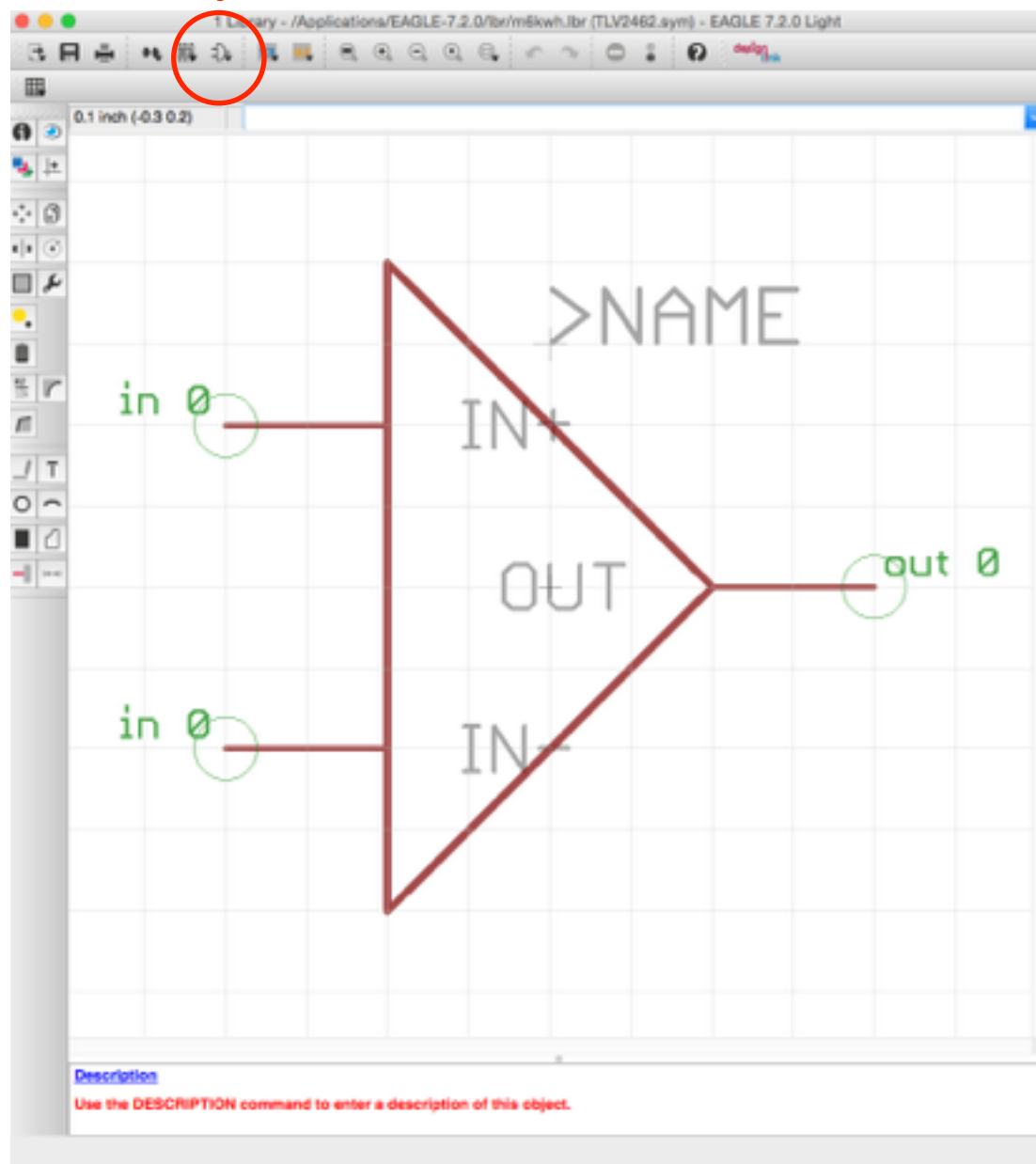


Device Package Symbol



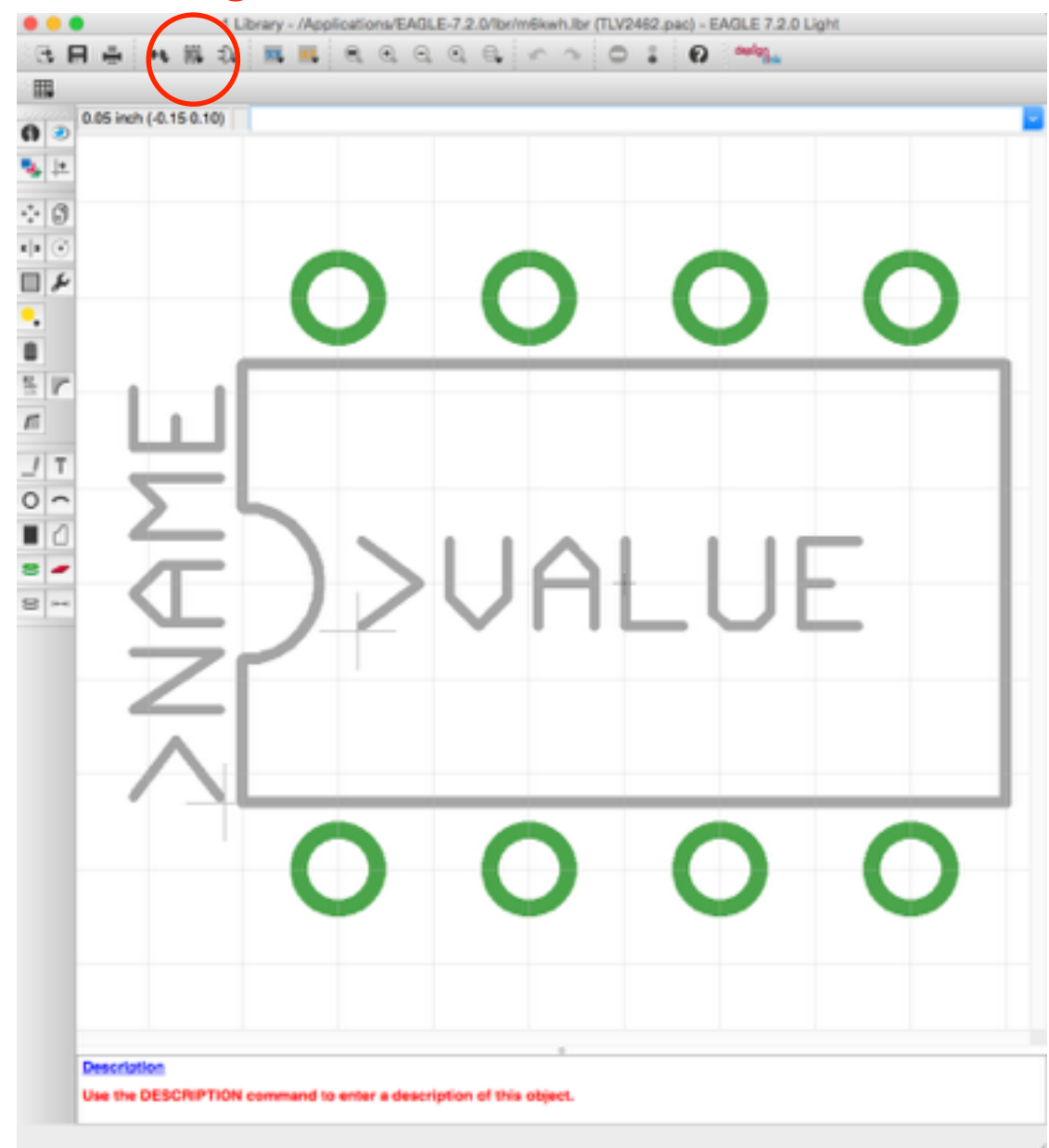
TLV2462 dual Op Amp

Symbol Editor



Draw a
Gate, add pins

Package Editor



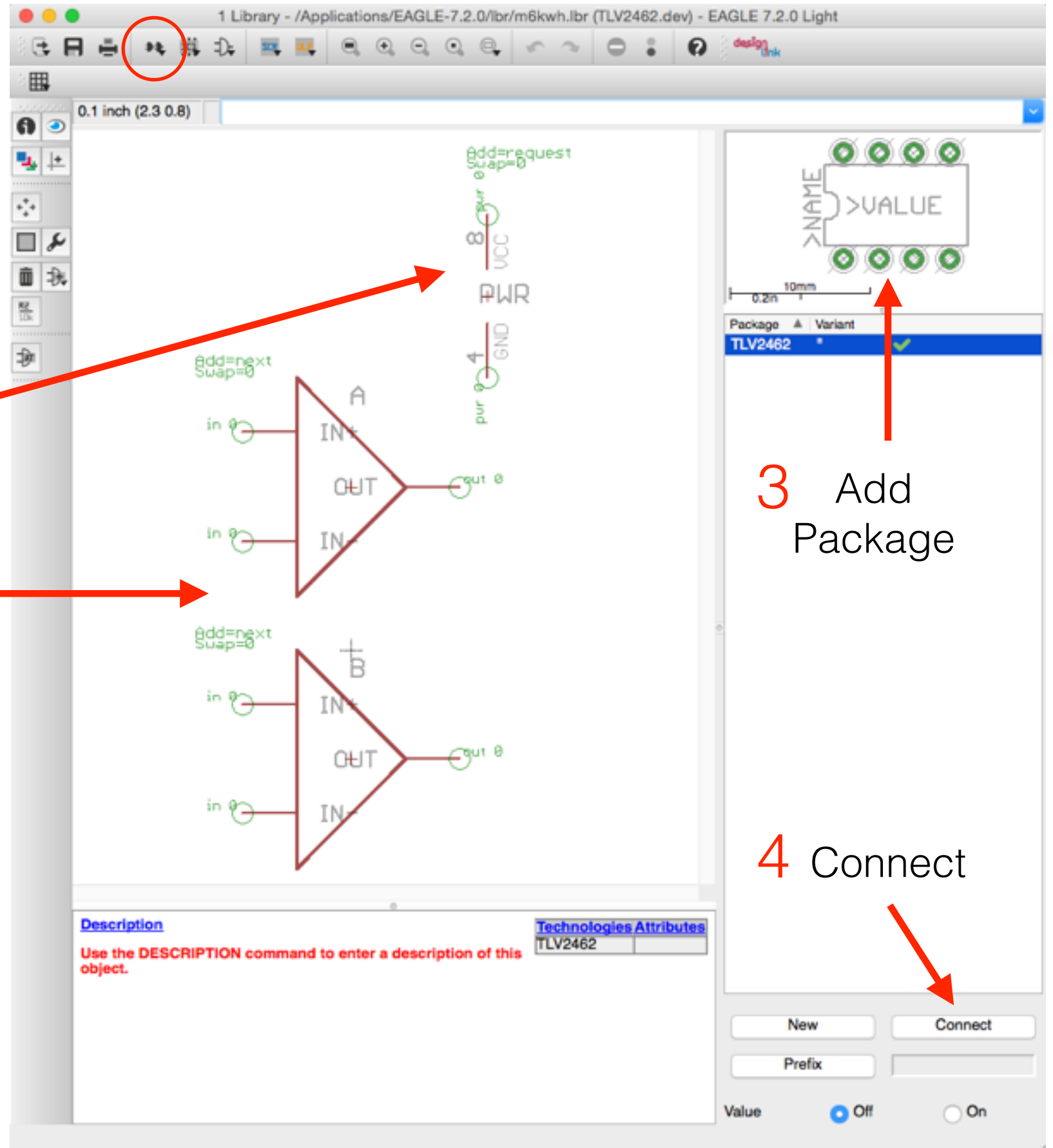
Draw the
Package, to scale



Device Editor

Make up the Device

- 1 Symbol add two gates
- 2 Add power supply pins, from library



Connect up Pins to Pads

Connect (TLV2462)

Pin

Name

Pad

Name

Connection

Pin	Pad
A.IN+	3
A.IN-	2
A.OUT	1
B.IN+	5
B.IN-	6
B.OUT	7
PWR.GND	4
PWR.VCC	8

1 Select the Pin → 2 Select the Pad → 3 Connect

Connect

Append

Disconnect

Copy from:

