How To EAGLE

A PCB CAD Tutorial

Ben Hurwitz

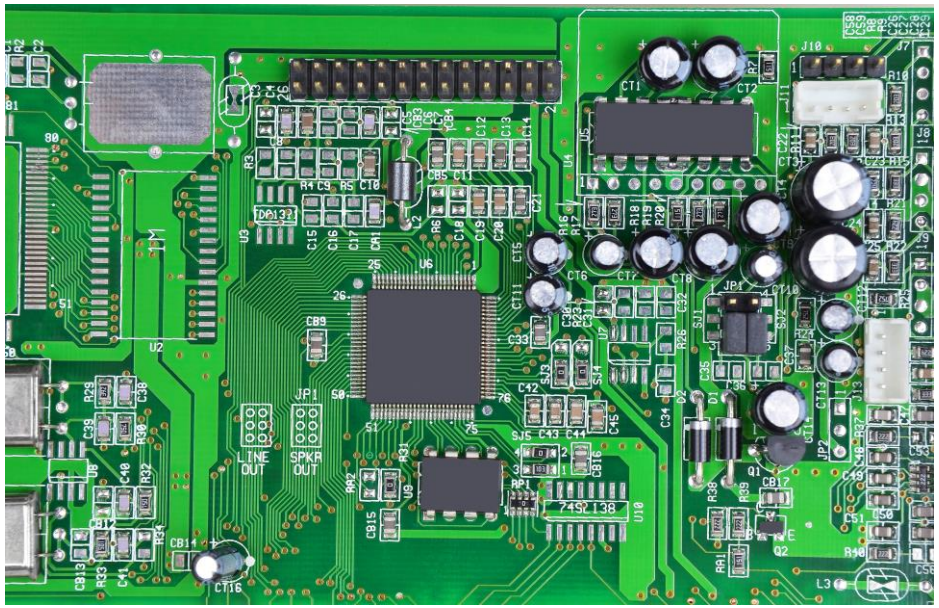
2020

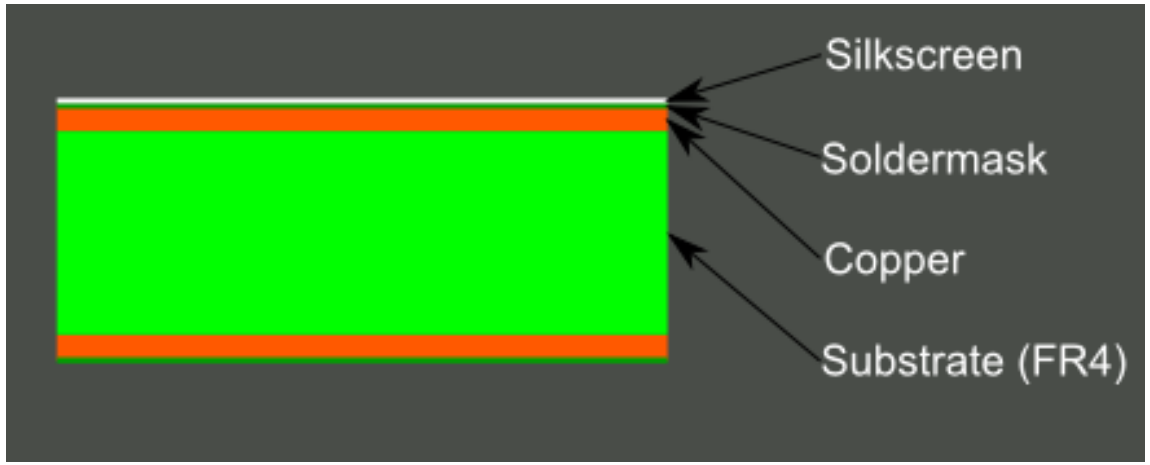
What is EAGLE?

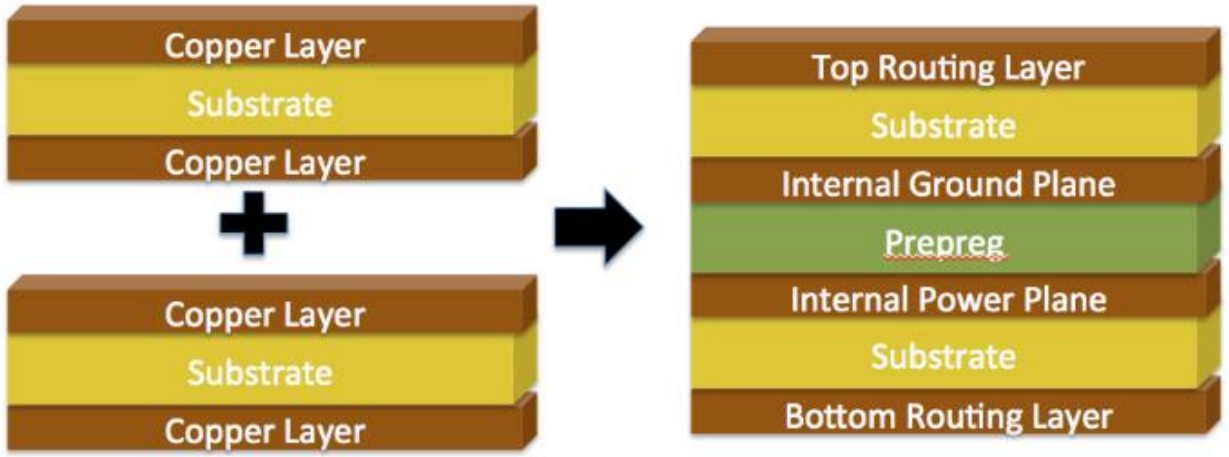
- E-CAD/PCB CAD/PCB Design software
- Currently owned and operated by Autodesk
  - Some slick Autodesk integrations now
  - Much improved from just a few years ago, pre-Autodesk.
- Professional edition available for free to students (“Educational version”)
  - In fact, all Autodesk software is free to students to some extent.
  - (Unrelated, but so is Adobe software!)

What is a PCB?

- Printed Circuit Boards
- Eliminates loose wiring by soldering components onto a hard substrate with pre-etched connections
- Comprised of multiple layers
- Vias connect various copper layers

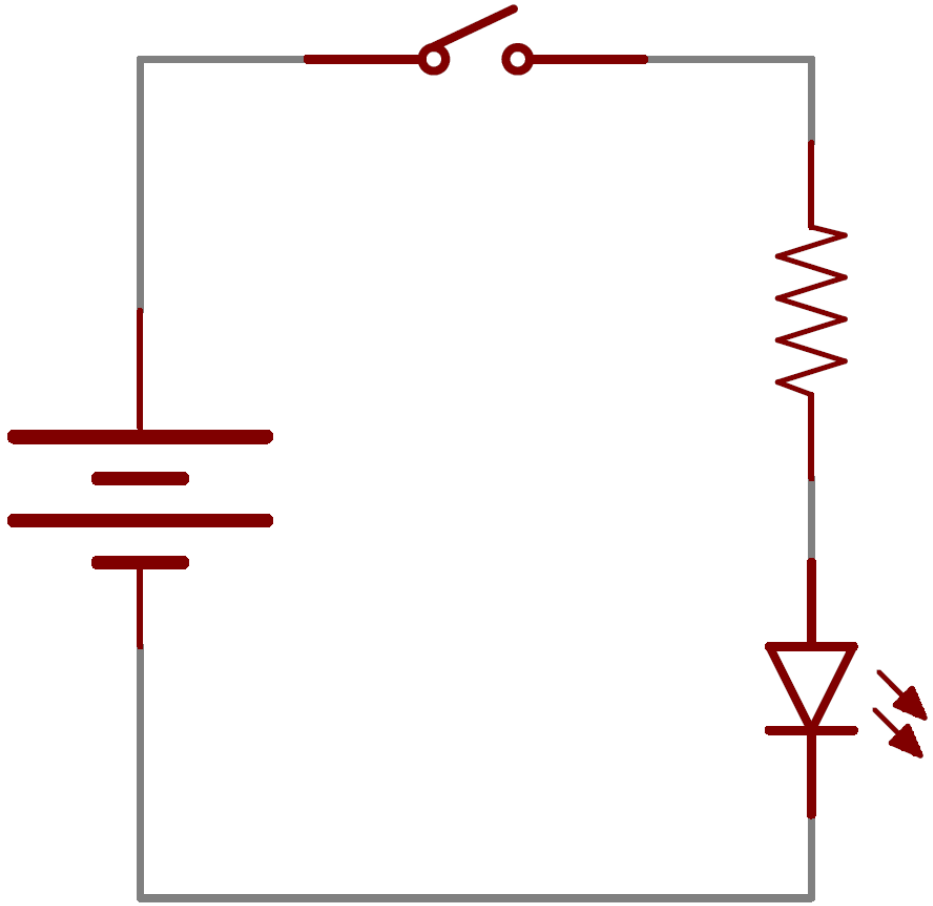






What are we doing today?

- We are designing a simple battery-powered switched-LED circuit



Questions before we start?

Hopefully, you've opened EAGLE and logged in.

If not, do that now.

Control Panel - EAGLE 9.5.0 education

File View Options Window Help

Name	Description
Libraries	
Design Blocks	
Design Rules	
User Language Programs	
Scripts	
CAM Jobs	
SPICE Models	User SPICE Models
Projects	

Home Preview

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Recent Files

- nameTag.brd
- switchBoard_revB_single.sch
- switchBoard_revB_single.brd
- eagle-class.sch

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Tue Sep 17 2019 02:00 PM Register

Electromechanical Workflow: Component Placement
Thu Sep 19 2019 02:00 PM Register

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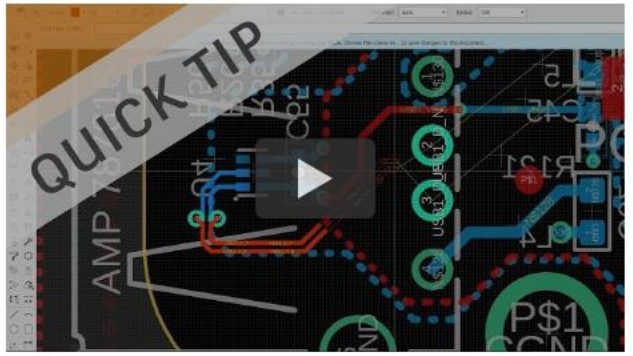

Differential Pair Routing mode in EAGLE 9.4!
See your Differential Pairs in highlight for easy viewing and leverage the power of Walkaround and Push/Shove Obstacle Avoidance in

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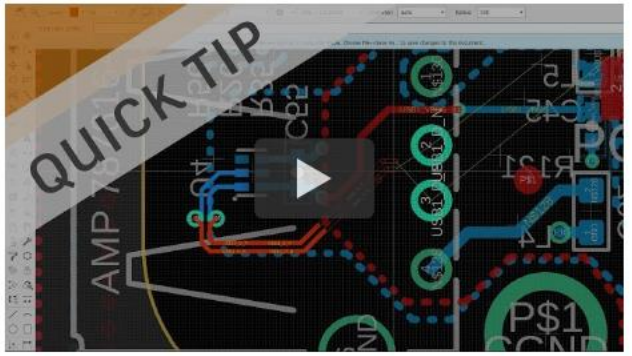

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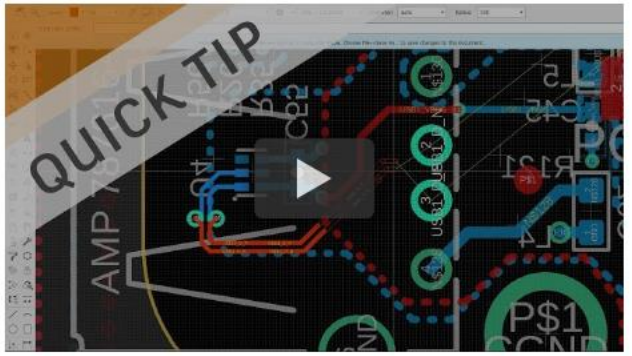

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Open library manager
Use all
Use none
Search in folder

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Update to 9.5.2 Ben Hurwitz

Libraries

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The component libraries supplied with EAGLE have been compiled with great care as an additional service to you, our customer. However, the large number of available components and suppliers of these components means that the occasional discrepancy is unavoidable. Please note, therefore, that Autodesk takes no responsibility for the complete accuracy of information included in library files.

Updates to these libraries, as well as additional libraries, can be downloaded using the Manage Libraries tool. To view these libraries, right click on *Libraries* and select *Open libraries manager*

Other libraries, that have not yet been officially released, can be found on Autodesk's internet site at the Libraries download section.

Use the ADD command in the Schematic Editor or Layout Editor window to search for a certain device or package!

Information about defining your own libraries can be found in the file library.txt in the doc directory.

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File View Options Window Help

Name | Description

- Eagle Pcb
  - 19inch.lbr — 19-Inch Slot Eurocards
  - 40xx.lbr — CMOS Logic Devices, 4000 Series
  - 41xx.lbr — 41xx Series Devices
  - 45xx.lbr — CMOS Logic Devices, 4500 Series
  - 74ac-logic.lbr — TTL Logic Devices, 74AC11xx and 74AC16xx Series
  - 74ttl-din.lbr — TTL Devices with DIN Symbols
  - 74xx-eu.lbr — TTL Devices, 74xx Series with European Symbols
  - 74xx-little-de.lbr — Single and Dual Gates Family, US symbols
  - 74xx-little-us.lbr — Single and Dual Gates Family, US symbols
  - 74xx-us.lbr — TTL Devices, 74xx Series with US Symbols
  - 751xx.lbr — 751xx Series Devices
  - allegro.lbr — Allegro MicroSystems, Inc
  - altera-cyclone-II.lbr — ALTERA Cyclone II FPGA
  - altera-stratix-iv.lbr — Altera Stratix IV
  - altera.lbr — Altera Programmable Logic Devices
  - am29-memory.lbr — Advanced Micro Devices Flash Memories
  - amd-mach.lbr — AMD MACH4/MACH5 Family (Vantis)
  - amd.lbr — AMD Packages
  - amis.lbr — AMI Semiconductor
  - analog-devices.lbr — Analog Devices Components
  - aplus.lbr — APLUS INTEGRATED CIRCUITS INC.
  - ase.lbr — ASE Advanced Semiconductor Engeneering.Inc
  - atmel.lbr — ATMEL Devices
  - austriamicrosystems.lbr — austriamicrosystems
  - avago.lbr — AVAGO Technologies
  - axis.lbr — Axis Packages
  - battery.lbr — Lithium Batteries and NC Accus
  - belton-engineering.lbr — Belton Engineering Co., Ltd.
  - burr-brown.lbr — Burr-Brown Components
  - busbar.lbr — Schroff Current Bus Bars for 19-Inch Racks
  - buzzer.lbr — Speakers and Buzzers
  - c-trimm.lbr — Trimm Capacitor from STELCO GmbH
  - california-micro-devices.lbr — california micro devices
  - capacitor-wima.lbr — WIMA Capacitors
  - chipcard-siemens.lbr — Siemens Chip Card Products
  - cirrus-logic.lbr — CIRRUS LOGIC
  - con-3m.lbr — 3M Connectors
  - con-4ucon.lbr — 4UCON TECHNOLOGY INC. Connector
  - con-amp-champ.lbr — IEEE488 (Centronics) Connectors from AMP
  - con-amp-micromatch.lbr — AMP Connectors, Type MicroMatch
  - con-amp-mt.lbr — AMP Connectors, Type MT
  - con-amp-mt6.lbr — AMP Connectors, Type MT6
  - con-amp-quick.lbr — AMP Connectors, Type QUICK
  - con-amp-te.lbr — AMP TE Connectivity AMPLIMITE 0.50 Series
  - con-amp.lbr — AMP Connectors
  - con-amphenol.lbr — Amphenol Connectors
  - con-avx.lbr — AVX Connectors
  - con-berg.lbr — Berg Connectors
  - con-bosch.lbr — BOSCH Automotiv Connetors
  - con-chipcard-iso7816.lbr — ISO 7816 Chipcard (Package)
  - con-coax.lbr — Coax Connectors
  - con-commcon.lbr — COMPACT PCI CONNECTORS

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Green dots

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File View Options Window Help

Directories...
Backup / Locking
User interface...
Proxy settings...
Data collection and use...

Name	Description
Librarie	
Design	
Design	
User Li	
Scripts	
CAM Jobs	
SPICE Models	User SPICE Models
Projects	

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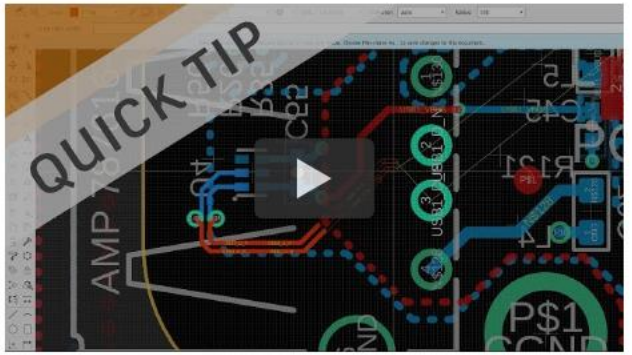

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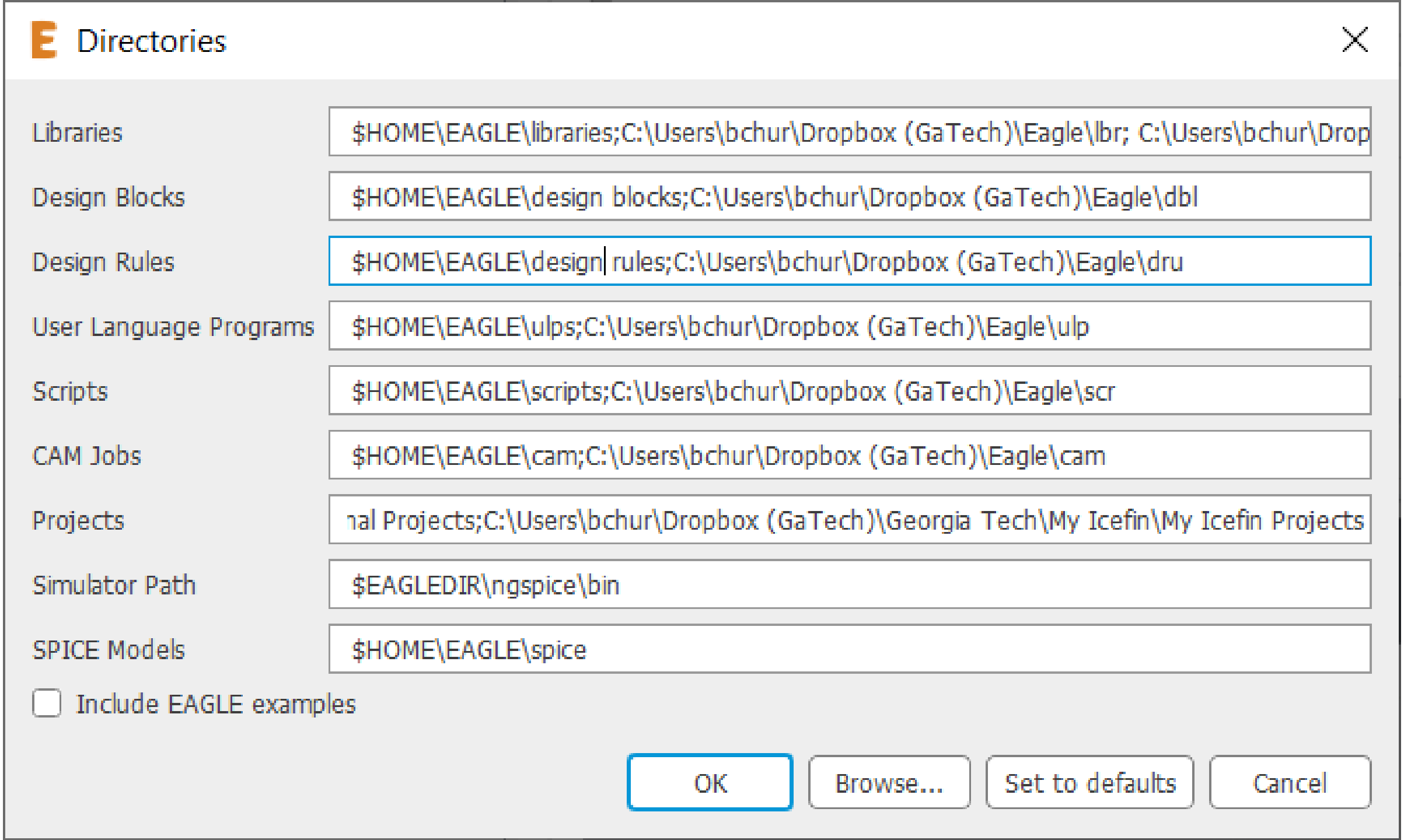
Directories
Libraries
$HOME\EAGLE\libraries;C:\Users\bchur\Dropbox (GaTech)\Eagle\lbr; C:\Users\bchur\Drop
Design Blocks
$HOME\EAGLE\design blocks;C:\Users\bchur\Dropbox (GaTech)\Eagle\dbl
Design Rules
$HOME\EAGLE\design rules;C:\Users\bchur\Dropbox (GaTech)\Eagle\dru
User Language Programs
$HOME\EAGLE\ulps;C:\Users\bchur\Dropbox (GaTech)\Eagle\ulp
Scripts
$HOME\EAGLE\scripts;C:\Users\bchur\Dropbox (GaTech)\Eagle\scr
CAM Jobs
$HOME\EAGLE\cam;C:\Users\bchur\Dropbox (GaTech)\Eagle\cam
Projects
nal Projects;C:\Users\bchur\Dropbox (GaTech)\Georgia Tech\My Icefin\My Icefin Projects
Simulator Path
$EAGLEDIR\ngspice\bin
SPICE Models
$HOME\EAGLE\spice
Include EAGLE examples
OK
Browse...
Set to defaults
Cancel

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File View Options Window Help

New
Open
Open recent projects
Save all
Close project
Exit Alt+X

Project
Schematic
Board
Library
Design Block
CAM Job
ULP
Script
Text

Description

SPICE Models — User SPICE Models
Projects

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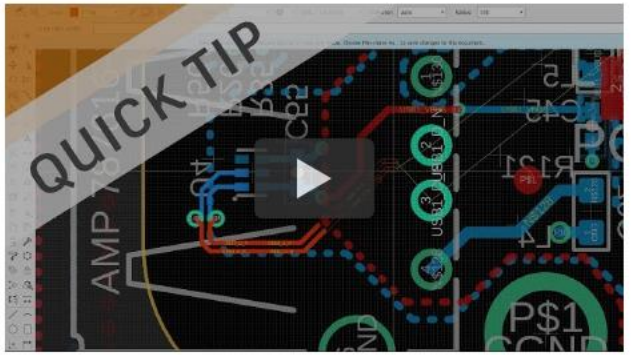

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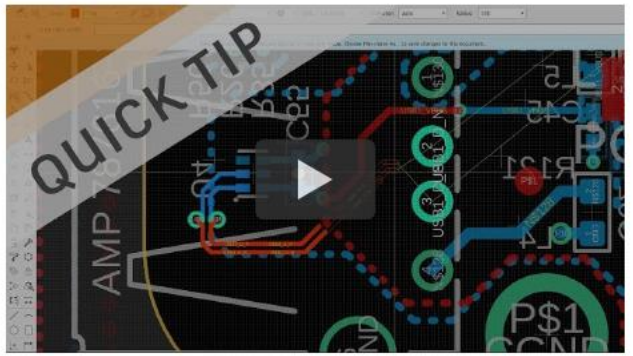

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Libraries		
Design Blocks		
Design Rules		
User Language Programs		
Scripts		
CAM Jobs		
SPICE Models		User SPICE Models
Projects		
Projects		Personal
Bare Bones Arduino (Tutorial)	●	
batt_swtiched-LED	●	Empty Project
ENEE440	●	
Designs		Icefin projects
Projects		The Hive projects
Personal Projects		
My Icefin Projects		

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Empty Project

Use the context menu to create new schematic or board files within this project.