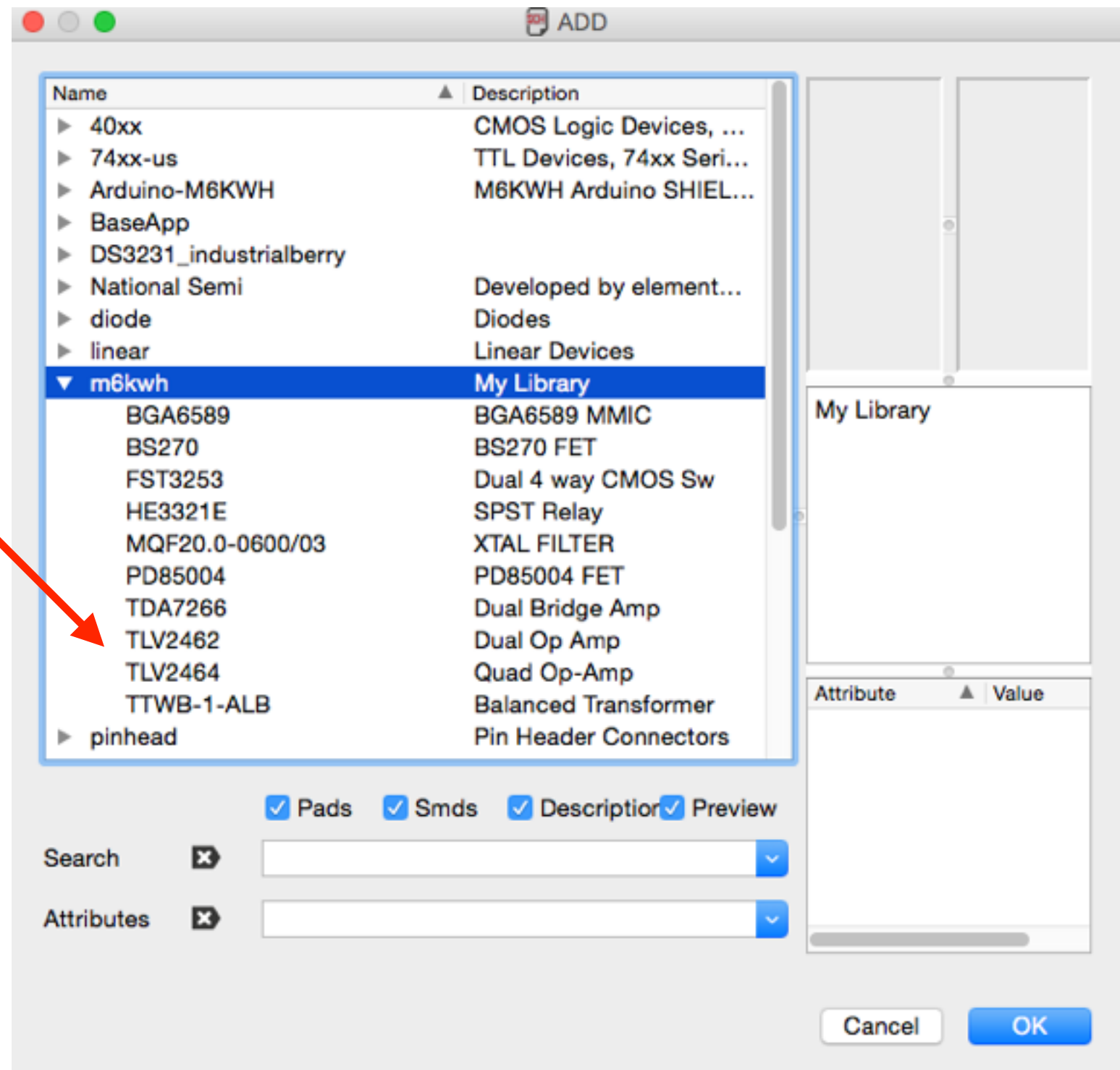
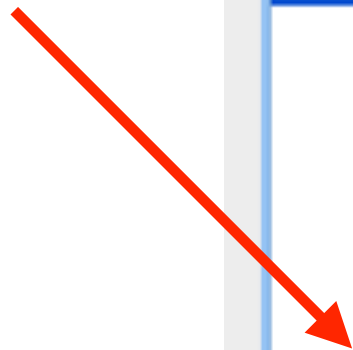
Cancel

OK

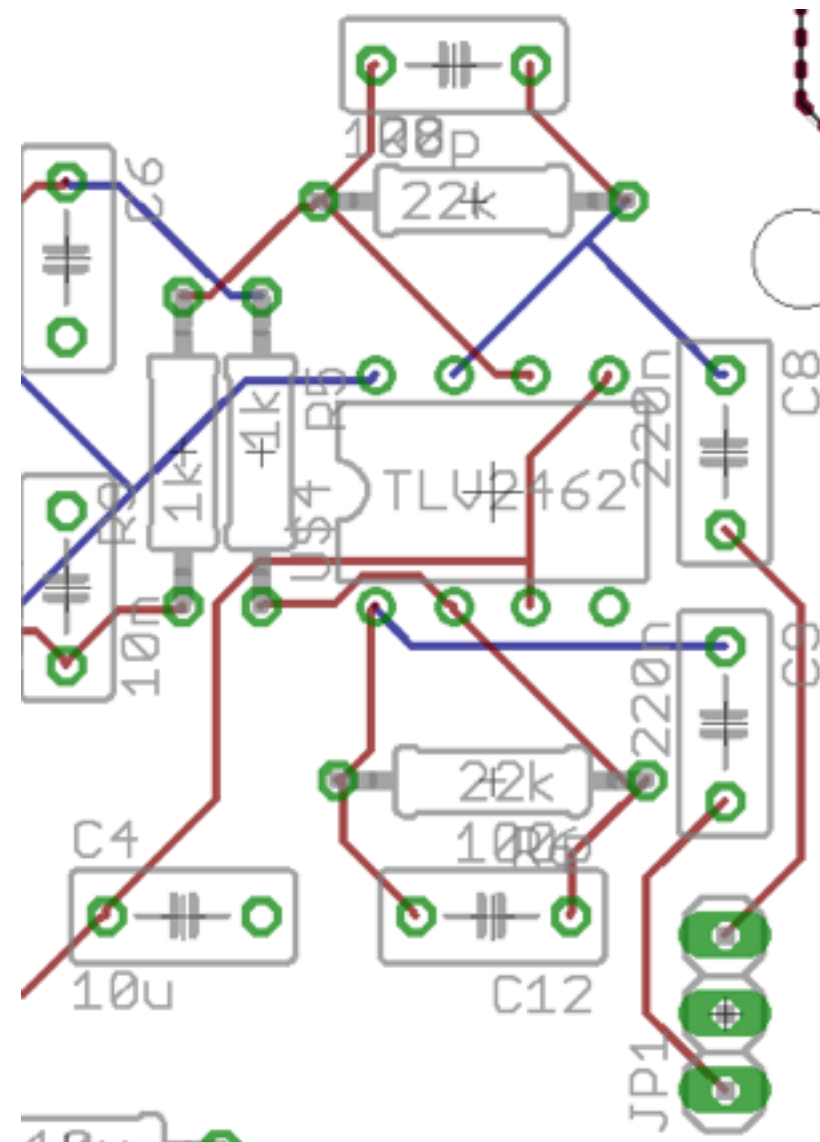
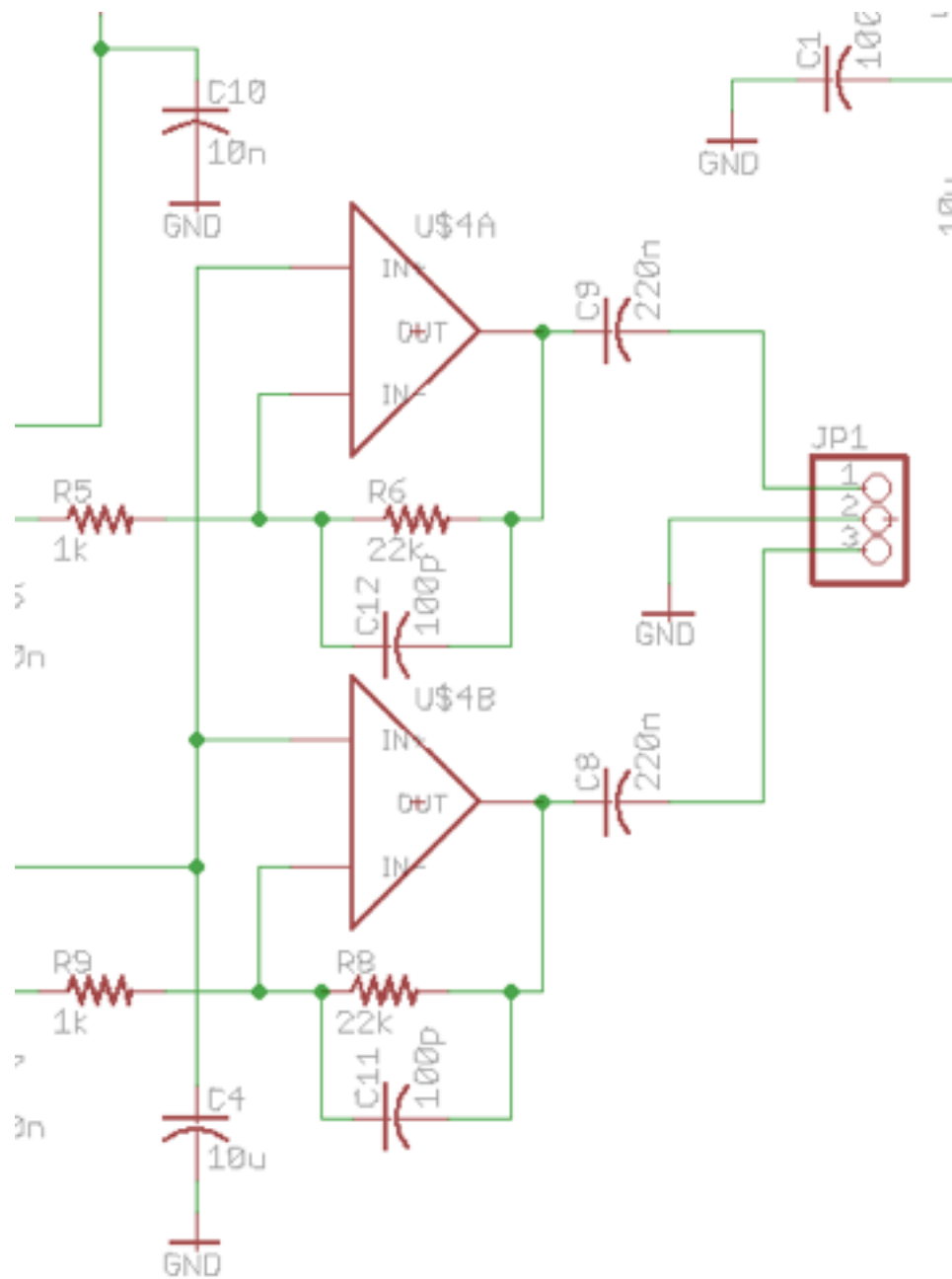