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1 Schematic - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\untitled.sch - EAGLE 9.5.0 education

File Edit Draw View Tools Library Options Window Help

Layer: 91 Nets

Sheets Inspector Selection Filter

Types

- Attribute
- Bus Wire
- Circle
- Dimension
- Frame
- Group
- Junction
- Label
- Line
- Module Instance
- Part
- Polygon Edge
- Probe
- Rectangle
- Text
- Wire

Reset

Design Manager

Browser Filter

View: Parts

Project Documents 1 of 1 shown (1 selected)

Search

Name Type

All Sheets

0.1 inch (1.1 0.9) Click or press Ctrl+L key to activate command line mode

Left-click & drag to define group (or left-click to start defining a group polygon)

1 Schematic - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\untitled.sch - EAGLE 9.5.0 education

File Edit Draw View Tools Library Options Window Help

Layer settings...
Grid...
Mark
Show
Info
Redraw
Zoom to fit
Zoom in
Zoom out
Zoom select
Sheets
Inspector
Selection Filter
Design Manager

Click or press Ctrl+L key to activate command line mode

Part
Polygon Edge
Probe
Rectangle
Text
Wire

Reset

Design Manager

Browser Filter

View: Parts

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File Edit Draw View Tools Library Options Window Help

1/1

Layer: 91 Nets

0.1 inch (0.0 2.6)

Left-click & drag to define group (or left-click to start defining a group polygon)

1 Schematic - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\untitled.sch - EAGLE 9.5.0 education

File Edit Draw View Tools Library Options Window Help

1/1

Layer: 91 Nets

0.1 inch (0.0 2.6)

Left-click & drag to define group (or left-click to start defining a group polygon)

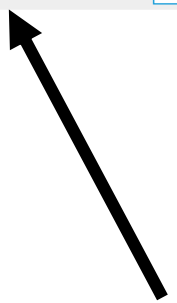
1 Schematic - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\untitled.sch - EAGLE 9.5.0 education

File Edit Draw View Tools Library Options Window Help

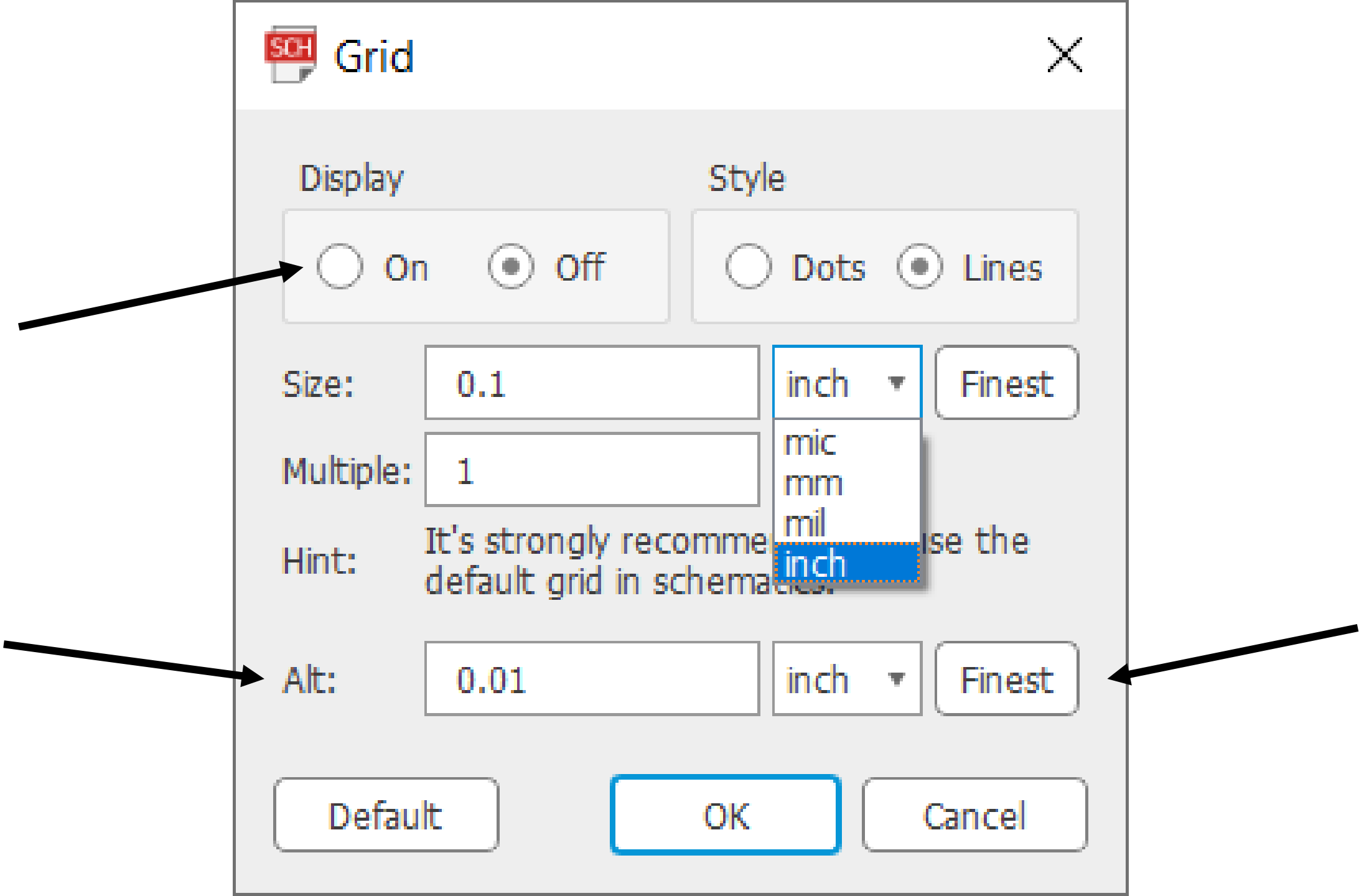
Grid

Layer: 91 Nets

0.1 inch (2.2 4.4)



Change the grid settings


Grid
Display
On
Off
Style
Dots
Lines
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inch
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mil
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Multiple:
1
Hint:
It's strongly recomme se the
default grid in schemat
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0.01
inch
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Default
OK
Cancel

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File Edit Draw View Tools Library Options Window Help

Layer: 91 Nets

0.1 inch (-1.3 0.8)

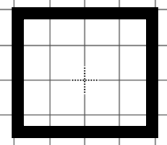
Nothing to undo. Left-click & drag to define group (or left-click to start defining a group polygon)

1 Schematic - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\untitled.sch - EAGLE 9.5.0 education

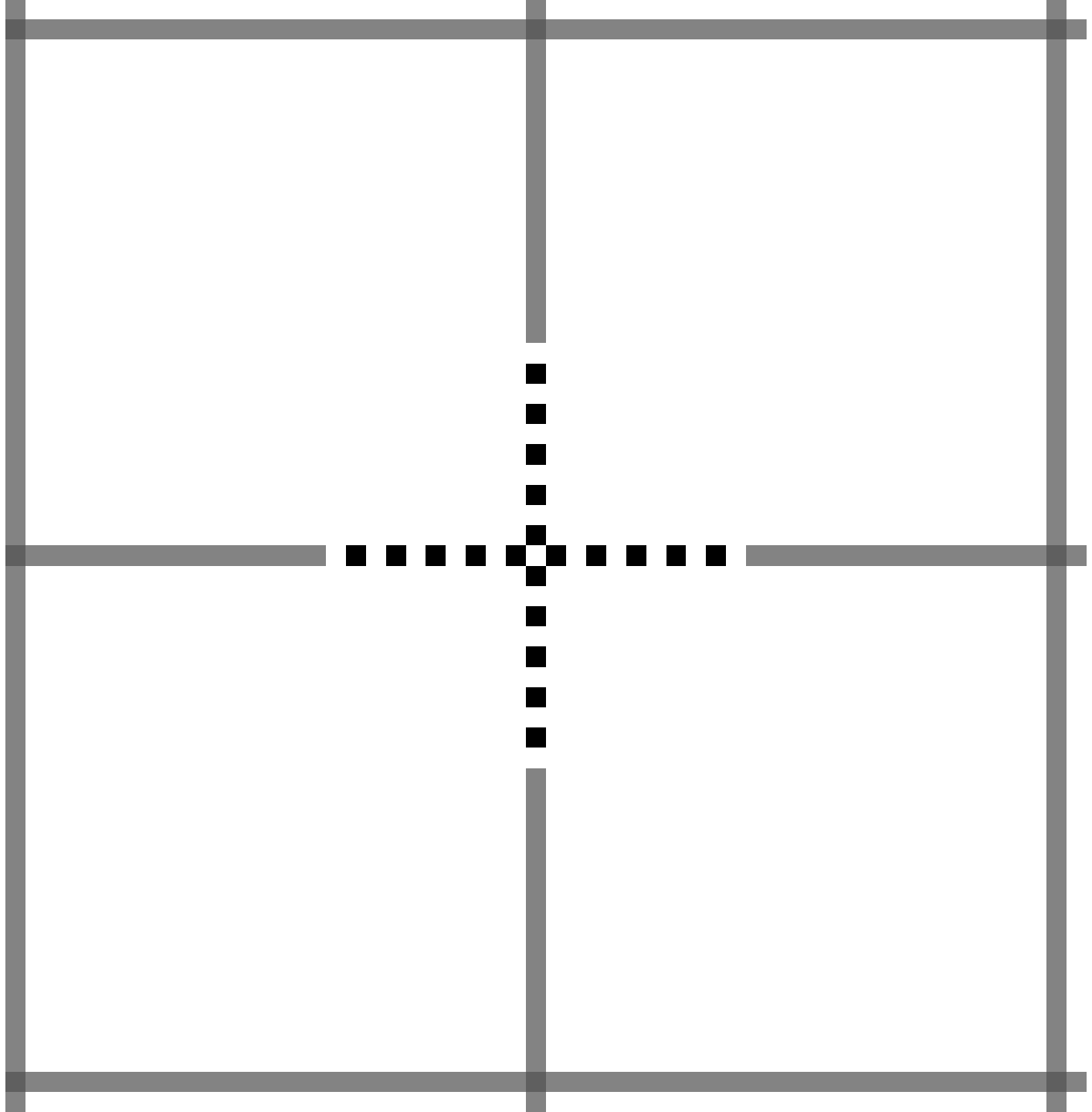
File Edit Draw View Tools Library Options Window Help

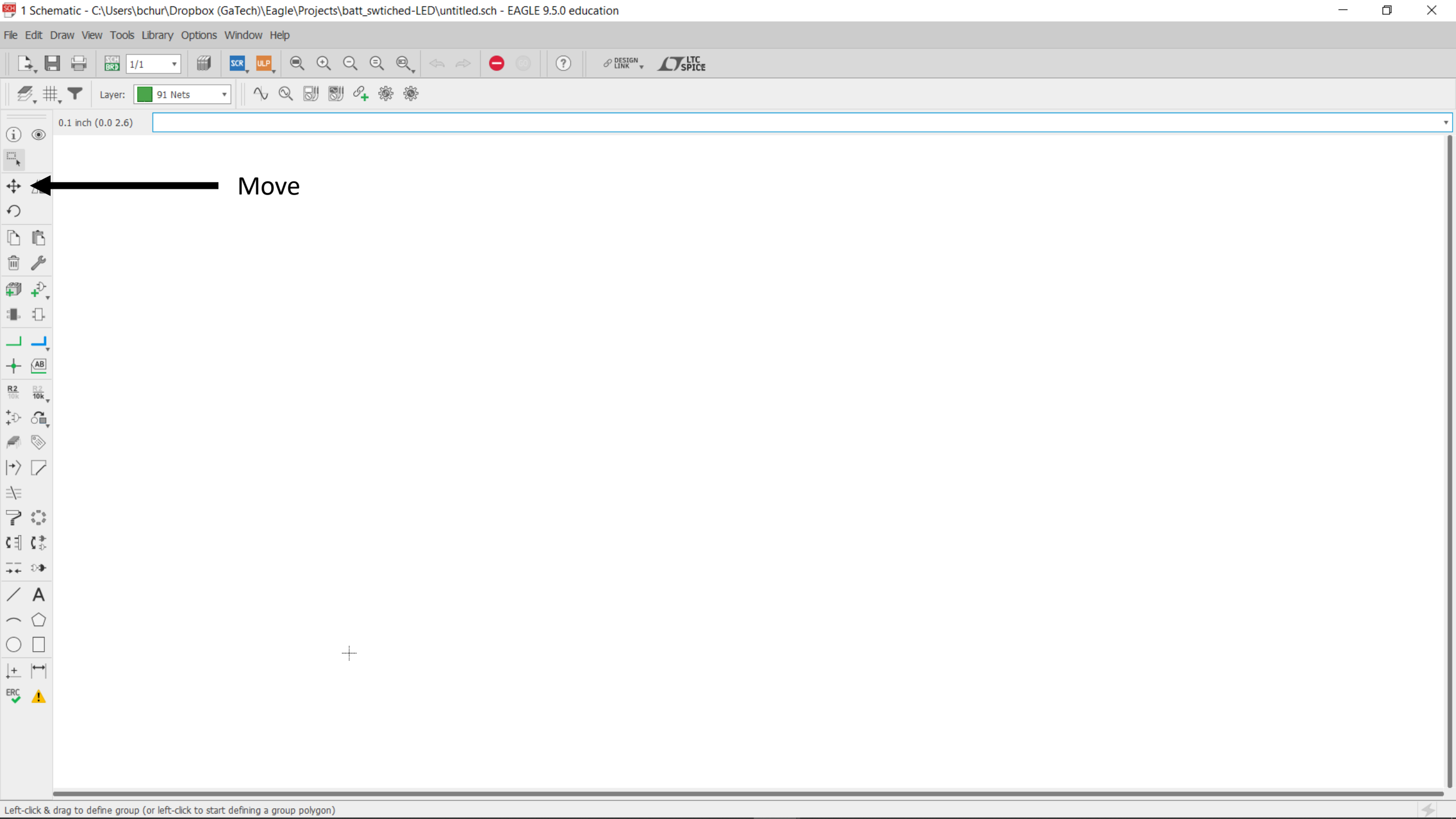
Layer: 91 Nets

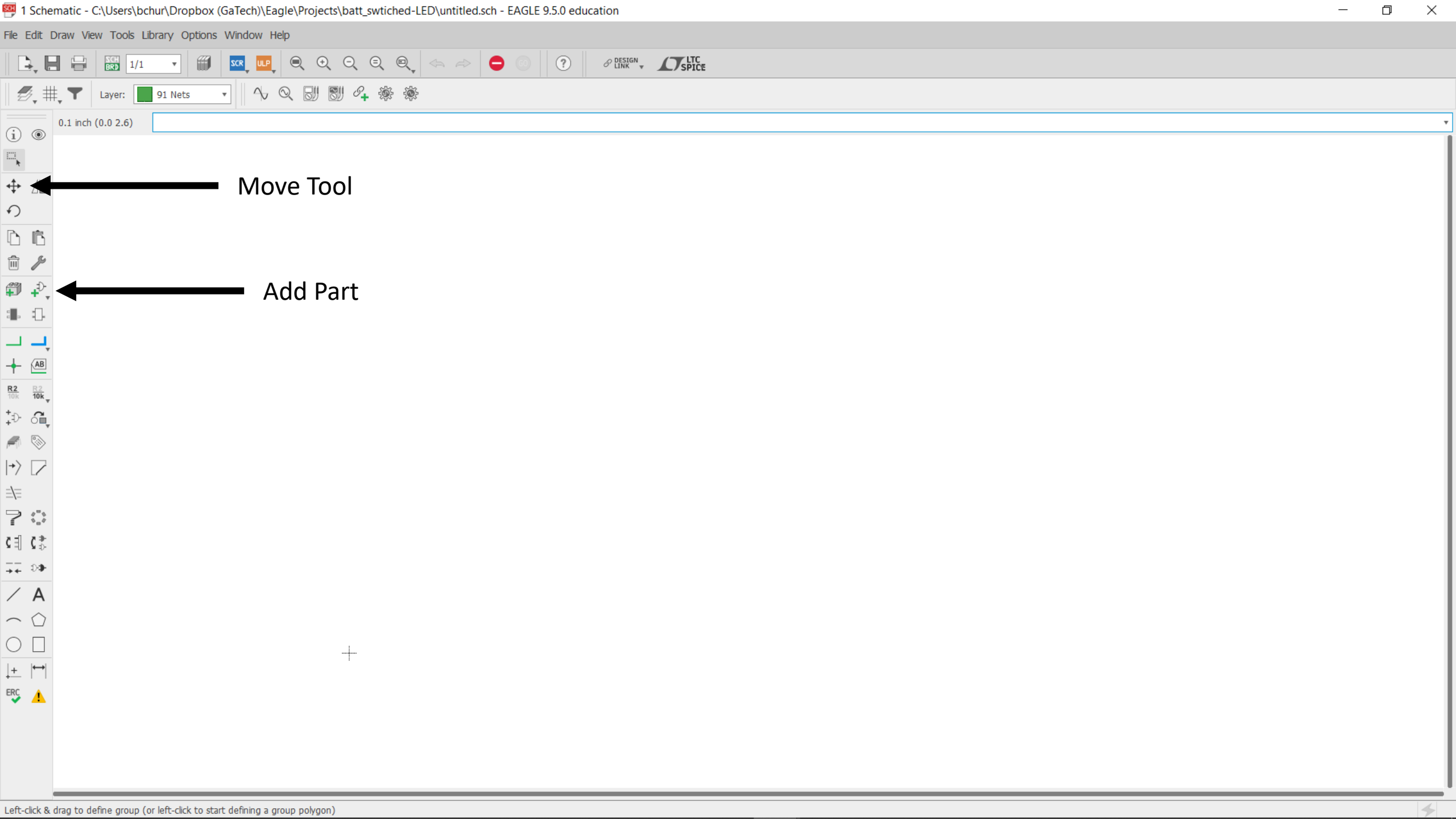
0.1 inch (-1.3 0.8)

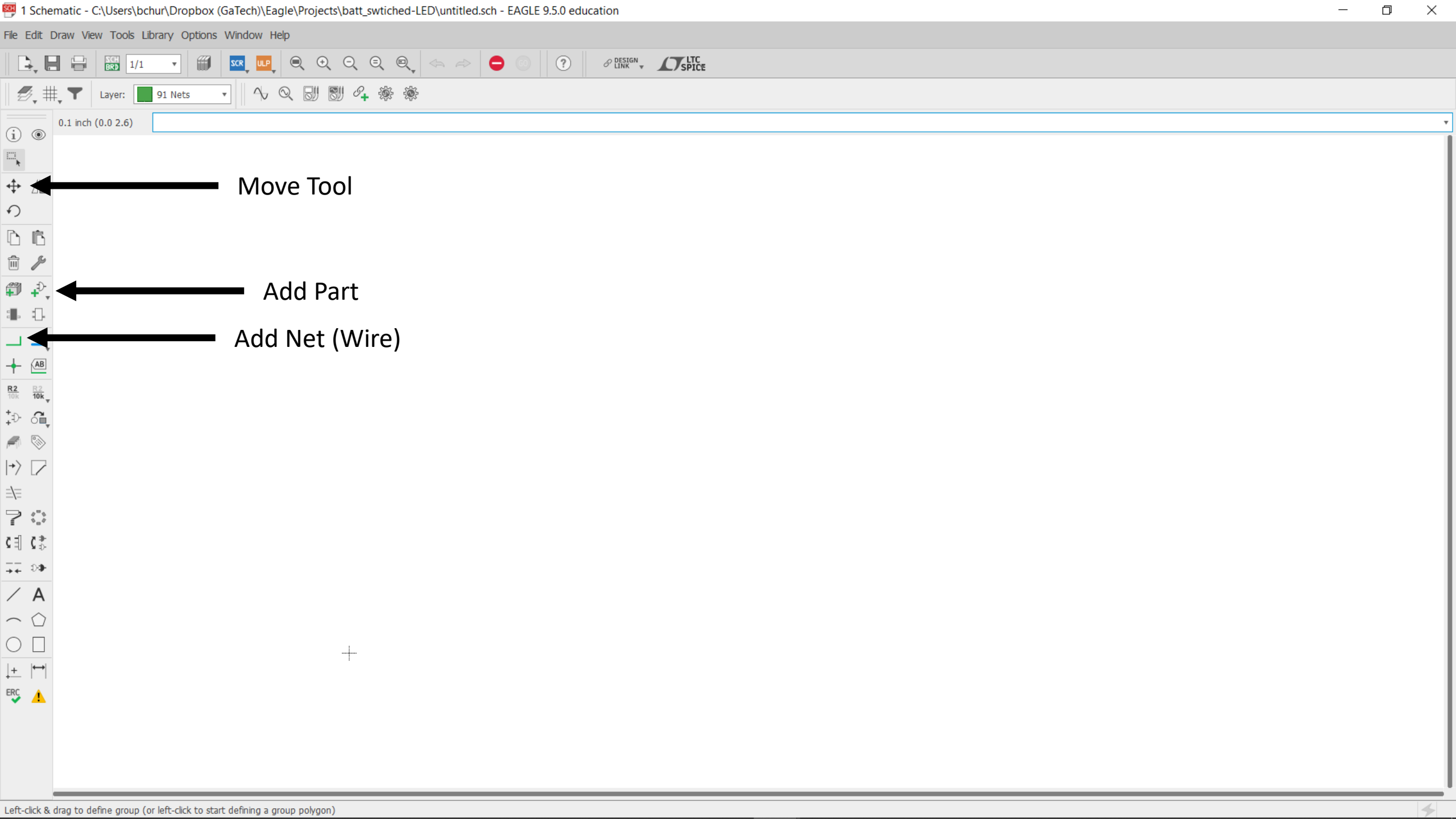


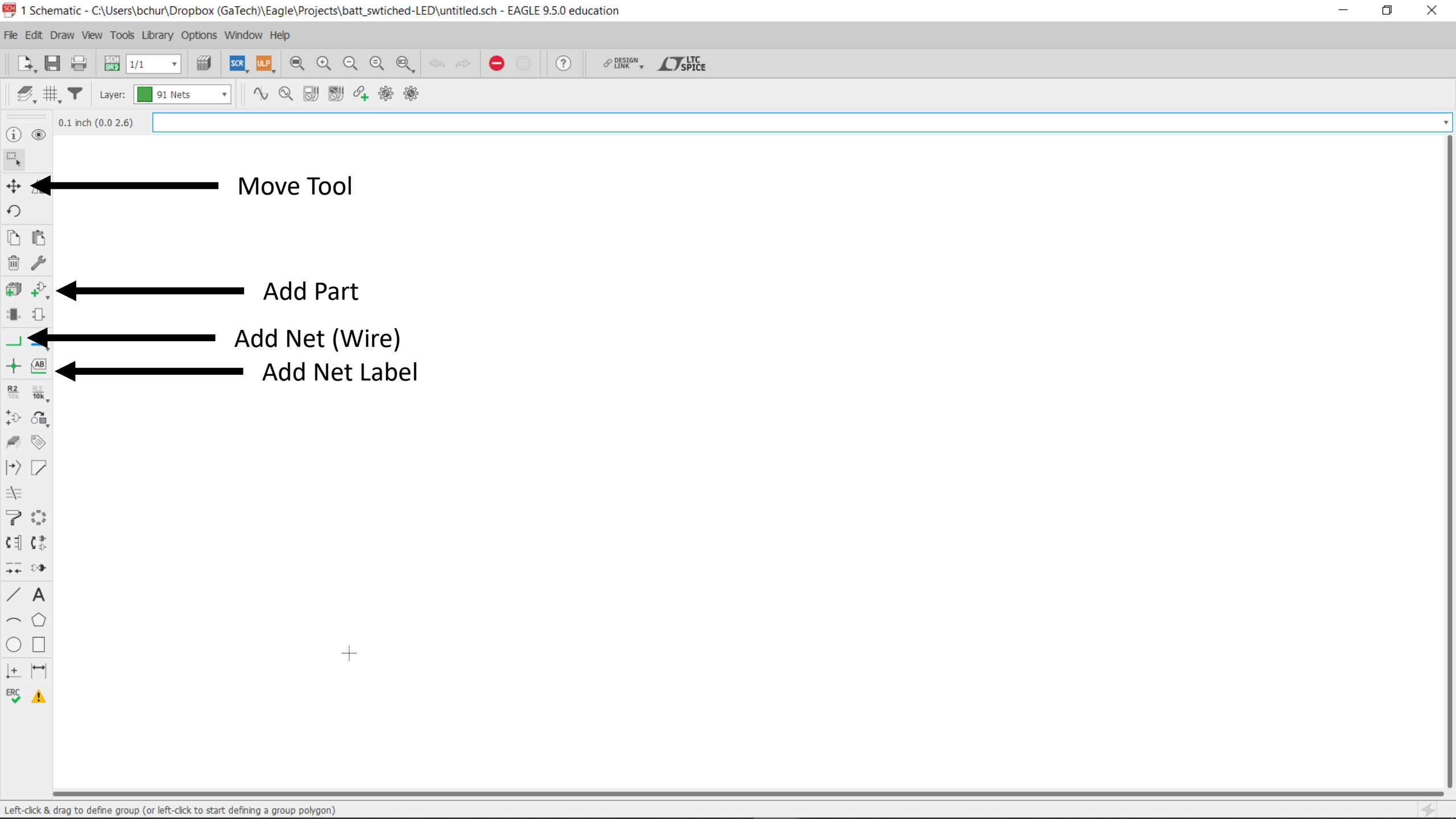
Nothing to undo. Left-click & drag to define group (or left-click to start defining a group polygon)

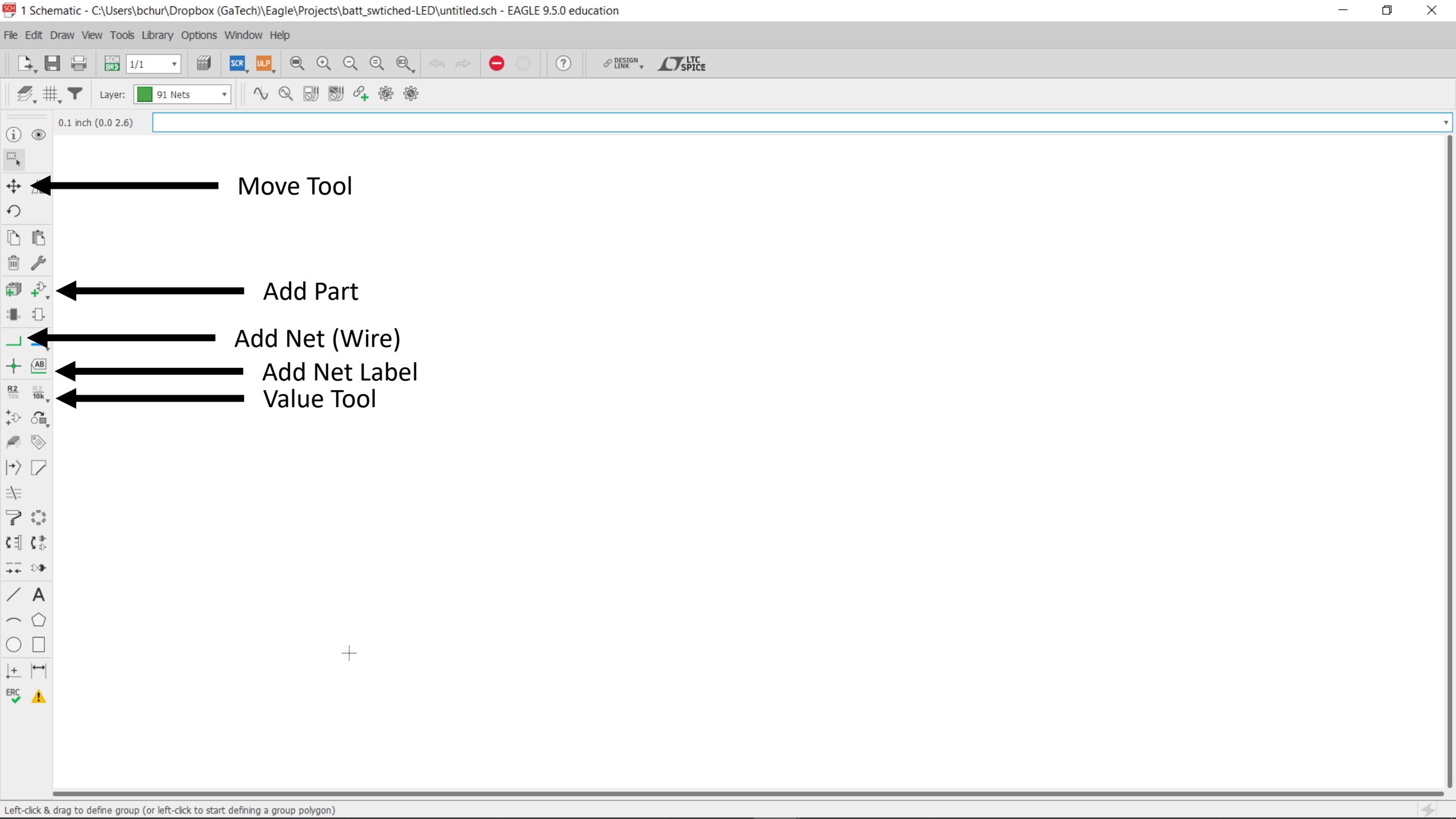


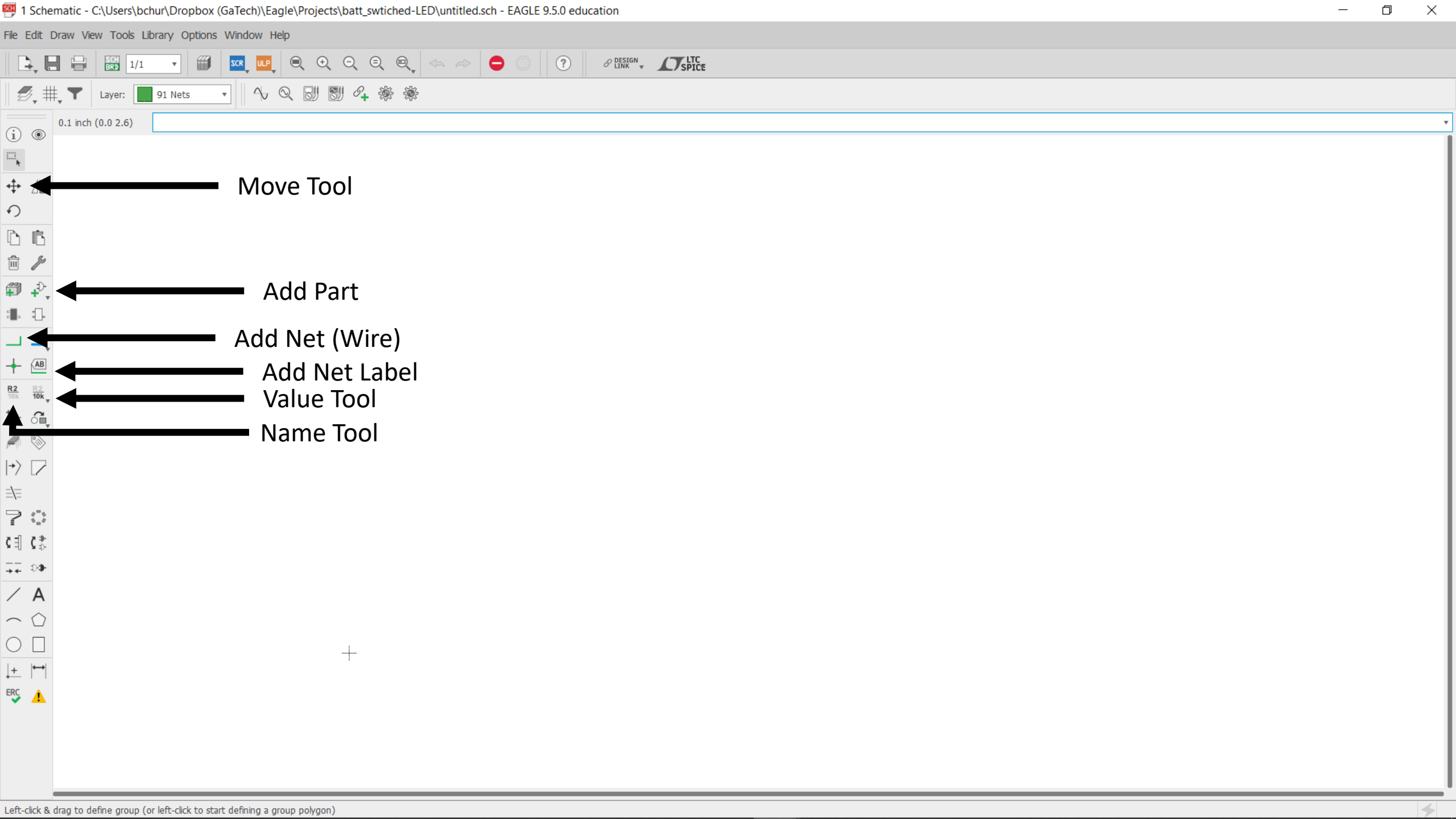

1 Schematic - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\untitled.sch - EAGLE 9.5.0 education
File Edit Draw View Tools Library Options Window Help
1/1
Layer:
91 Nets
0.1 inch (0.0 2.6)
Move
Left-click & drag to define group (or left-click to start defining a group polygon)

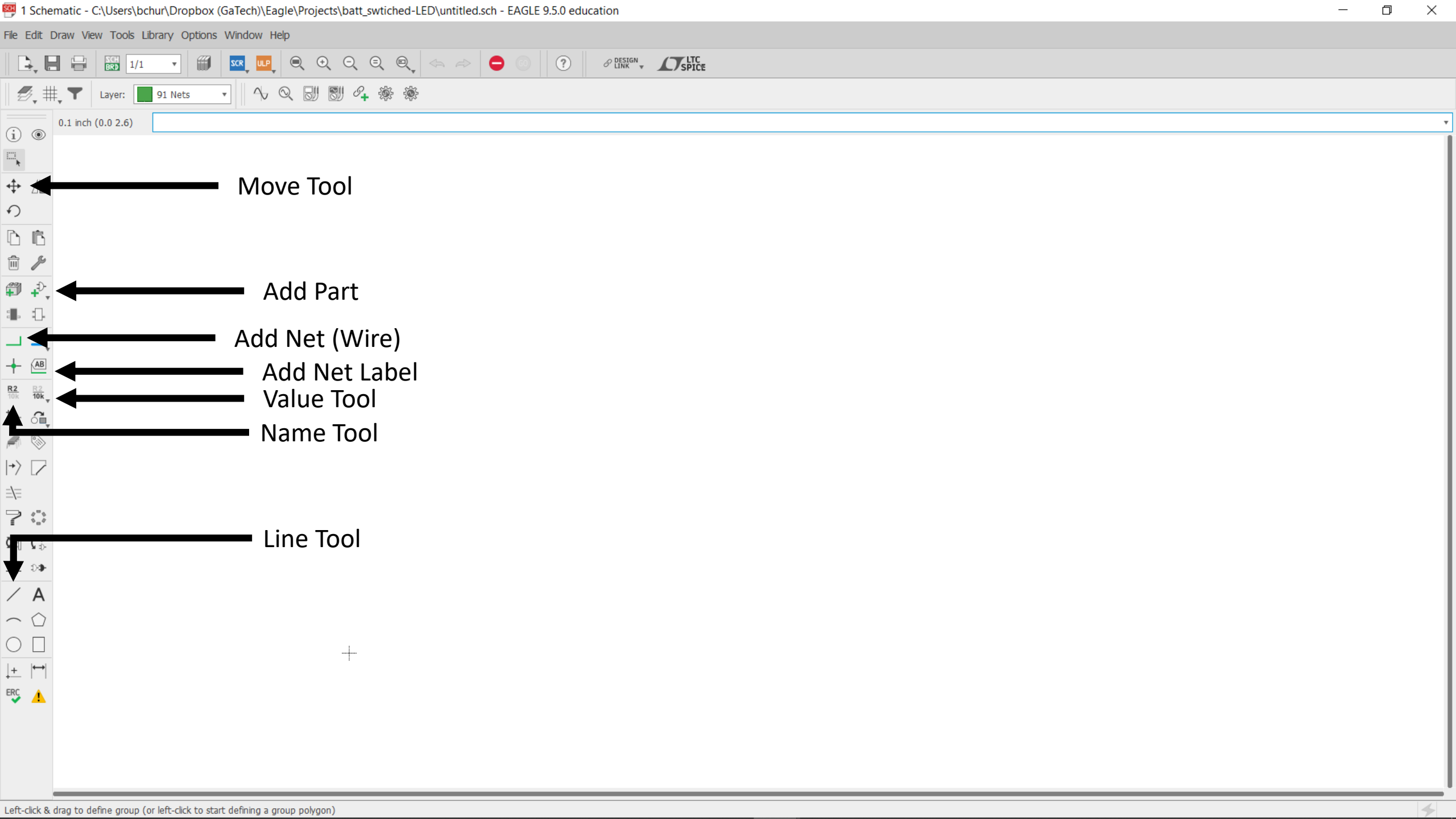

1 Schematic - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\untitled.sch - EAGLE 9.5.0 education
File Edit Draw View Tools Library Options Window Help
Layer: 91 Nets
0.1 inch (0.0 2.6)
Move Tool
Add Part
Left-click & drag to define group (or left-click to start defining a group polygon)

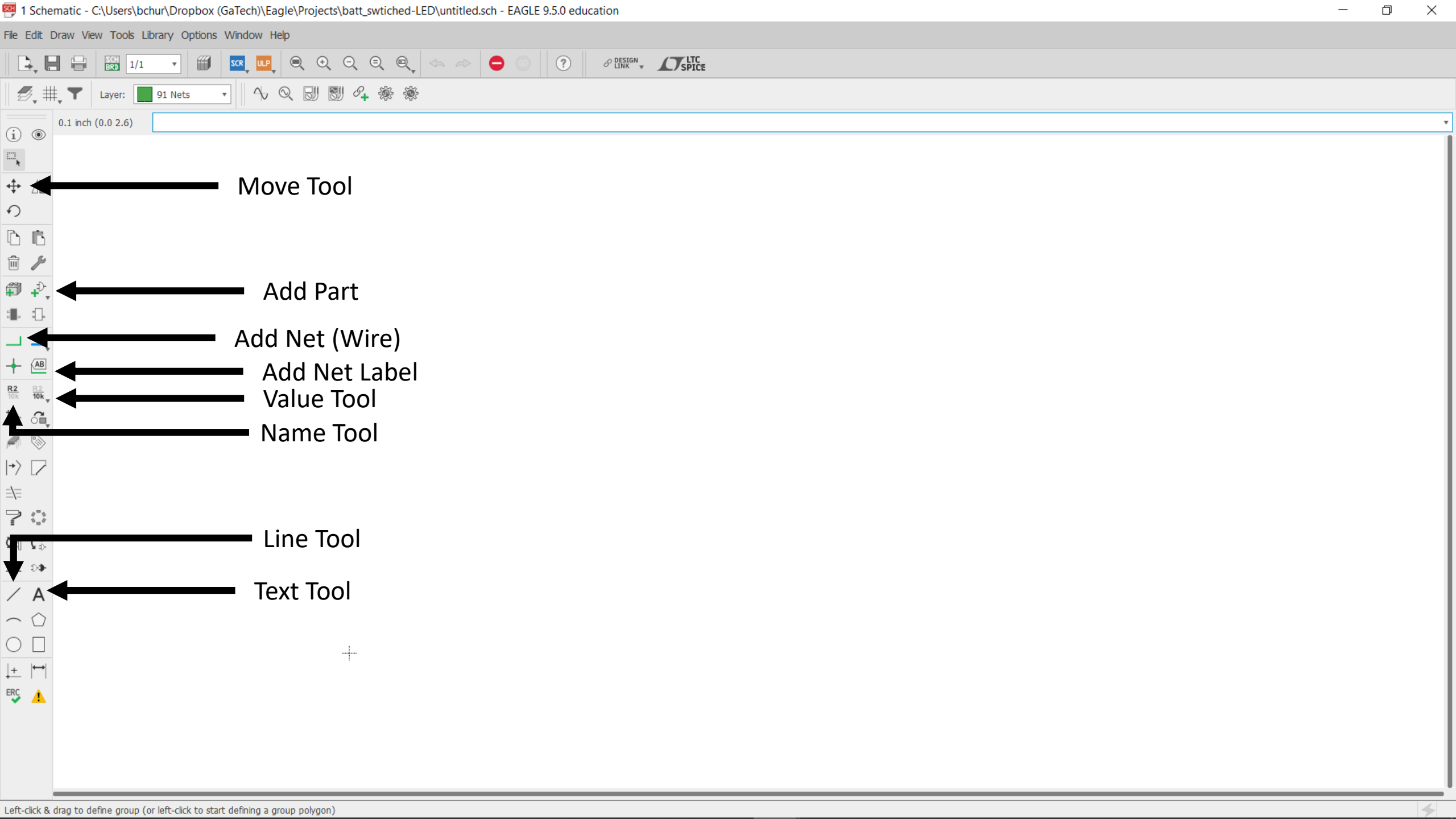

1 Schematic - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\untitled.sch - EAGLE 9.5.0 education
File Edit Draw View Tools Library Options Window Help
Layer: 91 Nets
0.1 inch (0.0 2.6)
Move Tool
Add Part
Add Net (Wire)
Left-click & drag to define group (or left-click to start defining a group polygon)