Save to your Library

Your Device



Use in your design



Schematic Capture

Get device

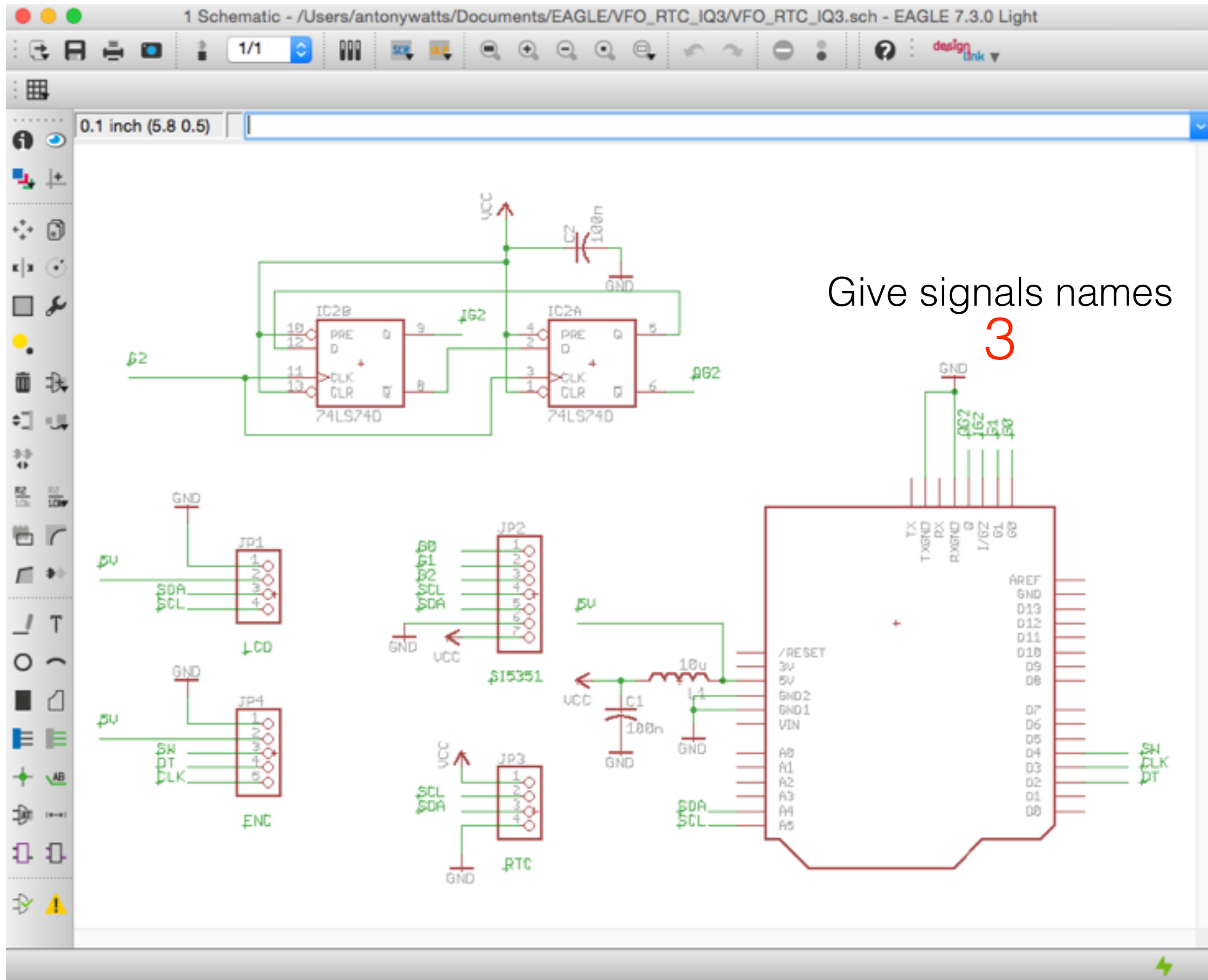
1

Connect

2

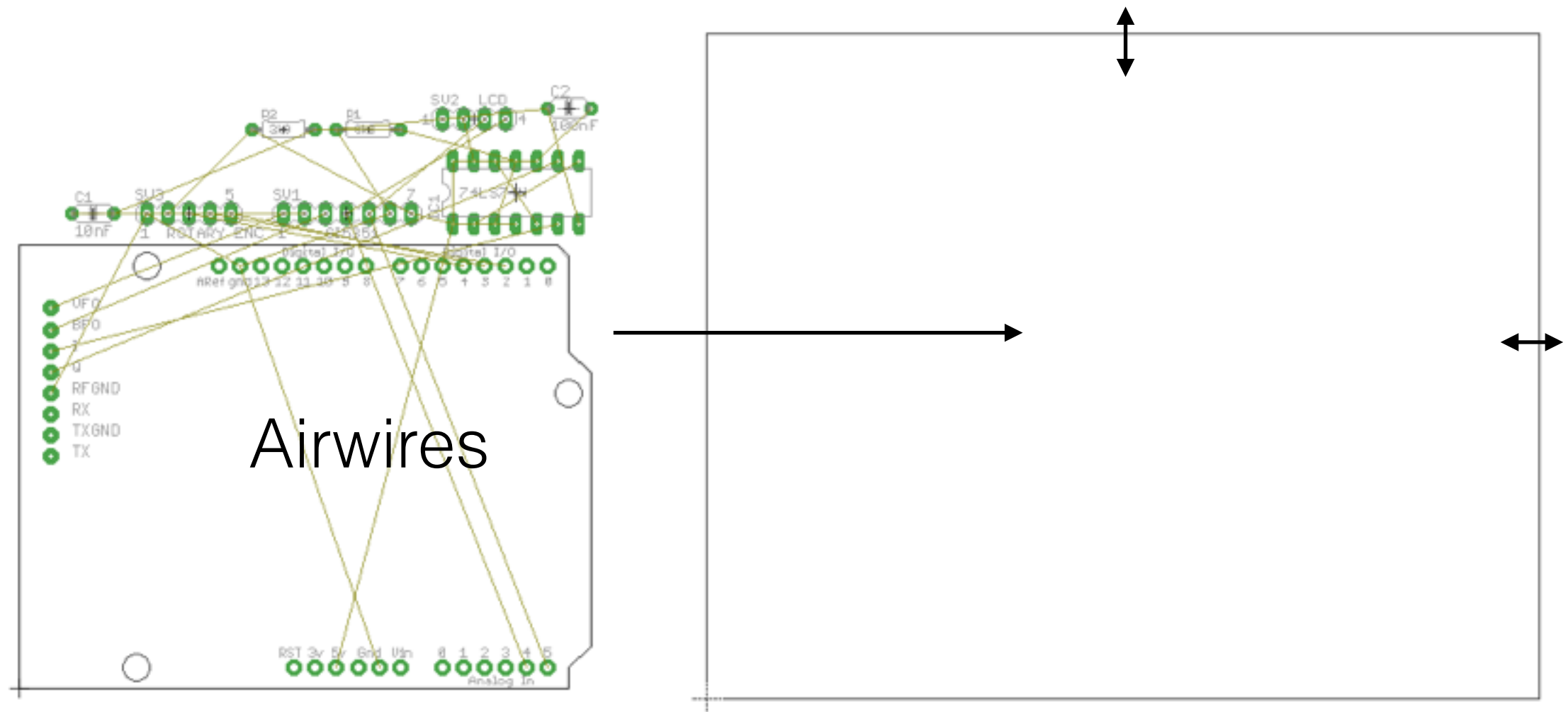
Give signals names

3

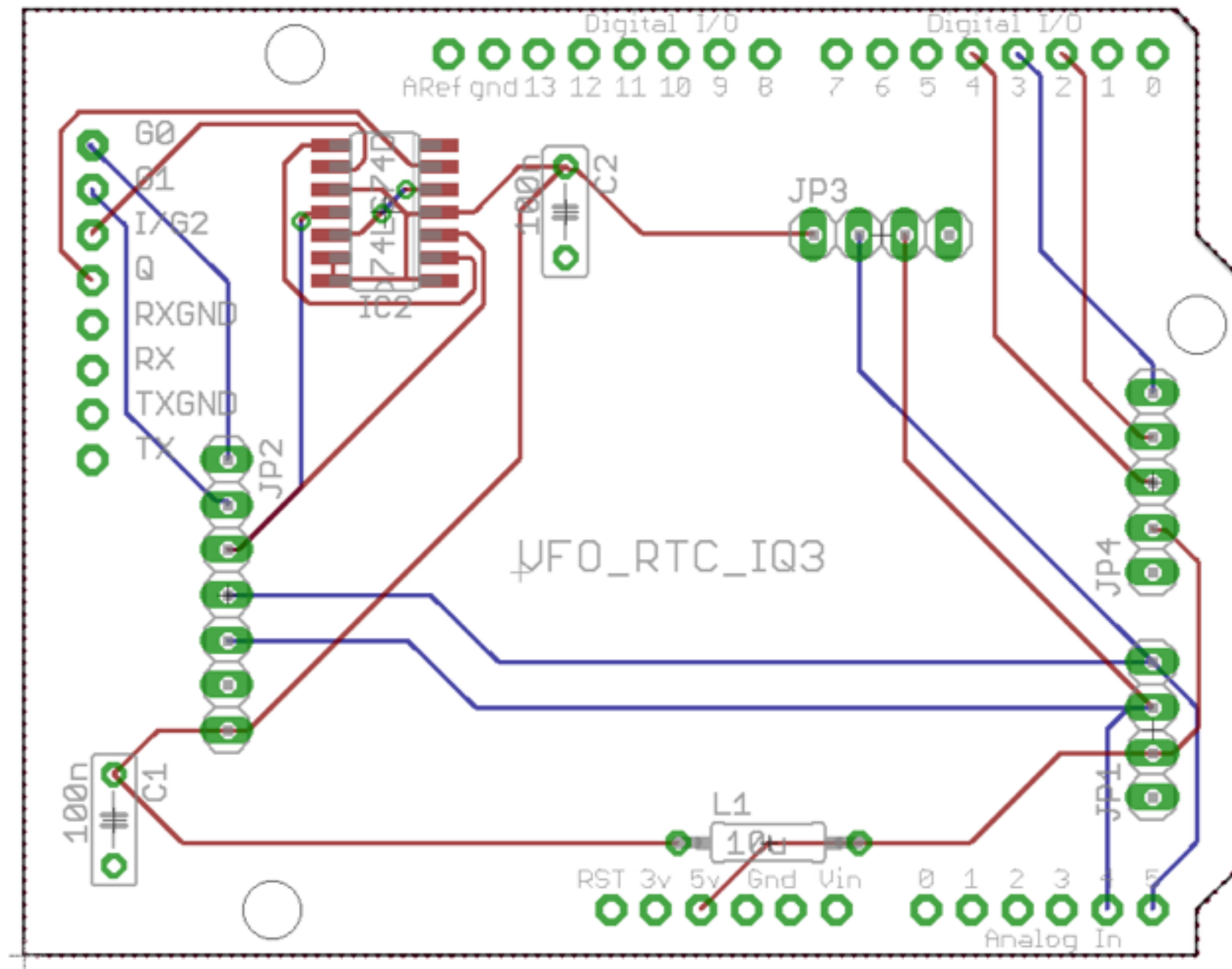


Create PCB Board