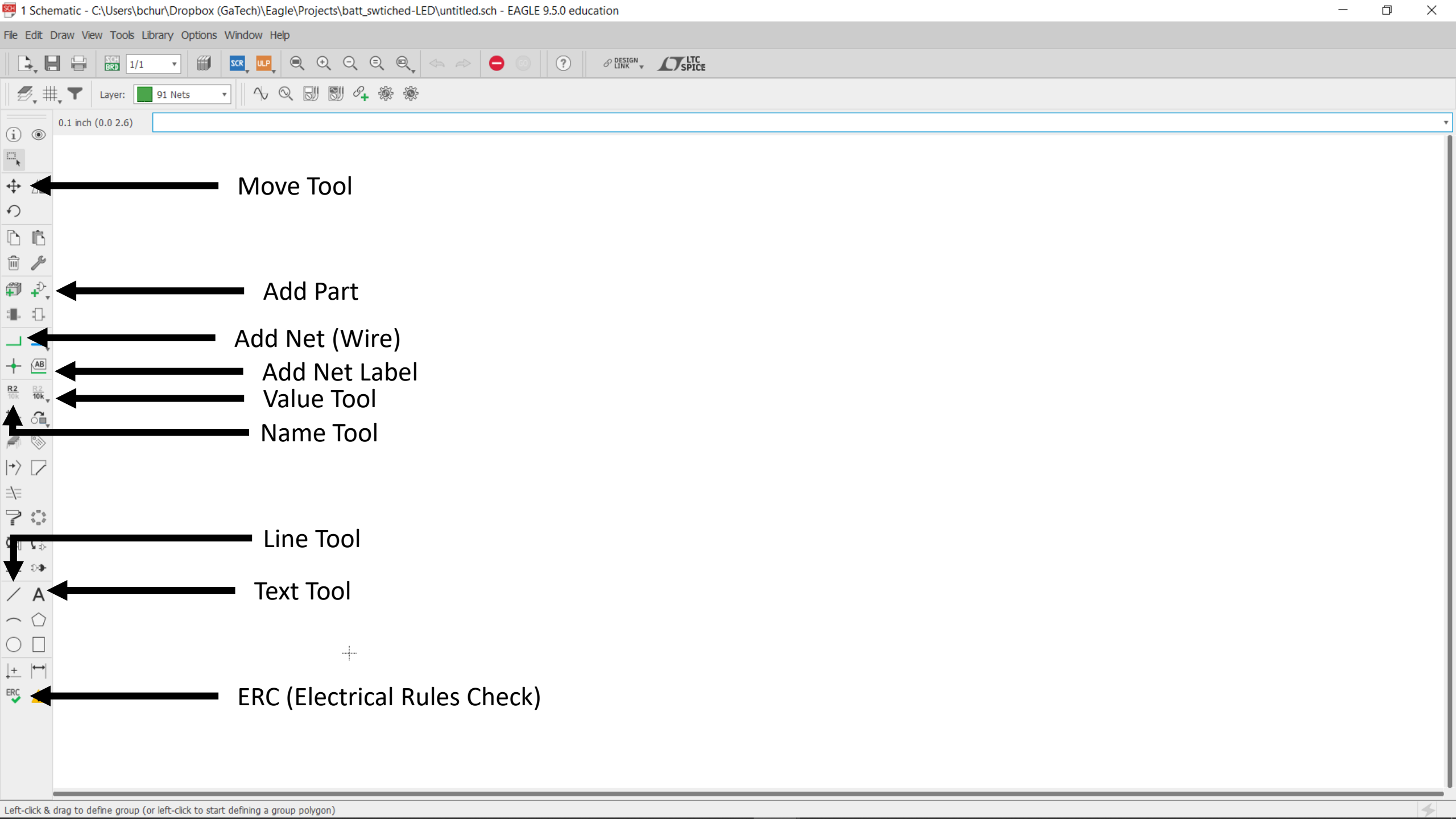

1 Schematic - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\untitled.sch - EAGLE 9.5.0 education
File Edit Draw View Tools Library Options Window Help
Layer: 91 Nets
0.1 inch (0.0 2.6)
Move Tool
Add Part
Add Net (Wire)
Add Net Label
Left-click & drag to define group (or left-click to start defining a group polygon)


1 Schematic - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\untitled.sch - EAGLE 9.5.0 education
File Edit Draw View Tools Library Options Window Help
Layer: 91 Nets
0.1 inch (0.0 2.6)
Move Tool
Add Part
Add Net (Wire)
Add Net Label
Value Tool
Left-click & drag to define group (or left-click to start defining a group polygon)


1 Schematic - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\untitled.sch - EAGLE 9.5.0 education
File Edit Draw View Tools Library Options Window Help
Layer: 91 Nets
0.1 inch (0.0 2.6)
Move Tool
Add Part
Add Net (Wire)
Add Net Label
Value Tool
Name Tool
Left-click & drag to define group (or left-click to start defining a group polygon)


1 Schematic - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\untitled.sch - EAGLE 9.5.0 education
File Edit Draw View Tools Library Options Window Help
Layer: 91 Nets
0.1 inch (0.0 2.6)
Move Tool
Add Part
Add Net (Wire)
Add Net Label
Value Tool
Name Tool
Line Tool
Left-click & drag to define group (or left-click to start defining a group polygon)


1 Schematic - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\untitled.sch - EAGLE 9.5.0 education
File Edit Draw View Tools Library Options Window Help
Layer: 91 Nets
0.1 inch (0.0 2.6)
Move Tool
Add Part
Add Net (Wire)
Add Net Label
Value Tool
Name Tool
Line Tool
Text Tool
Left-click & drag to define group (or left-click to start defining a group polygon)


1 Schematic - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\untitled.sch - EAGLE 9.5.0 education
File Edit Draw View Tools Library Options Window Help
Layer: 91 Nets
0.1 inch (0.0 2.6)
Move Tool
Add Part
Add Net (Wire)
Add Net Label
Value Tool
Name Tool
Line Tool
Text Tool
ERC (Electrical Rules Check)
Left-click & drag to define group (or left-click to start defining a group polygon)

1 Schematic - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\untitled.sch - EAGLE 9.5.0 education

File Edit Draw View Tools Library Options Window Help

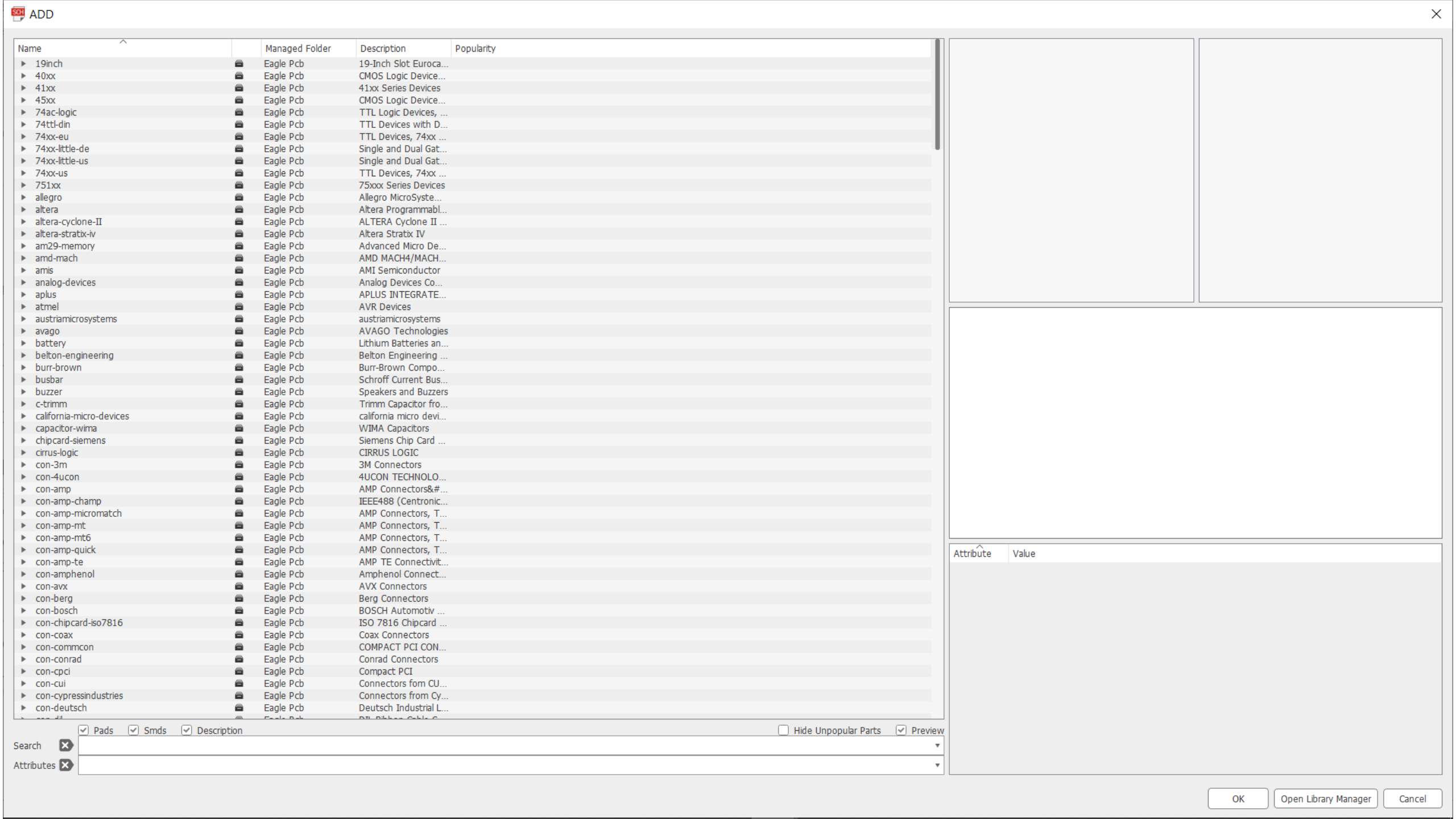
1/1

Layer: 91 Nets

0.1 inch (-4.7 1.2)

Add Part

Add a part

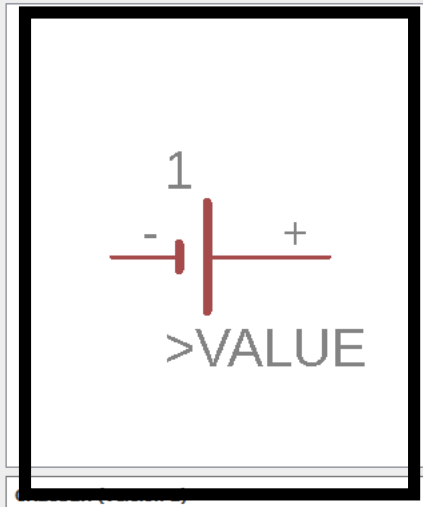

ADD
Name
Managed Folder
Description
Popularity
19inch Eagle Pcb 19-Inch Slot Euroca...
40xx Eagle Pcb CMOS Logic Device...
41xx Eagle Pcb 41xx Series Devices
45xx Eagle Pcb CMOS Logic Device...
74ac-logic Eagle Pcb TTL Logic Devices, ...
74ttl-din Eagle Pcb TTL Devices with D...
74xx-eu Eagle Pcb TTL Devices, 74xx ...
74xx-little-de Eagle Pcb Single and Dual Gat...
74xx-little-us Eagle Pcb Single and Dual Gat...
74xx-us Eagle Pcb TTL Devices, 74xx ...
751xx Eagle Pcb 75xxx Series Devices
allegro Eagle Pcb Allegro MicroSyste...
altera Eagle Pcb Altera Programmabl...
altera-cyclone-II Eagle Pcb ALTERA Cyclone II ...
altera-stratix-iv Eagle Pcb Altera Stratix IV
am29-memory Eagle Pcb Advanced Micro De...
amd-mach Eagle Pcb AMD MACH4/MACH...
amis Eagle Pcb AMI Semiconductor
analog-devices Eagle Pcb Analog Devices Co...
aplus Eagle Pcb APLUS INTEGRATE...
atmel Eagle Pcb AVR Devices
austriamicrosystems Eagle Pcb austriamicrosystems
avago Eagle Pcb AVAGO Technologies
battery Eagle Pcb Lithium Batteries an...
belton-engineering Eagle Pcb Belton Engineering ...
burr-brown Eagle Pcb Burr-Brown Compo...
busbar Eagle Pcb Schroff Current Bus...
buzzer Eagle Pcb Speakers and Buzzers
c-trimm Eagle Pcb Trimm Capacitor fro...
california-micro-devices Eagle Pcb california micro devi...
capacitor-wima Eagle Pcb WIMA Capacitors
chipcard-siemens Eagle Pcb Siemens Chip Card ...
cirrus-logic Eagle Pcb CIRRUS LOGIC
con-3m Eagle Pcb 3M Connectors
con-4ucon Eagle Pcb 4UCON TECHNOLO...
con-amp Eagle Pcb AMP Connectors&#...
con-amp-champ Eagle Pcb IEEE488 (Centronic...
con-amp-micromatch Eagle Pcb AMP Connectors, T...
con-amp-mt Eagle Pcb AMP Connectors, T...
con-amp-mt6 Eagle Pcb AMP Connectors, T...
con-amp-quick Eagle Pcb AMP Connectors, T...
con-amp-te Eagle Pcb AMP TE Connectivit...
con-amphenol Eagle Pcb Amphenol Connect...
con-avx Eagle Pcb AVX Connectors
con-berg Eagle Pcb Berg Connectors
con-bosch Eagle Pcb BOSCH Automotiv ...
con-chipcard-iso7816 Eagle Pcb ISO 7816 Chipcard ...
con-coax Eagle Pcb Coax Connectors
con-commcon Eagle Pcb COMPACT PCI CON...
con-conrad Eagle Pcb Conrad Connectors
con-cpci Eagle Pcb Compact PCI
con-cui Eagle Pcb Connectors fom CU...
con-cypressindustries Eagle Pcb Connectors from Cy...
con-deutsch Eagle Pcb Deutsch Industrial L...
Attribute
Value
Pads
Smds
Description
Hide Unpopular Parts
Preview
Search
Attributes
OK
Open Library Manager
Cancel

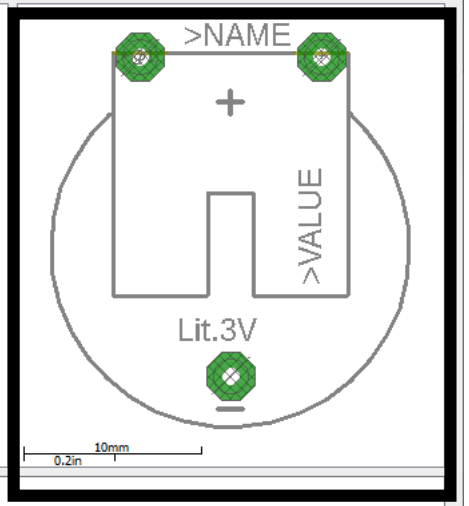
ADD

SYMBOL

FOOTPRINT

Name		Managed Folder	Description	Popularity
▼ battery		Eagle Pcb	Lithium Batteries an...	
10MM_SM_COIN_CELL_CLIP			Battery cell clip for ...	
AB9V			9-V BATTERY CLIP	
B2430UNI			LI BATTERY	
BATTERY-HOLDER_11.6MM			11.6mm PC BUTTO...	
CH291-1220LF			Battery Holder, SM...	
CR-AA			LI BATTERY Varta	
CR1/2			LI BATTERY Sonne...	
CR2/3			LI BATTERY Sonne...	
CR03N			LI BATTERY Sonne...	
CR2032H			LI BATTERY Varta	
CR2032V			LI BATTERY Varta	
CR2430H			LI BATTERY Varta	
CR2430V			LI BATTERY Varta	
CR2450V			LI BATTERY Varta	
CRAA			LI BATTERY Varta	
DEL01			LI BATTERY Sonne...	
SL-150-1/2AA/PR			LI BATTERY Sonne...	
SL-150-1/2AA/PT			LI BATTERY Sonne...	
SL-160AA/PR			LI BATTERY Sonne...	
SL-160AA/PT			LI BATTERY Sonne...	
SL-340/B3.6V			LI BATTERY Sonne...	
SL-340/P			LI BATTERY Sonne...	
SL-340/P3.6V			LI BATTERY Sonne...	
SL-340/SM3.6V			LI BATTERY Sonne...	
SL340B			LI BATTERY Sonne...	
SL340P			LI BATTERY Sonne...	
SL340SM			LI BATTERY Sonne...	
▼ linear-technology		Eagle Pcb	Linear Technology ...	
LTC4062			Standalone Linear L...	
▼ maxim		Eagle Pcb	Maxim Components	
▶ MAX71*?			NiCd/NiMH Battery ...	
MAX1551			Dual-Input USB/AC ...	
MAX1555			Dual-Input USB/AC ...	
▼ special		Eagle Pcb	Special Devices	
BATTERY			BATTERY	
▼ texas		Eagle Pcb	Texas Instruments ...	
BQ78PL114			PowerLAN (TM) Ma...	
BQ27010			Li-Ion AND Li-Pol B...	
BQ27210			Li-Ion AND Li-Pol B...	
LM3401			Hysteretic PFET Co...	





LI BATTERY Varta

Footprint: CR2032H (Version 1)

LI BATTERY Varta

3D Package: CR2032H (Version 1)

LI BATTERY Varta

Attribute	Value
POPULARITY	0

What's a symbol?
What's a footprint?

Pads Smds Description

Hide Unpopular Parts Preview

Search *battery*

Attributes

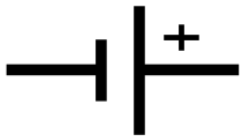
OK Open Library Manager Cancel

Diode

Capacitor

Inductor

Resistor

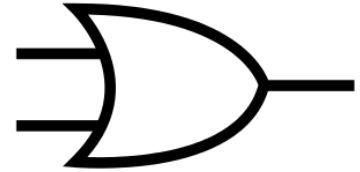


DC voltage source

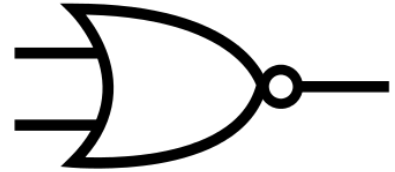
AC voltage source

And gate

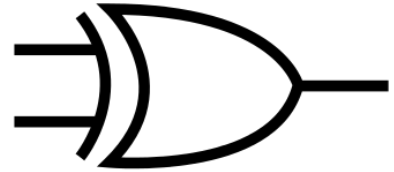
Nand gate



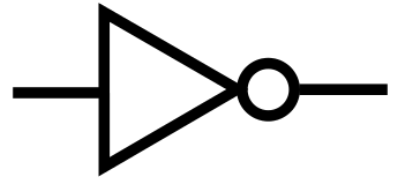
Or gate



Nor gate



Xor gate



Inverter (Not gate)

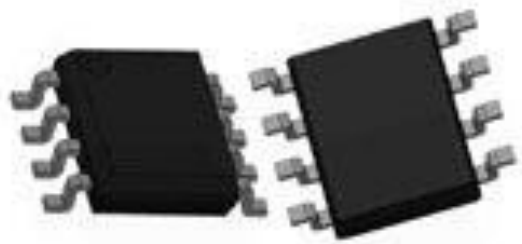
IC Package - Surface Mount

SOT23

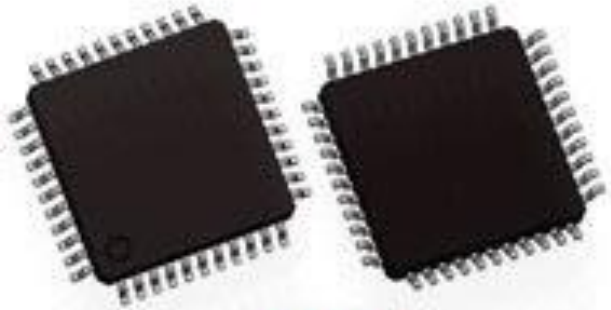
SOT223

TO252

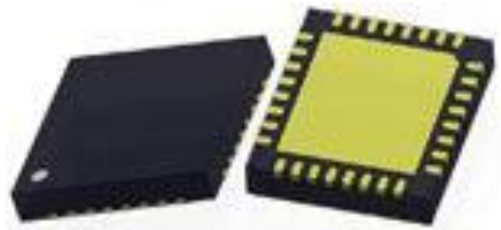
DDPAK



SOP



TQFP



QFN

IC Package - Through Hole

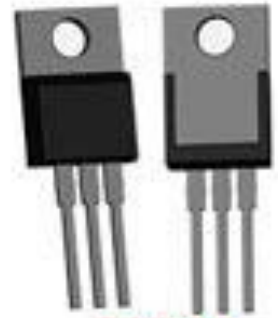
PDIP

DIP

ZIP

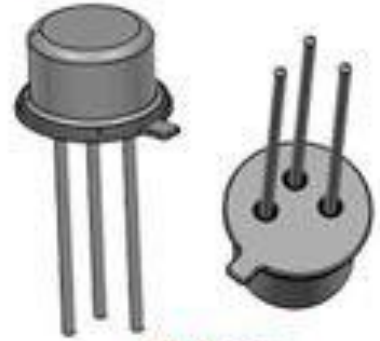
T7-TO220

TO2205



TO220

TO92



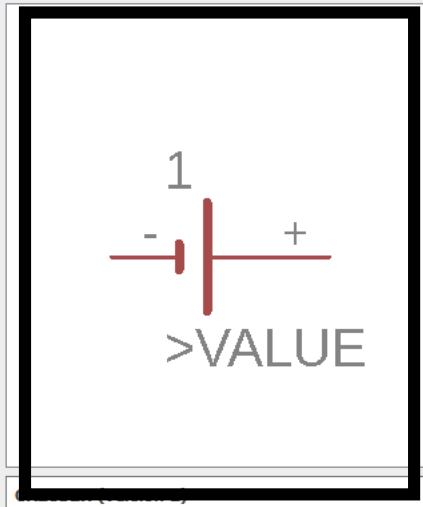
TO18

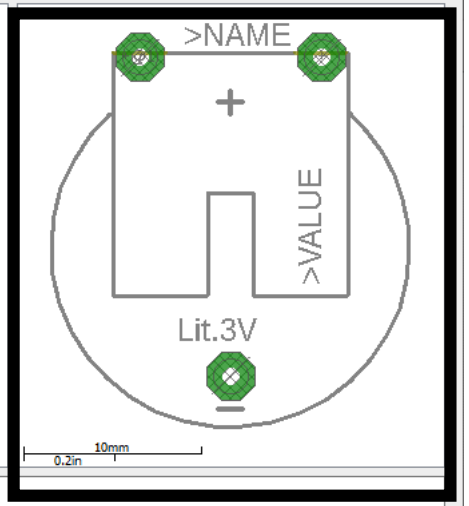
ADD

SYMBOL

FOOTPRINT

Name		Managed Folder	Description	Popularity
▼ battery		Eagle Pcb	Lithium Batteries an...	
10MM_SM_COIN_CELL_CLIP			Battery cell clip for ...	
AB9V			9-V BATTERY CLIP	
B2430UNI			LI BATTERY	
BATTERY-HOLDER_11.6MM			11.6mm PC BUTTO...	
CH291-1220LF			Battery Holder, SM...	
CR-AA			LI BATTERY Varta	
CR1/2			LI BATTERY Sonne...	
CR2/3			LI BATTERY Sonne...	
CR03N			LI BATTERY Sonne...	
CR2032H			LI BATTERY Varta	
CR2032V			LI BATTERY Varta	
CR2430H			LI BATTERY Varta	
CR2430V			LI BATTERY Varta	
CR2450V			LI BATTERY Varta	
CRAA			LI BATTERY Varta	
DEL01			LI BATTERY Sonne...	
SL-150-1/2AA/PR			LI BATTERY Sonne...	
SL-150-1/2AA/PT			LI BATTERY Sonne...	
SL-160AA/PR			LI BATTERY Sonne...	
SL-160AA/PT			LI BATTERY Sonne...	
SL-340/B3.6V			LI BATTERY Sonne...	
SL-340/P			LI BATTERY Sonne...	
SL-340/P3.6V			LI BATTERY Sonne...	
SL-340/SM3.6V			LI BATTERY Sonne...	
SL340B			LI BATTERY Sonne...	
SL340P			LI BATTERY Sonne...	
SL340SM			LI BATTERY Sonne...	
▼ linear-technology		Eagle Pcb	Linear Technology ...	
LTC4062			Standalone Linear L...	
▼ maxim		Eagle Pcb	Maxim Components	
▶ MAX71*?			NiCd/NiMH Battery ...	
MAX1551			Dual-Input USB/AC ...	
MAX1555			Dual-Input USB/AC ...	
▼ special		Eagle Pcb	Special Devices	
BATTERY			BATTERY	
▼ texas		Eagle Pcb	Texas Instruments ...	
BQ78PL114			PowerLAN (TM) Ma...	
BQ27010			Li-Ion AND Li-Pol B...	
BQ27210			Li-Ion AND Li-Pol B...	
LM3401			Hysteretic PFET Co...	





LI BATTERY Varta

Footprint: CR2032H (Version 1)

LI BATTERY Varta

3D Package: CR2032H (Version 1)

LI BATTERY Varta

Attribute	Value
POPULARITY	0

What's a symbol?
What's a footprint?

Pads Smds Description

Hide Unpopular Parts Preview

Search *battery*

Attributes

OK Open Library Manager Cancel

1 Schematic - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\untitled.sch - EAGLE 9.5.0 education

File Edit Draw View Tools Library Options Window Help

Layer: 91 Nets

0.1 inch (-0.7 0.1)

Left-click to place 'CR2032H'

1 Schematic - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\untitled.sch - EAGLE 9.5.0 education

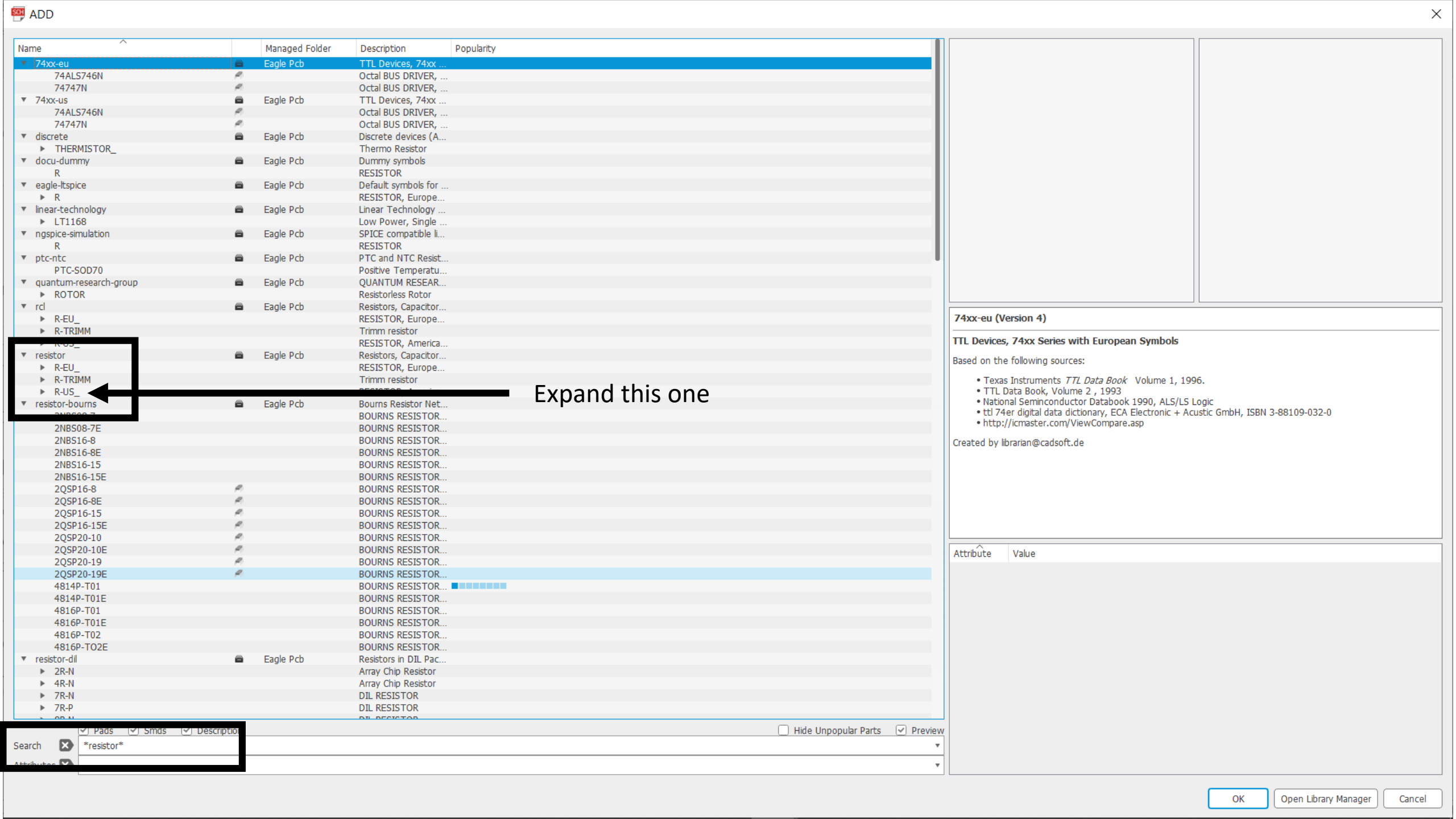
File Edit Draw View Tools Library Options Window Help

Layer: 91 Nets

0.1 inch (0.6 0.3)

Press ESC

Left-click to place 'CR2032H'


ADD
Name
Managed Folder
Description
Popularity
74xx-eu
Eagle Pcb
TTL Devices, 74xx ...
74ALS746N
Octal BUS DRIVER, ...
74747N
Octal BUS DRIVER, ...
74xx-us
Eagle Pcb
TTL Devices, 74xx ...
74ALS746N
Octal BUS DRIVER, ...
74747N
Octal BUS DRIVER, ...
discrete
Eagle Pcb
Discrete devices (A...
THERMISTOR_
Thermo Resistor
docu-dummy
Eagle Pcb
Dummy symbols
R
RESISTOR
eagle-ltspice
Eagle Pcb
Default symbols for ...
R
RESISTOR, Europe...
linear-technology
Eagle Pcb
Linear Technology ...
LT1168
Low Power, Single ...
ngspice-simulation
Eagle Pcb
SPICE compatible li...
R
RESISTOR
ptc-ntc
Eagle Pcb
PTC and NTC Resist...
PTC-SOD70
Positive Temperatu...
quantum-research-group
Eagle Pcb
QUANTUM RESEAR...
ROTOR
Resistorless Rotor
rcl
Eagle Pcb
Resistors, Capacitor...
R-EU_
RESISTOR, Europe...
R-TRIMM
Trimm resistor
RESISTOR, America...
resistor
Eagle Pcb
Resistors, Capacitor...
R-EU_
RESISTOR, Europe...
R-TRIMM
Trimm resistor
R-US_
resistor-bourns
Eagle Pcb
Bourns Resistor Net...
BOURNS RESISTOR...
2NBS08-7E
BOURNS RESISTOR...
2NBS16-8
BOURNS RESISTOR...
2NBS16-8E
BOURNS RESISTOR...
2NBS16-15
BOURNS RESISTOR...
2NBS16-15E
BOURNS RESISTOR...
2QSP16-8
BOURNS RESISTOR...
2QSP16-8E
BOURNS RESISTOR...
2QSP16-15
BOURNS RESISTOR...
2QSP16-15E
BOURNS RESISTOR...
2QSP20-10
BOURNS RESISTOR...
2QSP20-10E
BOURNS RESISTOR...
2QSP20-19
BOURNS RESISTOR...
2QSP20-19E
BOURNS RESISTOR...
4814P-T01
BOURNS RESISTOR...
4814P-T01E
BOURNS RESISTOR...
4816P-T01
BOURNS RESISTOR...
4816P-T01E
BOURNS RESISTOR...
4816P-T02
BOURNS RESISTOR...
4816P-TO2E
BOURNS RESISTOR...
resistor-dil
Eagle Pcb
Resistors in DIL Pac...
2R-N
Array Chip Resistor
4R-N
Array Chip Resistor
7R-N
DIL RESISTOR
7R-P
DIL RESISTOR
Expand this one
74xx-eu (Version 4)
TTL Devices, 74xx Series with European Symbols
Based on the following sources:
• Texas Instruments TTL Data Book Volume 1, 1996.
• TTL Data Book, Volume 2 , 1993
• National Seminconductor Databook 1990, ALS/LS Logic
• ttl 74er digital data dictionary, ECA Electronic + Acustic GmbH, ISBN 3-88109-032-0
• http://icmaster.com/ViewCompare.asp
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Attribute
Value
Pads
Smds
Description
Hide Unpopular Parts
Preview
Search
resistor
OK
Open Library Manager
Cancel

ADD

Name		Managed Folder	Description	Popularity
R-US_			RESISTOR, America...	
R-US_0204/2V			0204V	
R-US_0204/5			0204/5	
R-US_0204/7			0204/7	
R-US_0207/2V			0207/2V	
R-US_0207/5V			0207/5V	
R-US_0207/7			0207/7	
R-US_0207/10			0207/10	
R-US_0207/12			0207/12	
R-US_0207/15			0207/15	
R-US_0309/10			0309/10	
R-US_0309/12			0309/12	
R-US_0309/V			0309V	
R-US_0411/3V			0411V	
R-US_0411/12			0411/12	
R-US_0411/15			0411/15	
R-US_0414/5V			0414V	
R-US_0414/15			0414/15	
R-US_0613/5V			P0613V	
R-US_0613/15			P0613/15	
R-US_0617/5V			0617V	
R-US_0617/17			0617/17	
R-US_0617/22			0617/22	
R-US_0817/7V			P0817V	
R-US_0817/22			P0817/22	
R-US_0922/22			0922/22	
R-US_0922V			0922V	
R-US_01005			R01005	
R-US_1812X7R			1812X7R	
R-US_M0805			M0805	
R-US_M1206			M1206	
R-US_M1406			M1406	
R-US_M2012			M2012	
R-US_M2309			M2309	
R-US_M3216			M3216	
R-US_M3516			M3516	
R-US_M5923			M5923	
R-US_MELF0102AX			MINI_MELF-0102AX	
R-US_MELF0102R			MINI_MELF-0102R	
R-US_MELF0102W			MINI_MELF-0102W	
R-US_MELF0204R			MINI_MELF-0204R	
R-US_MELF0204W			MINI_MELF-0204W	
R-US_MELF0207R			MINI_MELF-0207R	
R-US_MELF0207W			MINI_MELF-0207W	
R-US_R0201			R0201	
R-US_R0402			R0402	
R-US_R0603			R0603	
R-US_R0805			R0805	
R-US_R0805W			R0805W	
R-US_R1206			R1206	
R-US_R1206W			R1206W	
R-US_R1210			R1210	
R-US_R1210W			R1210W	
R-US_R1218			R1218	

Whoa.

R-US_ (Version 3)

RESISTOR, American symbol

Attribute	Value

Pads Smds Description Hide Unpopular Parts Preview

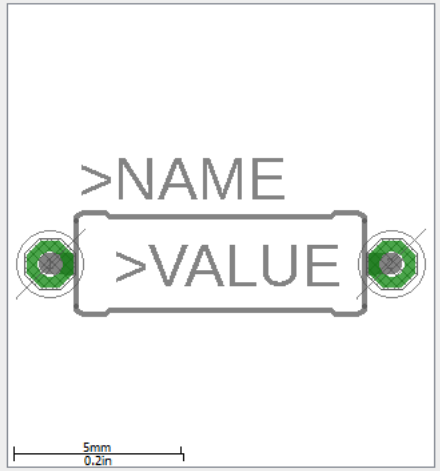
Search *resistor*

Attributes

OK Open Library Manager Cancel

ADD

Name	Managed Folder	Description	Popularity
R-US_		RESISTOR, America...	
R-US_0204/2V		0204V	
R-US_0204/5		0204/5	
R-US_0204/7		0204/7	
R-US_0207/2V		0207/2V	
R-US_0207/5V		0207/5V	
R-US_0207/7		0207/7	
R-US_0207/10		0207/10	
R-US_0207/12		0207/12	
R-US_0207/15		0207/15	
R-US_0309/10		0309/10	
R-US_0309/12		0309/12	
R-US_0309/V		0309V	
R-US_0411/3V		0411V	
R-US_0411/12		0411/12	
R-US_0411/15		0411/15	
R-US_0414/5V		0414V	
R-US_0414/15		0414/15	
R-US_0613/5V		P0613V	
R-US_0613/15		P0613/15	
R-US_0617/5V		0617V	
R-US_0617/17		0617/17	
R-US_0617/22		0617/22	
R-US_0817/7V		P0817V	
R-US_0817/22		P0817/22	
R-US_0922/22		0922/22	
R-US_0922V		0922V	
R-US_01005		R01005	
R-US_1812X7R		1812X7R	
R-US_M0805		M0805	
R-US_M1206		M1206	
R-US_M1406		M1406	
R-US_M2012		M2012	
R-US_M2309		M2309	
R-US_M3216		M3216	
R-US_M3516		M3516	
R-US_M5923		M5923	
R-US_MELF0102AX		MINI_MELF-0102AX	
R-US_MELF0102R		MINI_MELF-0102R	
R-US_MELF0102W		MINI_MELF-0102W	
R-US_MELF0204R		MINI_MELF-0204R	
R-US_MELF0204W		MINI_MELF-0204W	
R-US_MELF0207R		MINI_MELF-0207R	
R-US_MELF0207W		MINI_MELF-0207W	
R-US_R0201		R0201	
R-US_R0402		R0402	
R-US_R0603		R0603	
R-US_R0805		R0805	
R-US_R0805W		R0805W	
R-US_R1206		R1206	
R-US_R1206W		R1206W	
R-US_R1210		R1210	
R-US_R1210W		R1210W	
R-US_R1218		R1218	



R-US_ (Version 3)

RESISTOR, American symbol

Footprint: 0309/10 (Version 1)

RESISTOR

type 0309, grid 10mm

3D Package: 0309/10 (Version 1)

RESISTOR type 0309, grid 10mm

Attribute	Value

Pads Smds Description Hide Unpopular Parts Preview

Search *resistor*

Attributes

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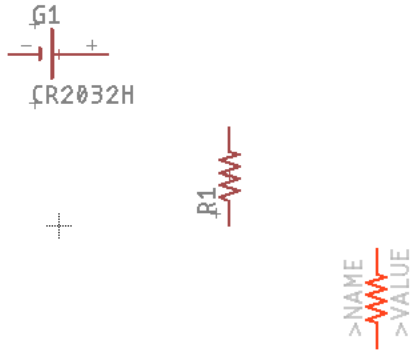
1 Schematic - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\untitled.sch - EAGLE 9.5.0 education

File Edit Draw View Tools Library Options Window Help

Layer: 91 Nets

0.1 inch (1.3 -0.3)



Right click to rotate while placing

Left-click to place 'R-US_R0805'

ADD

Name	Managed Folder	Description	Popularity
HP5082H		LED DISPLAY	
HP5082_		LED DISPLAY	
HTIL311A		LED DISPLAY 1-ch...	
eagle-ltspice	Eagle Pcb	Default symbols for ...	
LED_E		LED	
exar	Eagle Pcb	Exar Devices	
XR-2207		VOLTAGE CONTRO...	
infineon	Eagle Pcb	Infineon Technolog...	
ILD4001		LED Driver for High ...	
IQD-Frequency-Products	Eagle Pcb	Crystals and Oscillat...	
OCXO		Oven controlled Xt...	
OCXO-6-PIN		Oven controlled Xt...	
SMD-OCXO		SMD Oven Controll...	
led	Eagle Pcb	LEDs	
*P4		PointLED® Enhanc...	
*W51M		Golden DRAGON® ...	
*W51M-TH		Golden DRAGON® ...	
*W57B		Golden Dragon® 1 ...	
*_T679-?-1		LC TOPLED® Low ...	
?W5KM		Golden DRAGON® ...	
ACULED-RGB		ACULED	
ACULEDVHL		ACULED® VHL Sta...	
CLN6A		Cree® CLN6A-WK...	
CREE-XLAMP-XM-L		Cree® XLamp® XM...	
DUOLED-RG-A		DUO LED	
DUOLED-RG-C		DUO LED	
DUOLED-RY-A		DUO LED	
DUOLED-RY-C		DUO LED	
DUOLED2X5		DUO LED	
DUOLED5MM		DUO LED	
F50360		Full color Z-Power L...	
F50380		Z-POWER LED	
GM1BW76340A		White LED 45 lume...	
GM1BW78140A		High Brightness Chi...	
GM1WA55311A		Chip LED RGB	
GM5BW96385A		High brightness Wh...	
GM5WA94310A		Chip LED RGB	
L-115WEGW-CA		T-1(3mm) BI-COLO...	
LB10		LED BLOCK	
LD266		LED BLOCK	
LD269		LED BLOCK	
LED		LED	
LED-2AC-		LEDs with 2 Cathod...	
LP2C63-ST-RGB-SR0		1.5W RGB HIGH PO...	
LRTB_G6SG		LRTB G6SG 6-lead ...	
LSG-T676		LSG T676 Hyper M...	
LUXEON_5630		LUXEON 5630 Mid-...	
LUXEON_REBEL		LUXEON Rebel	
LZ1-00WW03		High Luminous Effic...	
LZ1-00WW05		High Luminous Effic...	
LZ4-00WW10		High Luminous Effic...	
LZ4-40U600		High Efficacy 365n...	
LZC-00CW40		High Luminous Effic...	
LZR182		LED BLOCK	

led (Version 5)

LEDs

Created by librarian@cadsoft.de
Extended by Federico Battaglin <federico.rd@fdpinternational.com> with DUOLED