- Define Board size
- Move parts to Board area



Position & route



Use 0.1" (2.5mm) grid

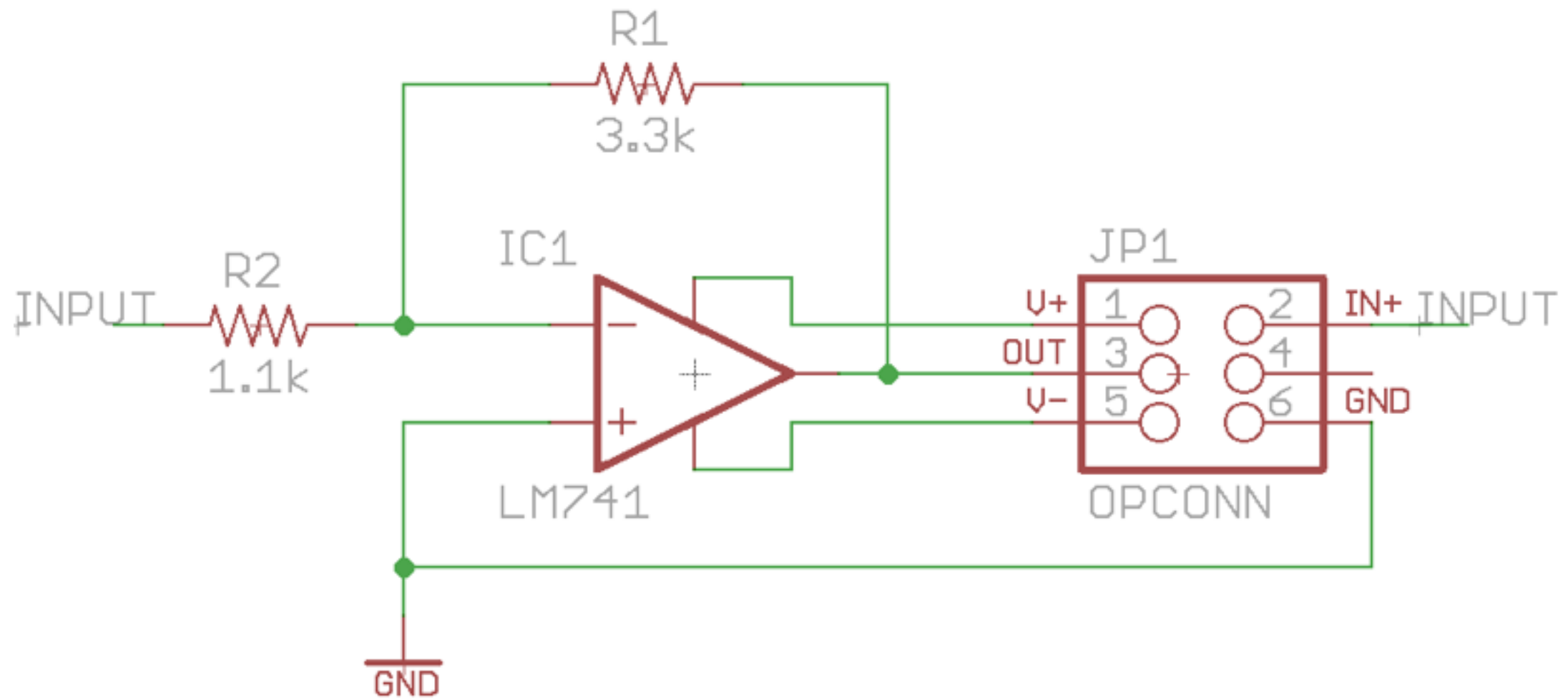


Simple Example

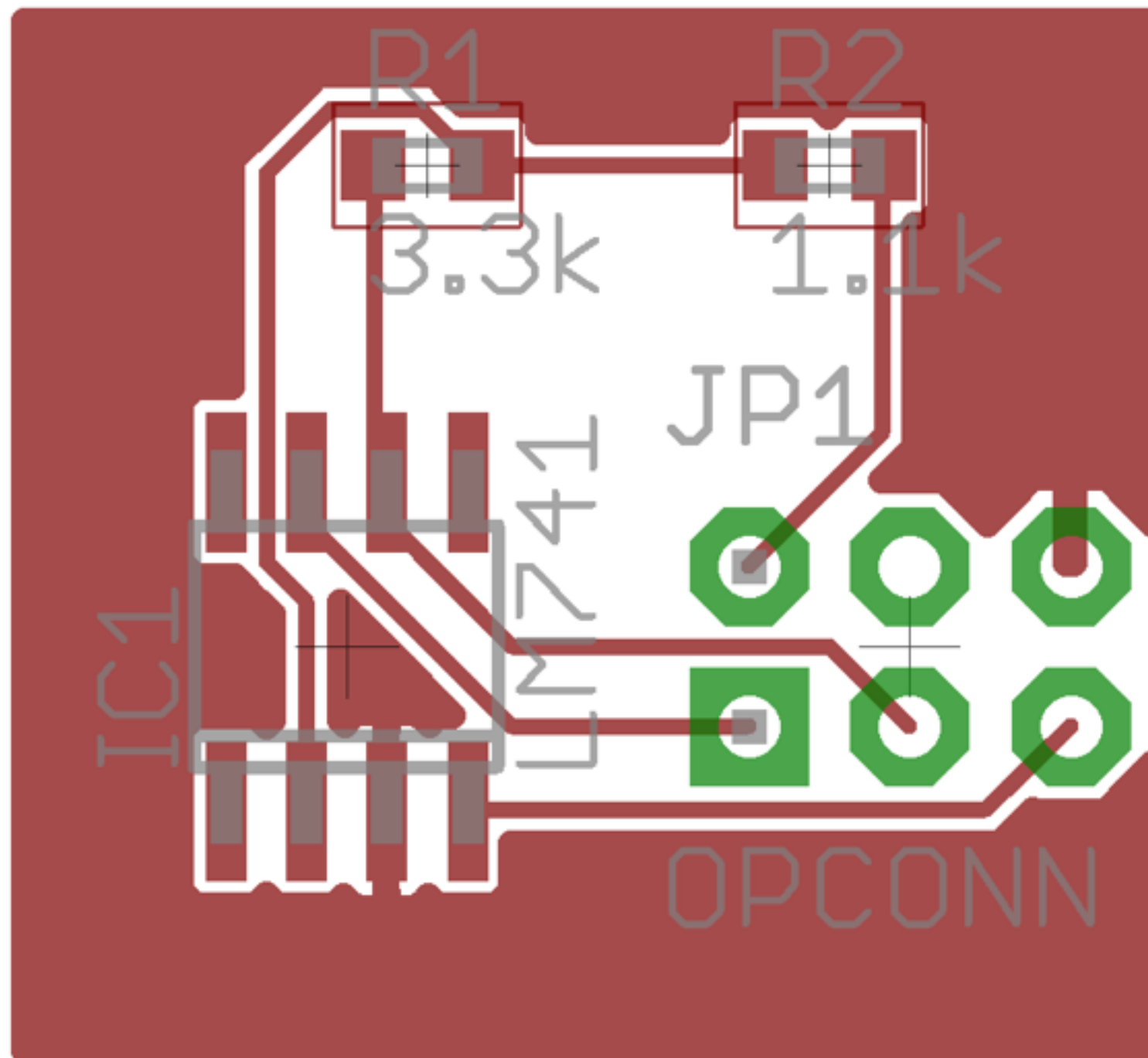
If you decide to install Eagle
try this example
files are on the USB stick

Draw Schematic