Attribute	Value

Pads Smds Description Hide Unpopular Parts Preview

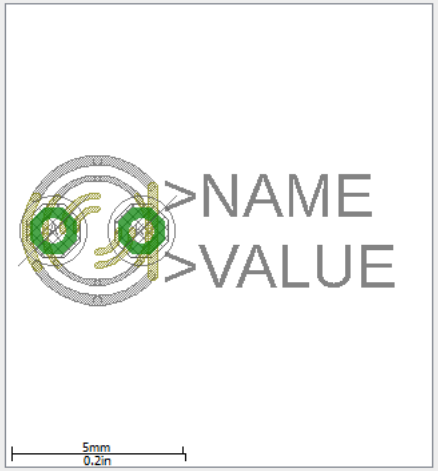
Search *led*

Attributes

OK Open Library Manager Cancel

ADD

Name		Managed Folder	Description	Popularity
led		Eagle Pcb	LEDs	
*P4			PointLED® Enhanced Thinfilm LED TOP & BOTTOM mount	
*W51M			Golden DRAGON® with Lens Enhanced Thinfilm LED	
*W51M-TH			Golden DRAGON® with Lens Enhanced Thinfilm LED	
*W57B			Golden Dragon® 1 Watt LED	
*_T679-?-1			LC TOPLED® Low Current LED	
?W5KM			Golden DRAGON® ARGUS® LED	
ACULED-RGB			ACULED	
ACULEDVHL			ACULED® VHL Standard Monochromatic and Multi-Colored Four-Chip LED	
CLN6A			Cree® CLN6A-WKW/MKW LED	
CREE-XLAMP-XM-L			Cree® XLamp® XM-L LEDs	
DUOLED-RG-A			DUO LED	
DUOLED-RG-C			DUO LED	
DUOLED-RY-A			DUO LED	
DUOLED-RY-C			DUO LED	
DUOLED2X5			DUO LED	
DUOLED5MM			DUO LED	
F50360			Full color Z-Power LED RGB P5-II Series	
F50380			Z-POWER LED	
GM1BW76340A			White LED 45 lumen 14000 mcd @50 mA	
GM1BW78140A			High Brightness Chip LED (White) 39 lm @ 150 mA	
GM1WA55311A			Chip LED RGB	
GM5BW96385A			High brightness White Color LED 2300 mcd @ IF = 20mA	
GM5WA94310A			Chip LED RGB	
L-115WEGW-CA			T-1(3mm) BI-COLOR INDICATOR LAMP	
LB10			LED BLOCK	
LD266			LED BLOCK	
LD269			LED BLOCK	
LED			LED	
LED			SMARTLED-TTW	
LED-LUMILED			LUMILED	
LED-LUMILED+			LUMILED+	
LED3MM			LED3MM	
LED5MM			LED5MM	
LED10MM			LED10MM	
LEDB152			Q62902-B152	
LEDB153			Q62902-B153	
LEDB155			Q62902-B155	
LEDB156			Q62902-B156	
LEDCHIP-LED0603			CHIP-LED0603	
LEDCHIP-LED0805			CHIP-LED0805	
LEDCHIPLED-0603-TTW			CHIPLED-0603-TTW	
LEDCHIPLED_0603			CHIPLED_0603	
LEDCHIPLED_0805			CHIPLED_0805	
LEDCHIPLED_1206			CHIPLED_1206	
LEDIRL80A			IRL80A	
LEDKA-3528ASYC			KA-3528ASYC	
LEDLD260			LD260	
LEDLSU260			LSU260	
LEDLZR181			LZR181	
LEDMICRO-SIDELED			MICRO-SIDELED	
LEDMINI-TOP			OSRAM-MINI-TOP-LED	
LEDP-LCC-2			P-LCC-2	
LEDP-LCC-2-BACK			P-LCC-2-TOPLED-RG	



LED (Version 10)

LED

OSRAM:
- CHIPLED
LG R971, LG N971, LY N971, LG Q971, LY Q971, LO R971, LY R971 LH N974, LH R974
LS Q976, LO Q976, LY Q976
LO Q996
- Hyper CHIPLED
LW Q18S
LB Q993, LB Q99A, LB R99A
- SideLED
LS A670, LO A670, LY A670, LG A670, LP A670
LB A673, LV A673, LT A673, LW A673
LH A674
LY A675
LS A676, LA A676, LO A676, LY A676, LW A676
LS A679, LY A679, LG A679
- Hyper Micro SIDELED®
LS Y876, LA Y876, LO Y876, LY Y876

Attribute	Value
POPULARITY	97

Pads Smds Description Hide Unpopular Parts Preview

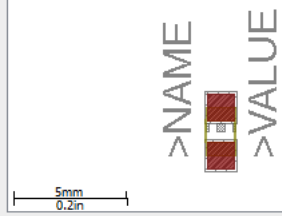
Search *led*

Attributes

OK Open Library Manager Cancel

ADD

Name	Managed Folder	Description	Popularity
led	Eagle Pcb	LEDs	
*P4		PointLED® Enhanced Thinfilm LED TOP & BOTTOM mount	
*W51M		Golden DRAGON® with Lens Enhanced Thinfilm LED	
*W51M-TH		Golden DRAGON® with Lens Enhanced Thinfilm LED	
*W57B		Golden Dragon® 1 Watt LED	
*_T679-?-1		LC TOPLED® Low Current LED	
?W5KM		Golden DRAGON® ARGUS® LED	
ACULED-RGB		ACULED	
ACULEDVHL		ACULED® VHL Standard Monochromatic and Multi-Colored Four-Chip LED	
CLN6A		Cree® CLN6A-WKW/MKW LED	
CREE-XLAMP-XM-L		Cree® XLamp® XM-L LEDs	
DUOLED-RG-A		DUO LED	
DUOLED-RG-C		DUO LED	
DUOLED-RY-A		DUO LED	
DUOLED-RY-C		DUO LED	
DUOLED2X5		DUO LED	
DUOLED5MM		DUO LED	
F50360		Full color Z-Power LED RGB P5-II Series	
F50380		Z-POWER LED	
GM1BW76340A		White LED 45 lumen 14000 mcd @50 mA	
GM1BW78140A		High Brightness Chip LED (White) 39 lm @ 150 mA	
GM1WA55311A		Chip LED RGB	
GM5BW96385A		High brightness White Color LED 2300 mcd @ IF = 20mA	
GM5WA94310A		Chip LED RGB	
L-115WEGW-CA		T-1(3mm) BI-COLOR INDICATOR LAMP	
LB10		LED BLOCK	
LD266		LED BLOCK	
LD269		LED BLOCK	
LED		LED	
LED		SMARTLED-TTW	
LED-LUMILED		LUMILED	
LED-LUMILED+		LUMILED+	
LED3MM		LED3MM	
LED5MM		LED5MM	
LED10MM		LED10MM	
LEDB152		Q62902-B152	
LEDB153		Q62902-B153	
LEDB155		Q62902-B155	
LEDB156		Q62902-B156	
LEDCHIP-LED0603		CHIP-LED0603	
LEDCHIP-LED0805		CHIP-LED0805	
LEDCHIPLED-0603-TTW		CHIPLED-0603-TTW	
LEDCHIPLED_0603		CHIPLED_0603	
LEDCHIPLED_0805		CHIPLED_0805	
LEDCHIPLED_1206		CHIPLED_1206	
LEDIRL80A		IRL80A	
LEDKA-3528ASYC		KA-3528ASYC	
LEDLD260		LD260	
LEDLSU260		LSU260	
LEDLZR181		LZR181	
LEDMICRO-SIDELED		MICRO-SIDELED	
LEDMINI-TOP		OSRAM-MINI-TOP-LED	
LEDP-LCC-2		P-LCC-2	
LEDP-LCC-2-BACK		P-LCC-2-TOPLED-RG	



Error downloading thumbnail: Network access is disabled..
Retry

LED (Version 10)

LED

OSRAM:
- CHIPLED
LG R971, LG N971, LY N971, LG Q971, LY Q971, LO R971, LY R971 LH N974, LH R974
LS Q976, LO Q976, LY Q976
LO Q996
- Hyper CHIPLED
LW Q18S
LB Q993, LB Q99A, LB R99A
- SideLED
LS A670, LO A670, LY A670, LG A670, LP A670
LB A673, LV A673, LT A673, LW A673
LH A674
LY A675
LS A676, LA A676, LO A676, LY A676, LW A676
LS A679, LY A679, LG A679
- Hyper Micro SIDELED®
LS Y876, LA Y876, LO Y876, LY Y876

Attribute	Value
POPULARITY	68

Pads Smds Description Hide Unpopular Parts Preview

Search *led*

Attributes

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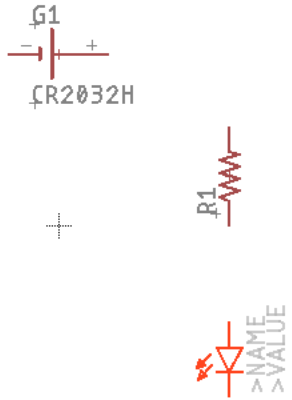
1 Schematic - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\untitled.sch - EAGLE 9.5.0 education

File Edit Draw View Tools Library Options Window Help

Layer: 91 Nets

0.1 inch (0.7 -0.5)



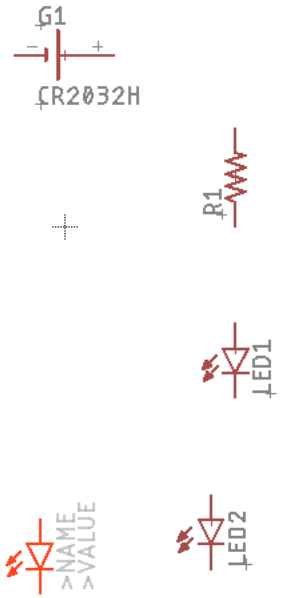
Left-click to place 'LED10MM'

1 Schematic - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\untitled.sch - EAGLE 9.5.0 education

File Edit Draw View Tools Library Options Window Help

Layer: 91 Nets

0.1 inch (-0.1 -1.3)



Left-click to place 'LED10MM'

ADD

Name		Managed Folder	Description	Popularity
40xx		Eagle Pcb	CMOS Logic Devices, 4000 Series	
4016			Quad bilateral ANALOG SWITCH	
4066			Quad bilateral ANALOG SWITCH	
74ttl-din		Eagle Pcb	TTL Devices with DIN Symbols	
544016N			Quad analog switch	
744066N			Quad analog SWITCH	
74xx-little-de		Eagle Pcb	Single and Dual Gates Family, US symbols	
74*1G53			SINGLE-POLE DOUBLE-THROW (SPDT) ANALOG SWITCH 2:1 ANALOG MULTIPLEXER/DEMULTIPLE...	
74*1G66			Single Analog / Bilateral Switch	
74*1G3157			Single-Pole, Double-Throw Analog Switch	
74xx-little-us		Eagle Pcb	Single and Dual Gates Family, US symbols	
74*1G53			SINGLE-POLE DOUBLE-THROW (SPDT) ANALOG SWITCH 2:1 ANALOG MULTIPLEXER/DEMULTIPLE...	
74*1G66			Single Analog / Bilateral Switch	
74*1G384			Single FET Bus Switch	
74*1G3157			Single-Pole, Double-Throw Analog Switch	
allegro		Eagle Pcb	Allegro MicroSystems, Inc	
A12*?			Hall-effect bipolar switch	
analog-devices		Eagle Pcb	Analog Devices Components	
ADG411			LC2MOS Precision Quad SPST Switches	
ADG412			LC2MOS Precision Quad SPST Switches	
ADG413			LC2MOS Precision Quad SPST Switches	
ADG419			LC²MOS Precision Mini-DIP Analog switch	
ADV7184			Multiformat SDTV Video Decoder with Fast Switch Overlay Support	
burr-brown		Eagle Pcb	Burr-Brown Components	
ACF2101			Dual Switched Integrator	
IVC102U			Amplifier	
OPA678			Operational Amplifier	
con-hirschmann		Eagle Pcb	Hirschmann Connectors	
LB1H			Female RF CONNECTOR	
LB3H			Female RF CONNECTOR	
LB4H			Female RF CONNECTOR	
MABSA			Dual SWITCH	
con-neutrik_ag		Eagle Pcb	NEUTRIK Connectors	
NCJ10FI-			Neutrik Audio Connector XLR SERIES	
con-pulse		Eagle Pcb	Pulse Engineering, Inc.	
J1006F01P			PULSEJACK (TM) 1x1 Tab-UP RJ45	
J1006F21			PULSEJACK (TM) 1x1 Tab-UP RJ45	
J1011F			PULSEJACK (TM) 1x1 Tab-UP RJ45	
J1012F21R			PULSEJACK (TM) 1x1 Tab-UP RJ45	
J1026F			PULSEJACK (TM) 1x1 Tab-UP RJ45	
J1026F01			PULSEJACK (TM) 1x1 Tab-UP RJ45	
J11012F			PULSEJACK (TM) 1x1 Tab-UP RJ45	
JP006821U			PULSEJACK (TM) 1x1 Tab-UP RJ45	
JP011821U			PULSEJACK (TM) 1x1 Tab-UP RJ45	
JP026851U			PULSEJACK (TM) 1x1 Tab-UP RJ45	
diode		Eagle Pcb	Diodes	
BAS40			Silicon Schottky Diodes	
BAS40-04			Silicon Schottky Diodes	
BAS40-05			Silicon Schottky Diodes	
BAS40-06			Silicon Schottky Diodes	
BAS70			Silicon Schottky Diodes	
BAS70-04			Silicon Schottky Diodes	
BAS70-05			Silicon Schottky Diodes	
BAS70-06			Silicon Schottky Diodes	
BAS70-07			Silicon Schottky Diodes	

Drag “Description” column out

Pads Smds Description Hide Unpopular Parts Preview

Search *switch*

Attributes

40xx (Version 4)

CMOS Logic Devices, 4000 Series

Based on the following sources:

- Motorola *CMOS LOGIC DATA*; book, 02/88, DL131 REV 1
- http://www.elexp.com
- http://www.intersil.com
- http://www.ls3c.com.tw/product/1/COMOS.html

Created by librarian@cadsoft.de

Attribute	Value

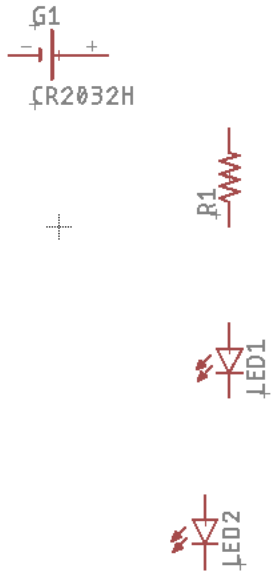
OK Open Library Manager Cancel

1 Schematic - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.sch - EAGLE 9.5.0 education

File Edit Draw View Tools Library Options Window Help

Layer: 91 Nets

0.1 inch (-0.7 1.6)



'C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.sch' saved. Left-click & drag to define group (or left-click to start defining a group polygon)

1 Schematic - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.sch - EAGLE 9.5.0 education

File Edit Draw View Tools Library Options Window Help

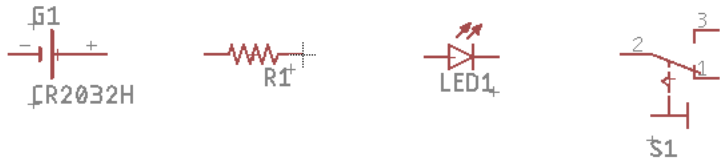
Layer: 91 Nets

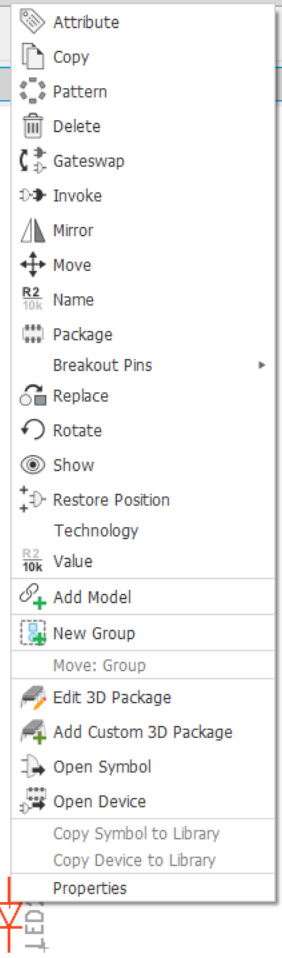
0.1 inch (2.2 -0.8)

Click or press Ctrl+L key to activate command line mode

- Use the **move tool** to *left click* and select parts
- Right click to **rotate**
- Middle click to **mirror**

- Use the **move tool** to *right click* for the context menu
- Can be used to **delete**, **replace**, and more





Part: LED2, 10MM, led, LED10MM, LED10MM, Value: Left-click to select object to move

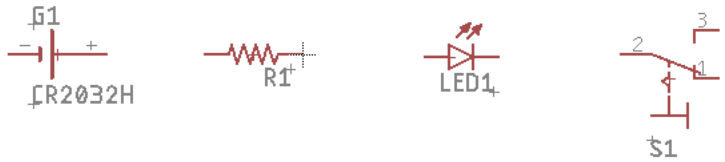
1 Schematic - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.sch - EAGLE 9.5.0 education

File Edit Draw View Tools Library Options Window Help

Layer: 91 Nets

0.1 inch (-3.0 2.4)

How to connect them?



Left-click to select object to delete

1 Schematic - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.sch - EAGLE 9.5.0 education

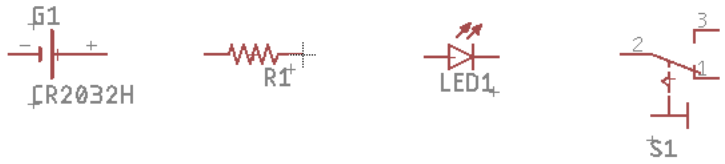
File Edit Draw View Tools Library Options Window Help

Layer: 91 Nets

0.1 inch (-3.0 2.4)

How to connect them?

Using nets!



Left-click to select object to delete

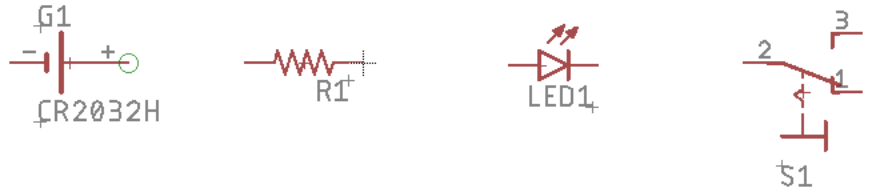
1 Schematic - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.sch - EAGLE 9.5.0 education

File Edit Draw View Tools Library Options Window Help

Layer: 91 Nets Style: continuous Net class: 0 default Radius: 0

0.1 inch (-0.9 0.0)

Left click to start a net
(Circle indicates a pin)



Left-click to start net wire

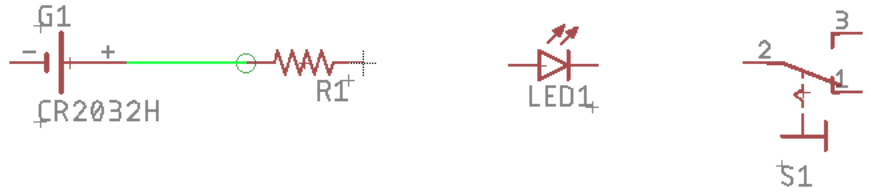
1 Schematic - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.sch - EAGLE 9.5.0 education

File Edit Draw View Tools Library Options Window Help

Layer: 91 Nets Style: continuous Net class: 0 default Radius: 0

0.1 inch (-0.4 0.0)

Left click to end a net
(Circle indicates a pin)



Left-click to draw net wire (double-click ends net)

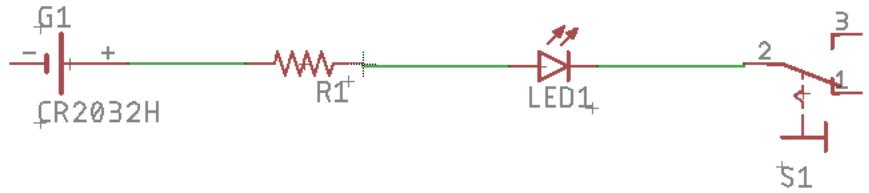
1 Schematic - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.sch - EAGLE 9.5.0 education

File Edit Draw View Tools Library Options Window Help

Layer: 91 Nets Style: continuous Net class: 0 default Radius: 0

0.1 inch (-3.1 2.0)

What about the end terminals?



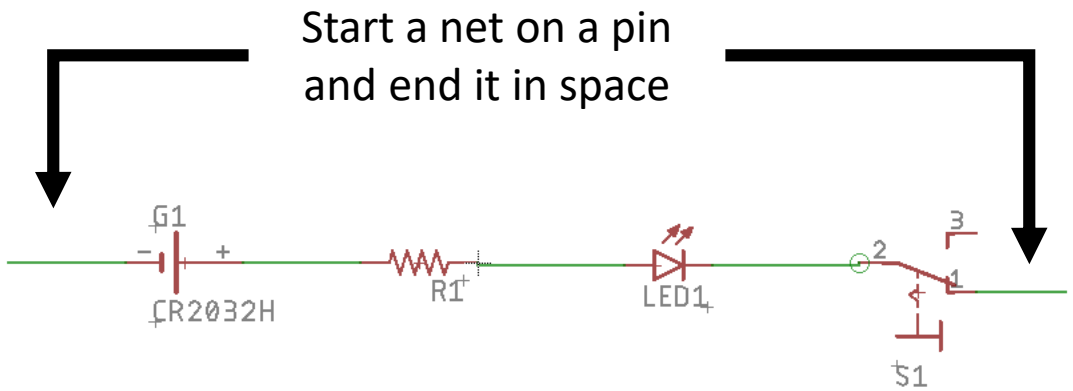
Left-click to start net wire

1 Schematic - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.sch - EAGLE 9.5.0 education

File Edit Draw View Tools Library Options Window Help

Layer: 91 Nets Style: continuous Net class: 0 default Radius: 0

0.1 inch (1.3 0.0)



'C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.sch' saved. Left-click to start net wire

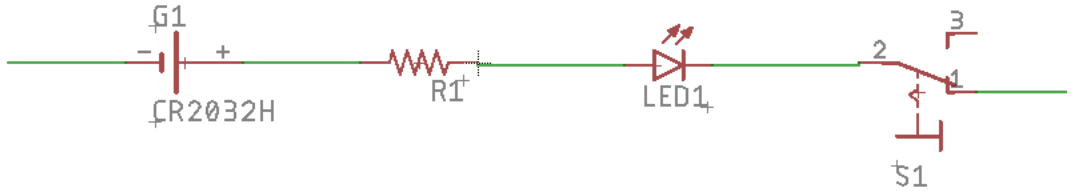
1 Schematic - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.sch - EAGLE 9.5.0 education

File Edit Draw View Tools Library Options Window Help

Layer: 91 Nets Style: continuous Net class: 0 default Radius: 0

0.1 inch (-4.0 0.3)

Name



Define the name of an object

1 Schematic - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.sch - EAGLE 9.5.0 education

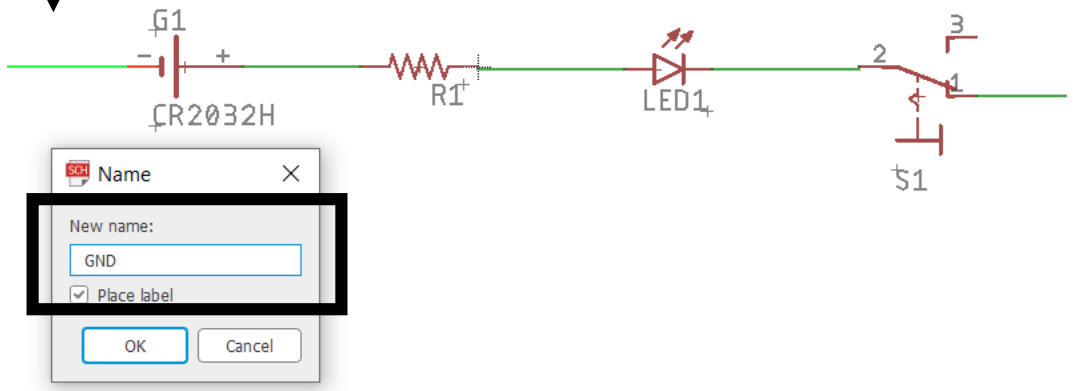
File Edit Draw View Tools Library Options Window Help

Layer: 91 Nets

0.1 inch (-1.5 0.0)

Click or press Ctrl+L key to activate command line mode

Click on the (-) pin's net (left of the battery) to name it GND



Make sure "Place label" is checked to see the name!

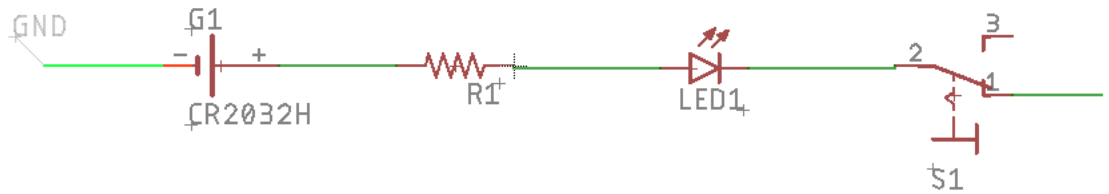
Left-click to select object to change name

1 Schematic - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.sch - EAGLE 9.5.0 education

File Edit Draw View Tools Library Options Window Help

Layer: 95 Names Size: 0.07 Ratio: 8 % Font: proportional

0.1 inch (-1.7 0.1)



Left-click to place label

1 Schematic - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.sch - EAGLE 9.5.0 education

File Edit Draw View Tools Library Options Window Help

Layer: 91 Nets

0.1 inch (-4.0 0.4)

Label

Place a label displaying a net/bus name

1 Schematic - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.sch - EAGLE 9.5.0 education

File Edit Draw View Tools Library Options Window Help

Layer: 95 Names Size: 0.07 Ratio: 8 % Font: proportional

0.1 inch (-2.3 2.0)

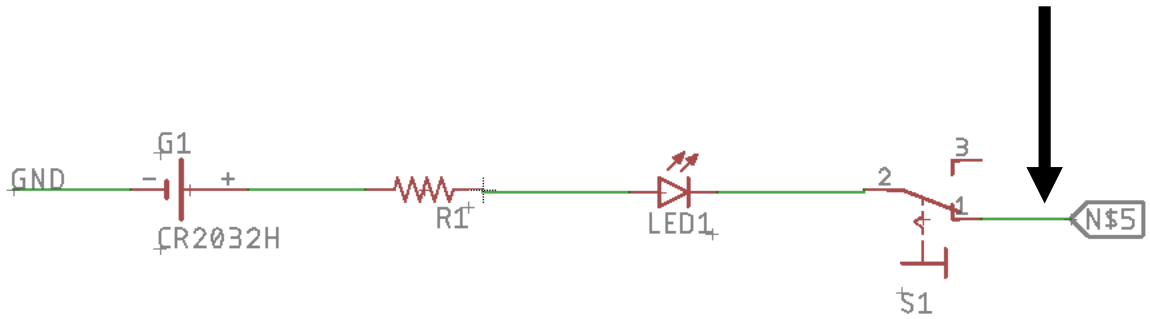
Left-click to select net or bus

1 Schematic - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.sch - EAGLE 9.5.0 education

File Edit Draw View Tools Library Options Window Help

Layer: 95 Names Size: 0.07 Ratio: 8 % Font: proportional

0.1 inch (-0.8 1.9) Click or press Ctrl+L key to activate command line mode



Left-click to select net or bus

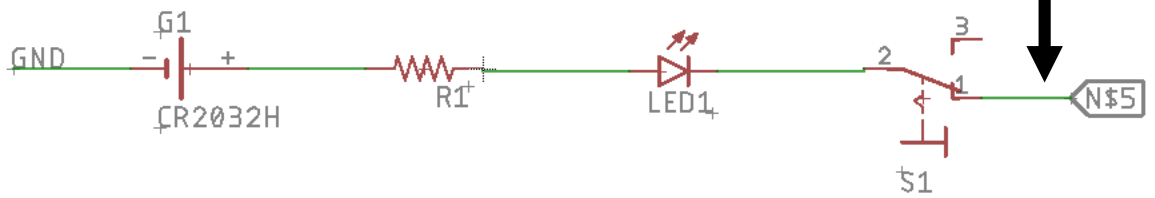
1 Schematic - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.sch - EAGLE 9.5.0 education

File Edit Draw View Tools Library Options Window Help

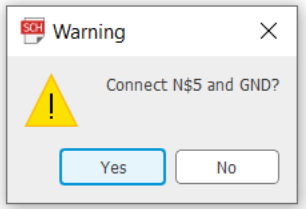
Layer: 91 Nets

0.1 inch (1.9 -0.1)

Click or press Ctrl+L key to activate command line mode



Use the name tool to name this net GND



This asks if you want to connect this net (N$5) to the net called GND.

Left-click to select object to change name

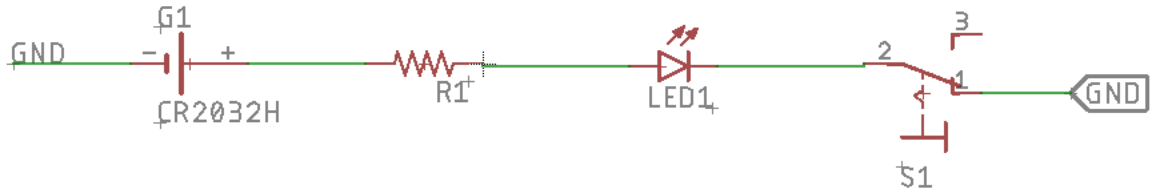
1 Schematic - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.sch - EAGLE 9.5.0 education

File Edit Draw View Tools Library Options Window Help

Layer: 91 Nets

0.1 inch (1.9 2.0)

Everything is now connected!



Confirm using ERC

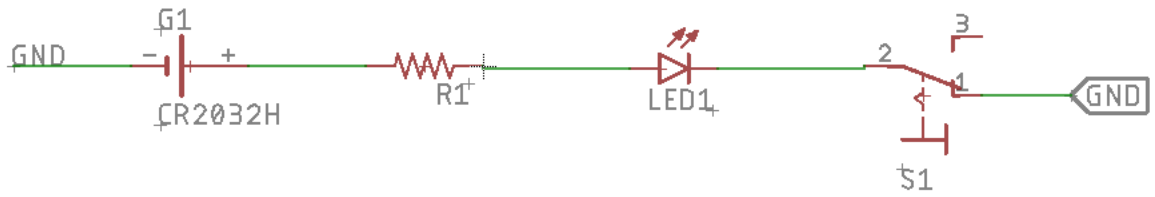
Left-click to select object to change name

1 Schematic - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.sch - EAGLE 9.5.0 education

File Edit Draw View Tools Library Options Window Help

Layer: 91 Nets

0.1 inch (-0.2 0.8)



Remember:

- *Errors* are show-stoppers.
- *Warnings* are reminders.

ERC Errors

Type	Sheet	Module
Consistency not checked (no board loaded)		
Errors (0)		
Warnings (3)		
Part LED1 has no value	1	
Part R1 has no value	1	
Part S1 has no value	1	
Approved (0)		

Centered

Clear all

Approve

ERC: 3 errors/warnings. Left-click to select object to change name

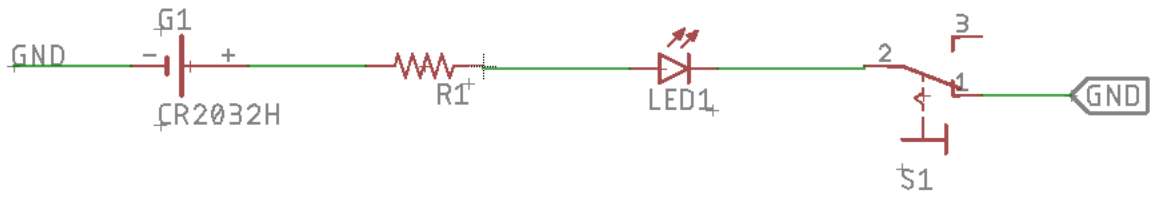
1 Schematic - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.sch - EAGLE 9.5.0 education

File Edit Draw View Tools Library Options Window Help

Layer: 91 Nets

0.1 inch (-3.1 1.1)

Value



ERC Errors

Type	Sheet	Module
Consistency not checked (no board loaded)		
Errors (0)		
Warnings (3)		
Part LED1 has no value	1	
Part R1 has no value	1	
Part S1 has no value	1	
Approved (0)		

Centered

Clear all

Approve

Define the value of an object

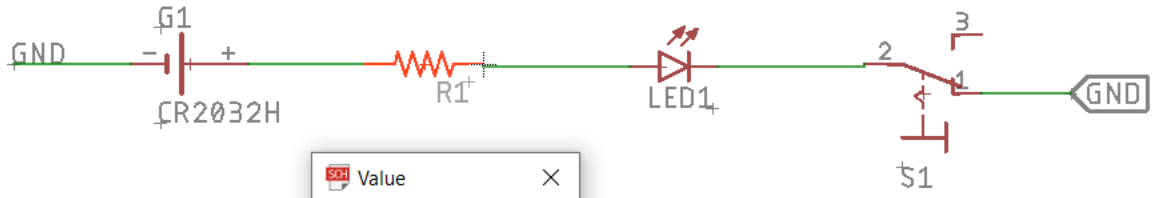
1 Schematic - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.sch - EAGLE 9.5.0 education

File Edit Draw View Tools Library Options Window Help

Layer: 91 Nets

0.1 inch (-0.2 0.0)

Click or press Ctrl+L key to activate command line mode



Value

New value for R1:

1k

OK Cancel

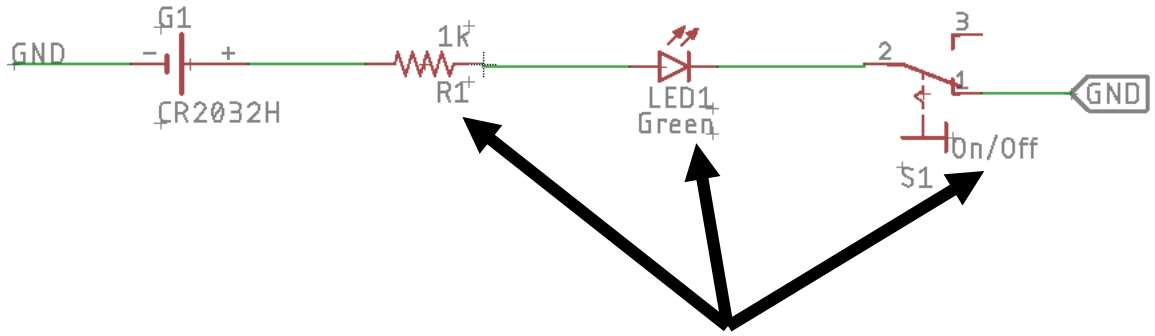
Left-click to select object to change value

1 Schematic - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.sch - EAGLE 9.5.0 education

File Edit Draw View Tools Library Options Window Help

Layer: 91 Nets

0.1 inch (-2.8 -1.2)



Values added

ERC checked successfully!

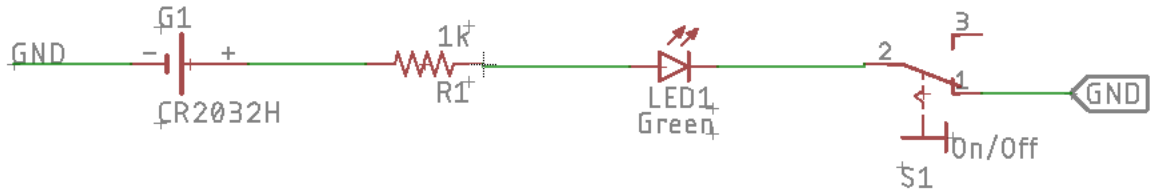
ERC: No errors/warnings. Left-click to select object to change value

1 Schematic - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.sch - EAGLE 9.5.0 education

File Edit Draw View Tools Library Options Window Help

Generate/switch to board

Generate/Switch to board view



Generate/switch to board

2 Board - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.brd - EAGLE 9.5.0 education

File Edit Draw View Tools Library Options Window Help

Save Layer: 1 Top

Design Manager

Browser Filter

View: Devices

Device Sets — 3 of 3 shown (1 selected)

Search

Device Set
<All Devices>
<Bottom Side Devices>
<Top Side Devices>

Devices — 4 of 4 shown (0 selected)

Search

Name	Footprint	Value	Side	Pins	Locked	Pos. (mil)	Angle
G1	CR2032H	CR2032H	TOP	3		(-900 400)	0.0°
LED1	LED10MM	Green	TOP	2		(-1000 1200)	0.0°
S1	M9040P	On/Off	TOP	3		(-1500 400)	0.0°

Inspector Selection Filter

Types

- Airwire
- Attribute
- Circle
- Device
- Dimension
- Frame
- Group

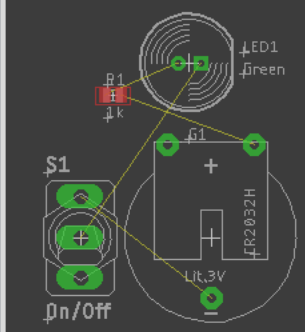
Layers

<All>
<Preset_Bottom>
<Preset_Standard>
<Preset_Top>
<clean_bottom>

- 1 Top
- 16 Bottom
- 17 Pads
- 18 Vias
- 19 Unrouted

Reset

50 mil (141 4452)



MANUFACTURING FUSION 360 FUSION TEAM

Left-click & drag to define group (or left-click to start defining a group polygon)

2 Board - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.brd - EAGLE 9.5.0 education

File Edit Draw View Tools Library Options Window Help

View menu:
- Layer settings...
- Grid...
- Mark
- Show
- Info
- Redraw
- Zoom to fit
- Zoom in
- Zoom out
- Zoom select
- Design Manager
- Inspector
- Selection Filter

50 mil (141 4452)

Click or press Ctrl+L key to activate command line mode

Device Set

3 of 3 shown (1 selected)

Devices

4 of 4 shown (0 selected)

Search

Name	Footprint	Value	Side	Pins	Locked	Pos. (mil)	Angle
G1	CR2032H	CR2032H	TOP	3		(-900 400)	0.0°
LED1	LED10MM	Green	TOP	2		(-1000 1200)	0.0°
S1	M9040P	On/Off	TOP	3		(-1500 400)	0.0°

Inspector | Selection Filter

Types
- Airwire
- Attribute
- Circle
- Device
- Dimension
- Frame
- Group

Layers
- <All>
- <Preset_Bottom>
- <Preset_Standard>
- <Preset_Top>
- <clean_bottom>

- 1 Top
- 16 Bottom
- 17 Pads
- 18 Vias
- 19 Unrouted

Reset

MANUFACTURING | FUSION 360 | FUSION TEAM

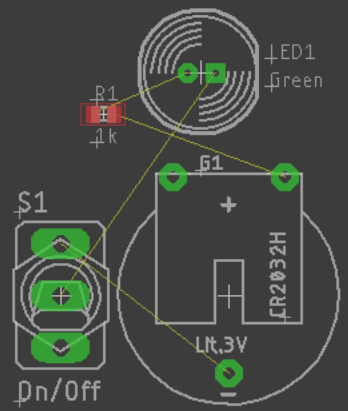
Left-click & drag to define group (or left-click to start defining a group polygon)

2 Board - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.brd - EAGLE 9.5.0 education

File Edit Draw View Tools Library Options Window Help

Layer: 1 Top

50 mil (1196 2863)



MANUFACTURING
FUSION 360
FUSION TEAM

Left-click & drag to define group (or left-click to start defining a group polygon)

2 Board - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.brd - EAGLE 9.5.0 education

File Edit Draw View Tools Library Options Window Help

Layer: 1 Top

50 mil (-1492 3990)

Click or press Ctrl+L key to activate command line mode

Grid

Display: On / Off

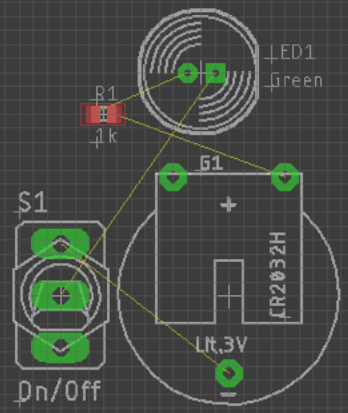
Style: Dots / Lines

Size: 50 mil Finest

Multiple: 1

Alt: 5 mil Finest

Default OK Cancel



MANUFACTURING

FUSION 360

FUSION TEAM

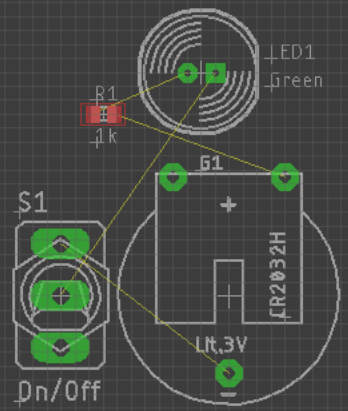
2 Board - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.brd - EAGLE 9.5.0 education

File Edit Draw View Tools Library Options Window Help

Layer: 1 Top

50 mil (-2059 3851)

Group



MANUFACTURING

FUSION 360

FUSION TEAM

Define a group

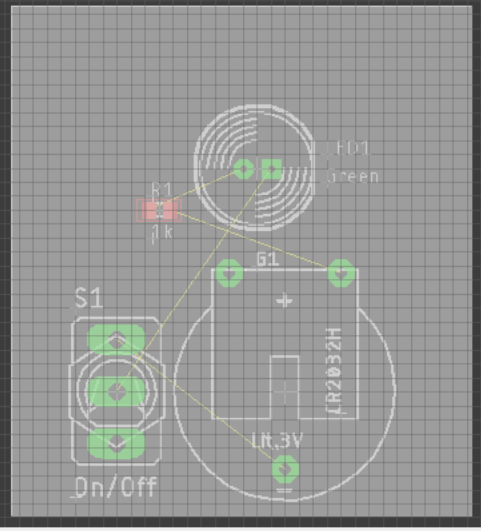
2 Board - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.brd - EAGLE 9.5.0 education

File Edit Draw View Tools Library Options Window Help

Layer: 1 Top

50 mil (-234 -43)

Use the Group tool to select and act on multiple parts at once by left clicking and dragging.