Eagle file invamp.sch is on the USB stick



Place & Autoroute



Demo

On-line help

On-line help about Eagle,
in three lessons,
available on my blog at

GanymedeHam.blogspot.com

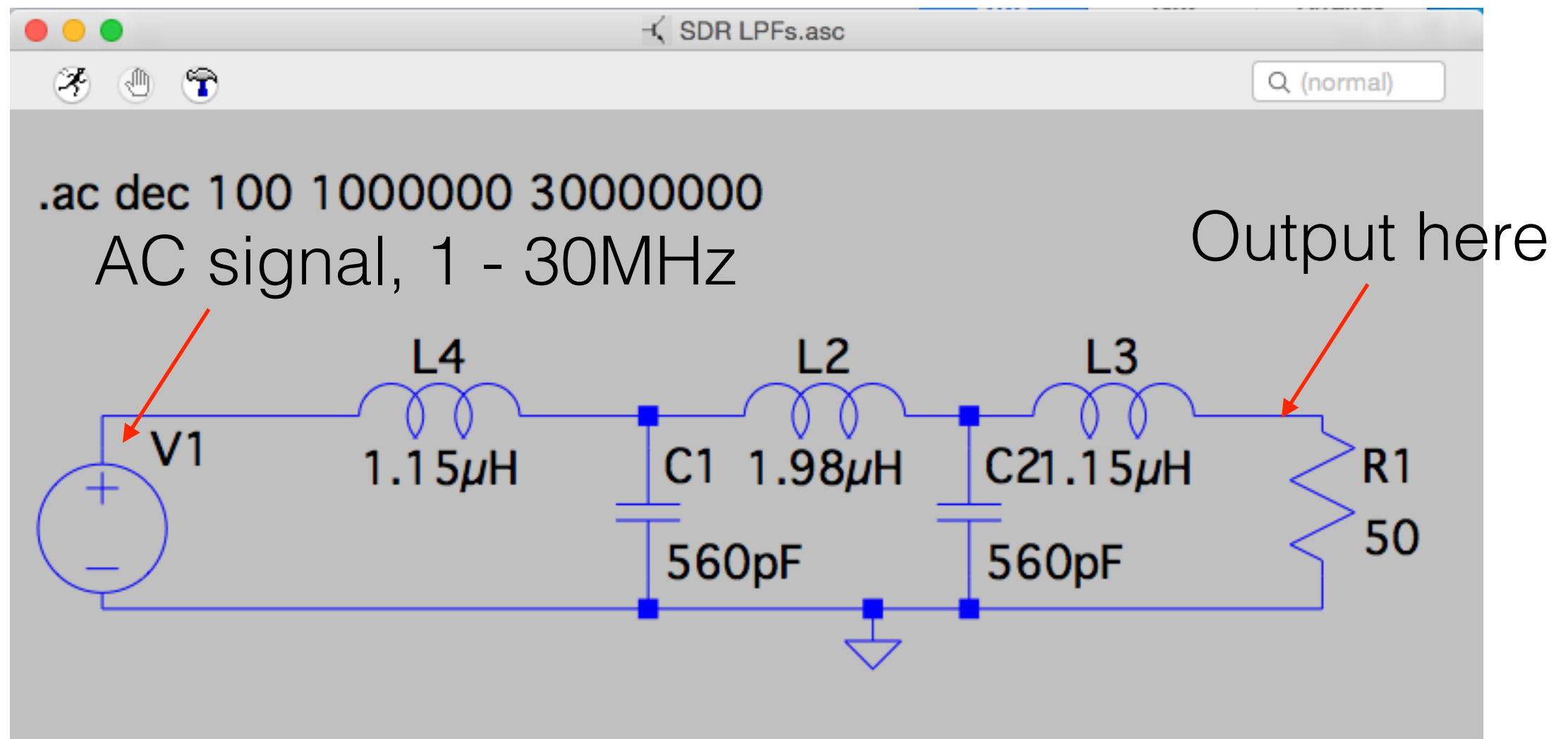
See 2015 February posts
Read, follow, copy, practice



LTSpice

Circuit simulation

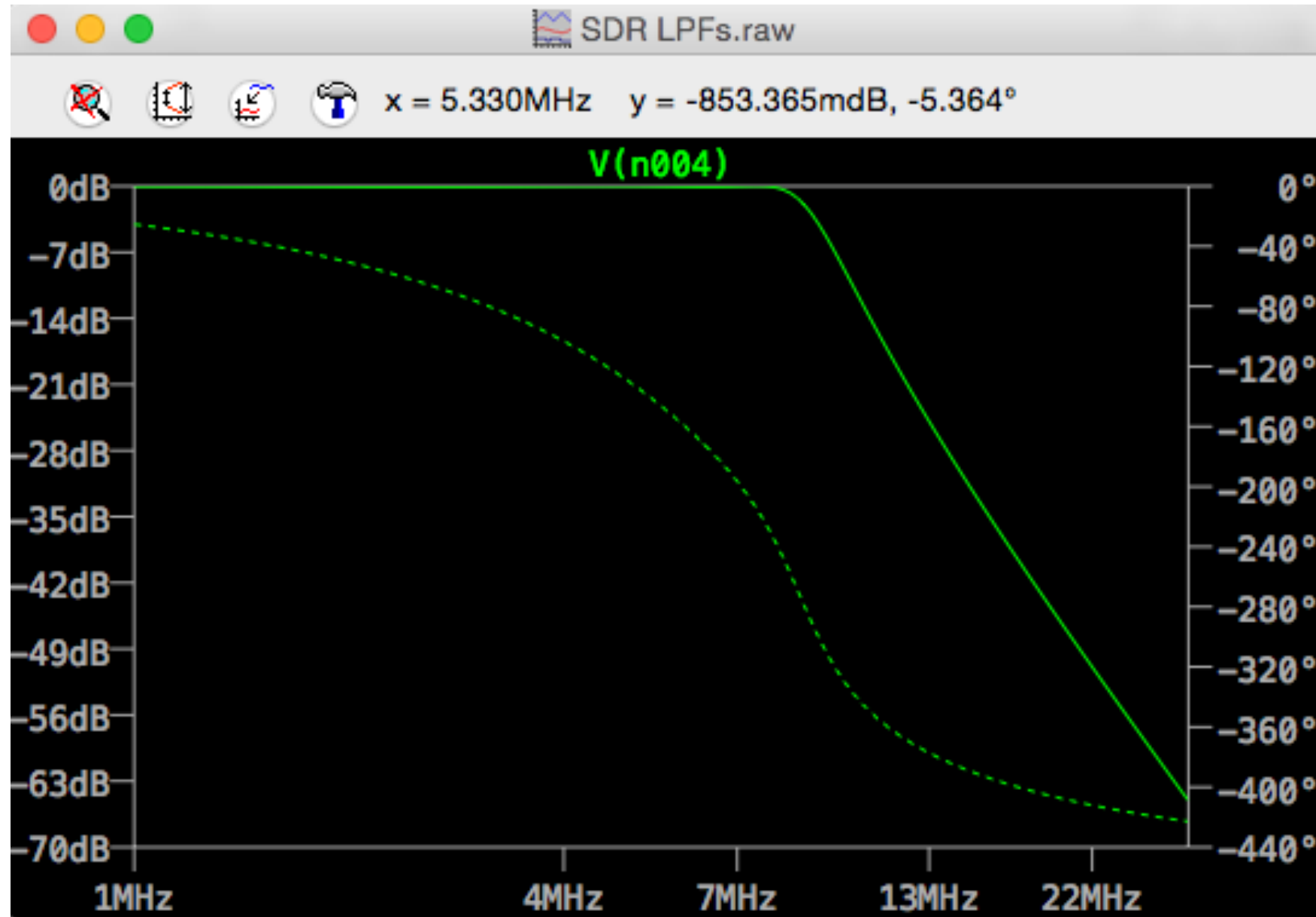
For example a LPF



Draw your circuit



Simulate it



Your circuits can be
fabricated at EuroCircuits
directly from Eagle board files
(they're a bit pricey)

Next time

We will learn about using
Rotary Encoders and
LCD displays

Arduino Sale!!!

Shields - modules - robot kits

Project sketches

- ad9850_Encoder_Input_LCD
- ad9850_KB_input_LCD
- ad9850_spectrum_analyser
- Ard_Mgr_Temp_2_led
- Cap_meter
- DHT11
- DHT11_LCD
- GPS_LCD128x64_Dist
- I2C_compass_GY273_module
- I2C_example_CN75_temp_sensor
- I2C_example_MCP4018_pot
- I2C_example_TMP75_temp_sensor
- LCD_Crystal_Ball
- LCD_draw_bar_chart
- LCD_Echo_display
- LCD_echo_display_128x64_u8glib_v2
- LCD_FFT_Audio_display
- LCD_Seconds_counter
- LCD_Temp_Humid
- LCD_Time_counter_Breadboard
- LDR_Servo
- LED_my_binary_clock
- MouseBox
- MouseLabrynth
- MouseMaze
- MouseMotors
- MouseSensors
- My_VFO_KB
- ONE_WHEEL_ROBOT
- ONE_WHEEL_ROBOT_BTIO_SCAN
- RTC
- Sound_Detector

- ad9850_Encoder_Input_LCD
- ad9850_KB_input_LCD
- ad9850_spectrum_analyser
- Ard_Mgr_Temp_2_led
- Cap_meter
- DHT11
- DHT11_LCD
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- LCD_draw_bar_chart
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- LCD_echo_display_128x64_u8glib_v2
- LCD_FFT_Audio_display
- LCD_Seconds_counter
- LCD_Temp_Humid
- LCD_Time_counter_Breadboard
- LDR_Servo
- LED_my_binary_clock
- MouseBox
- MouseLabrynth
- MouseMaze
- MouseMotors
- MouseSensors
- My_VFO_KB
- ONE_WHEEL_ROBOT
- ONE_WHEEL_ROBOT_BTIO_SCAN
- RTC
- Sound_Detector

- AccelStepper
- ad9850
- Adafruit_CC3000_Server
- Adafruit_S5351
- AFMotor
- ArduinoFFT
- ArduSnake
- Bounce2
- DCF77
- DDS
- dht11
- D81307
- D61307RTC
- D83231
- D83231-updated
- EnableInterrupt
- Encoder
- EtherShield
- fft
- FFT
- fix_fft
- FT6570
- FtpServer
- IOSController
- IOSControllerSerial
- IOSControllerWiFi
- Lcd1602
- LED_Bar
- LiquidCrystal_I2C
- Metro
- Morse_EnDecoder
- NewPing
- itches
- RobotShield
- Rotary
- RotaryEncoder
- RTCLib
- S570
- S5351
- Time
- TimerHelpers
- TimerOne
- Timezone
- TinyGPS
- Tone
- U8glib