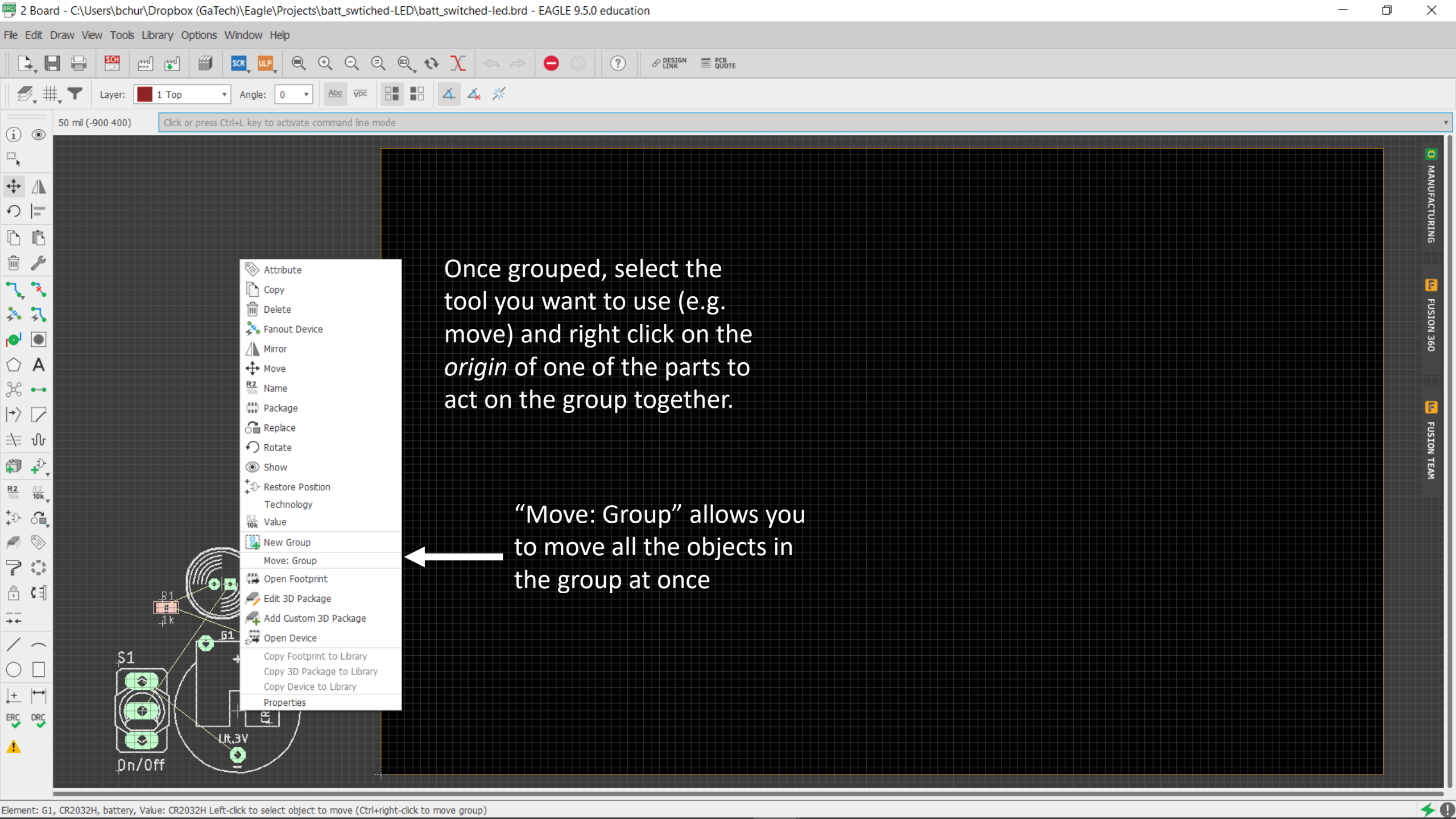


MANUFACTURING

FUSION 360

FUSION TEAM

Left-click & drag to define group (or left-click to start defining a group polygon)

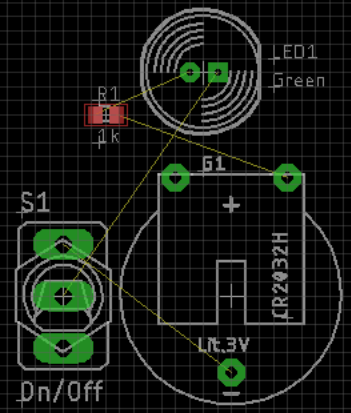

2 Board - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.brd - EAGLE 9.5.0 education
File Edit Draw View Tools Library Options Window Help
Layer: 1 Top
Angle: 0
50 mil (-900 400)
Click or press Ctrl+L key to activate command line mode
Attribute
Copy
Delete
Fanout Device
Mirror
Move
Name
Package
Replace
Rotate
Show
Restore Position
Technology
Value
New Group
Move: Group
Open Footprint
Edit 3D Package
Add Custom 3D Package
Open Device
Copy Footprint to Library
Copy 3D Package to Library
Copy Device to Library
Properties
Once grouped, select the tool you want to use (e.g. move) and right click on the origin of one of the parts to act on the group together.
"Move: Group" allows you to move all the objects in the group at once
R1
1k
G1
S1
Lit,3V
On/Off
MANUFACTURING
FUSION 360
FUSION TEAM
Element: G1, CR2032H, battery, Value: CR2032H Left-click to select object to move (Ctrl+right-click to move group)

2 Board - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.brd - EAGLE 9.5.0 education

File Edit Draw View Tools Library Options Window Help

Layer: 1 Top Angle: 0

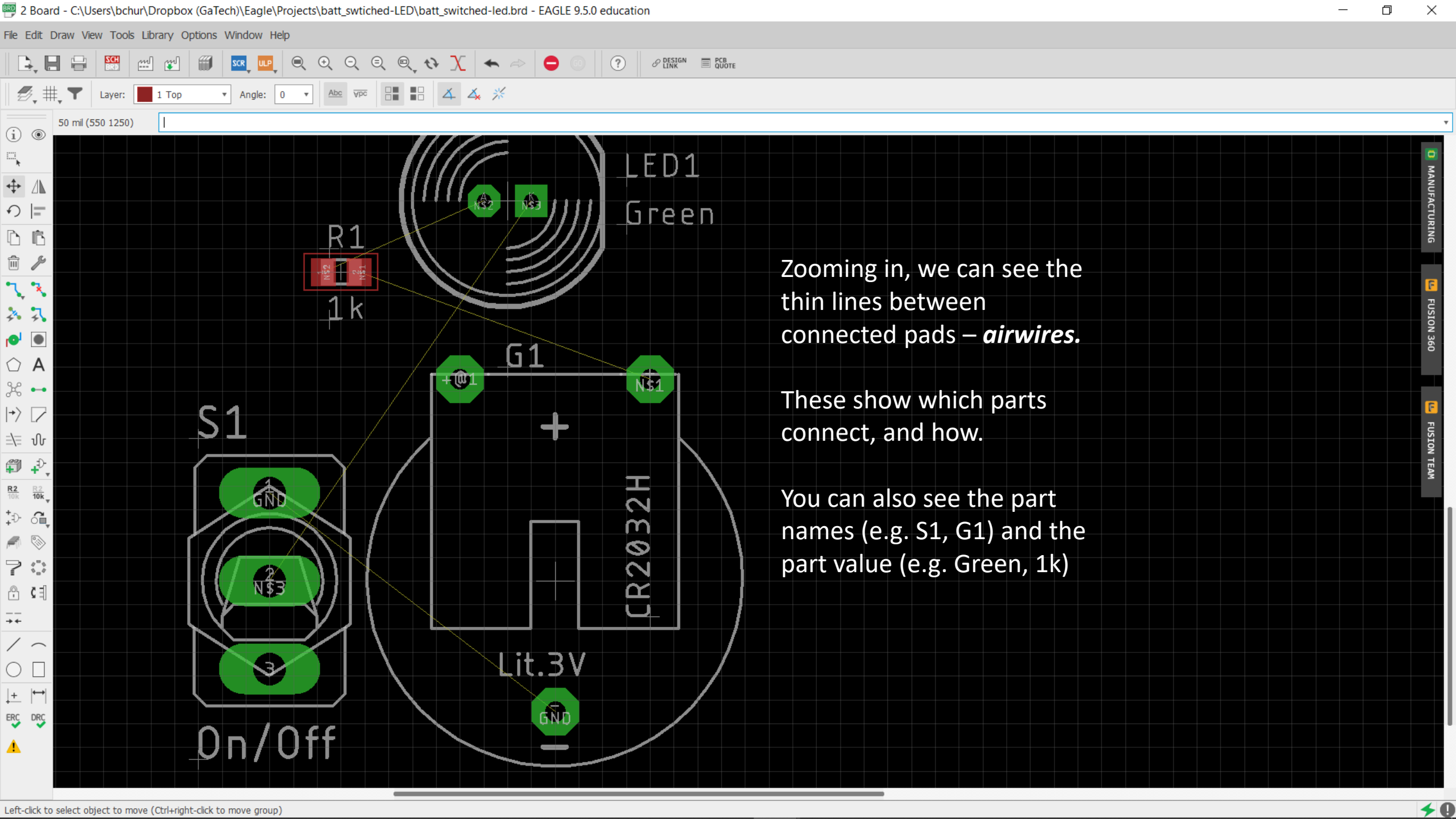
50 mil (900 2350)

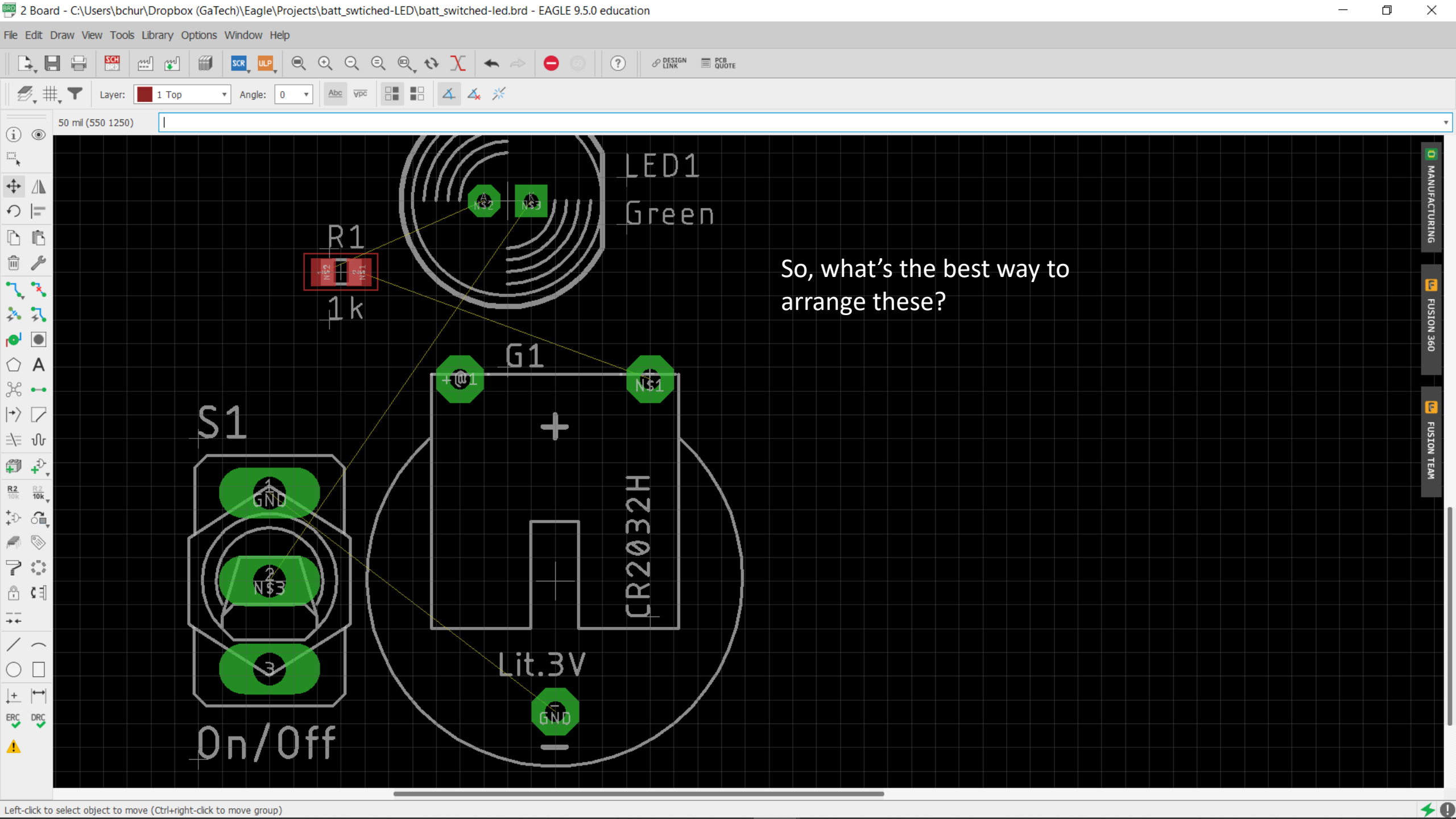


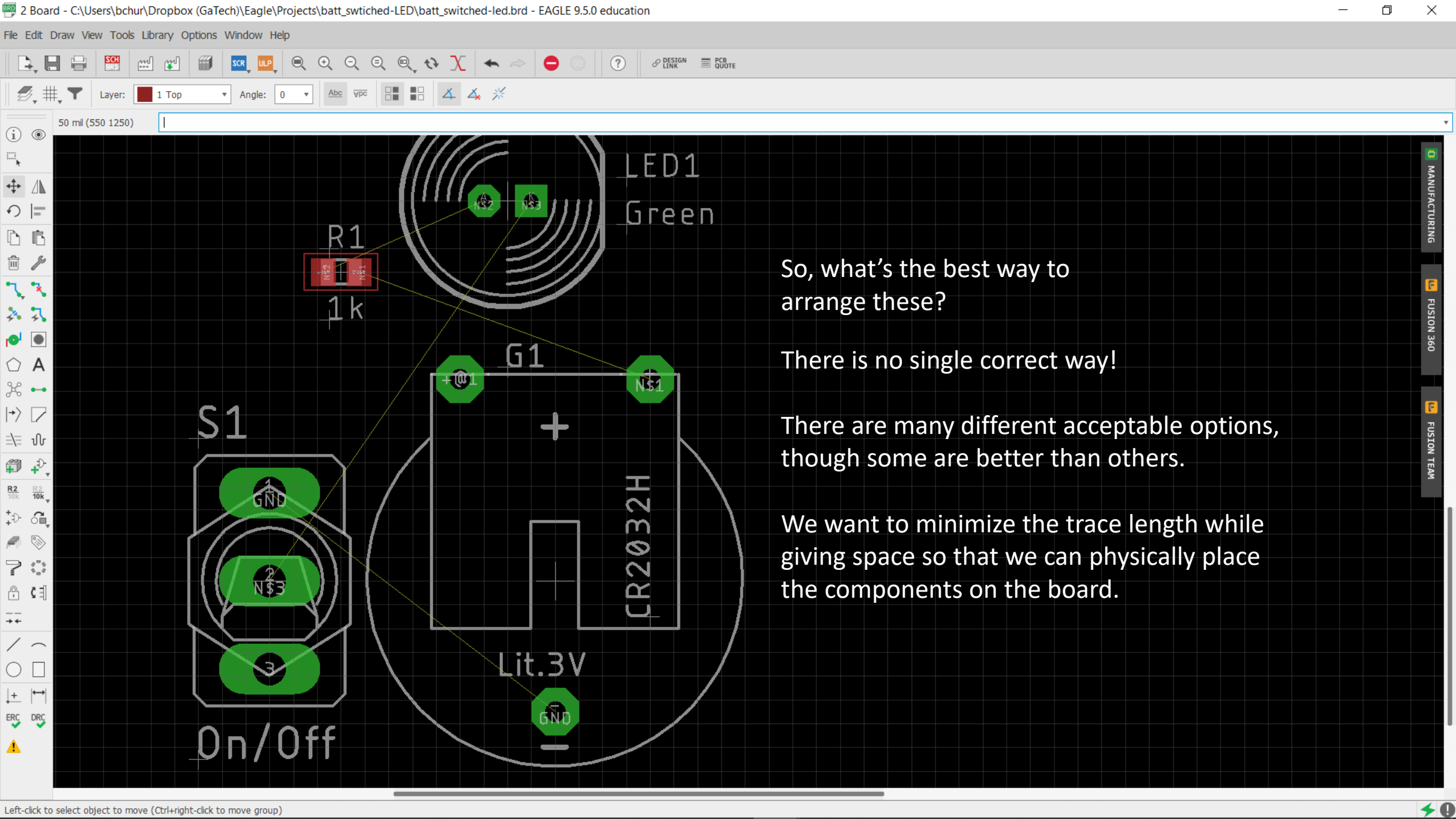
Now that we've moved our parts onto the board, we need to arrange them.

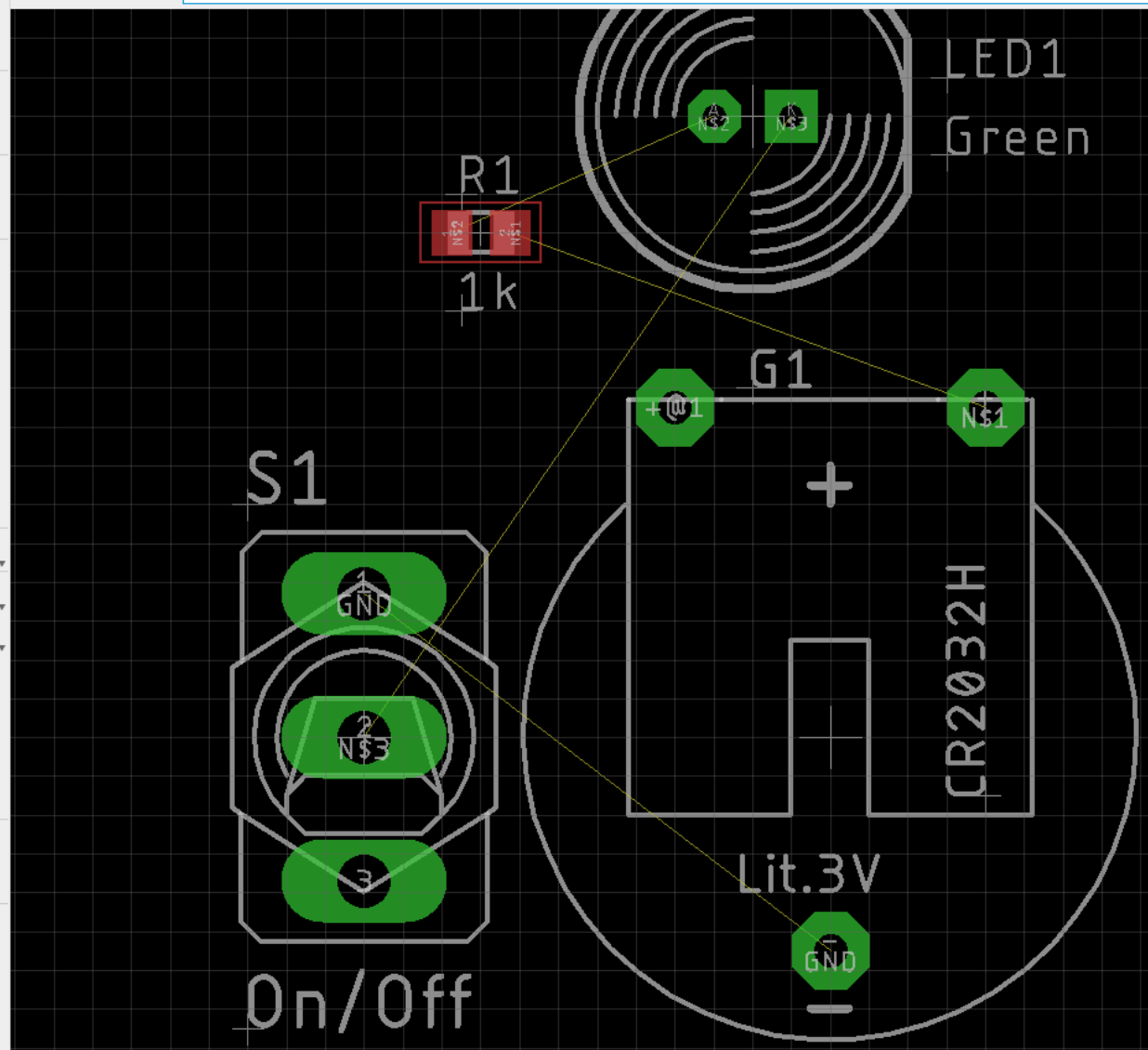
MANUFACTURING FUSION 360 FUSION TEAM

Left-click to select object to move (Ctrl+right-click to move group)


2 Board - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.brd - EAGLE 9.5.0 education
File Edit Draw View Tools Library Options Window Help
Layer: 1 Top
Angle: 0
50 mil (550 1250)
LED1
Green
R1
1k
G1
S1
GND
N$3
On/Off
CR2032H
Lit.3V
GND
Zooming in, we can see the thin lines between connected pads – airwires.
These show which parts connect, and how.
You can also see the part names (e.g. S1, G1) and the part value (e.g. Green, 1k)
MANUFACTURING
FUSION 360
FUSION TEAM
Left-click to select object to move (Ctrl+right-click to move group)


2 Board - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.brd - EAGLE 9.5.0 education
File Edit Draw View Tools Library Options Window Help
Layer: 1 Top
Angle: 0
50 mil (550 1250)
LED1
Green
R1
1k
G1
S1
GND
N$3
On/Off
+
CR2032H
Lit.3V
GND
N$1
So, what's the best way to arrange these?
MANUFACTURING
FUSION 360
FUSION TEAM
Left-click to select object to move (Ctrl+right-click to move group)


2 Board - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.brd - EAGLE 9.5.0 education
File Edit Draw View Tools Library Options Window Help
Layer: 1 Top
Angle: 0
50 mil (550 1250)
LED1
Green
R1
1k
G1
S1
GND
On/Off
Lit.3V
CR2032H
So, what's the best way to arrange these?
There is no single correct way!
There are many different acceptable options, though some are better than others.
We want to minimize the trace length while giving space so that we can physically place the components on the board.
MANUFACTURING
FUSION 360
FUSION TEAM
Left-click to select object to move (Ctrl+right-click to move group)



Some things to note:

- Movement and rotation are the same as in the schematic
- The middle button moves the part to the other side of the board (i.e. the backside)! There is no mirroring.
- The names and labels (e.g. LED1 and Green) can be moved separately.
- Any changes to parts must be done in the schematic, ***NOT HERE.***

Remember:

90% of the work is in the placement.

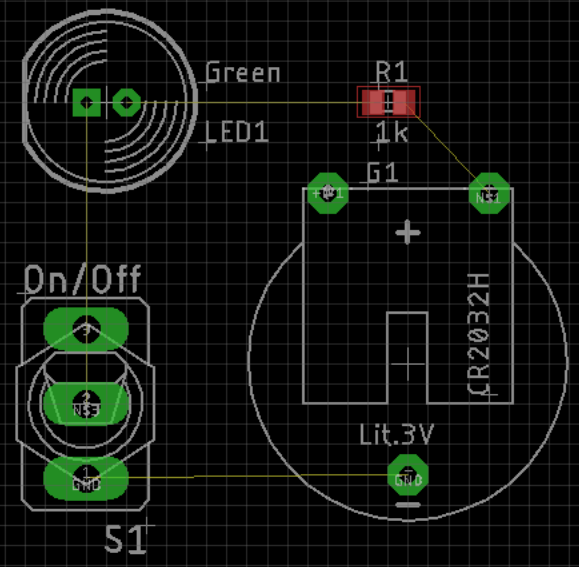
2 Board - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.brd - EAGLE 9.5.0 education

File Edit Draw View Tools Library Options Window Help

Layer: 1 Top Angle: 0

50 mil (-650 2500)

This is one potential layout – *there are infinite options!*



MANUFACTURING

FUSION 360

FUSION TEAM

Left-click to select object to move (Ctrl+right-click to move group)

2 Board - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.brd - EAGLE 9.5.0 education

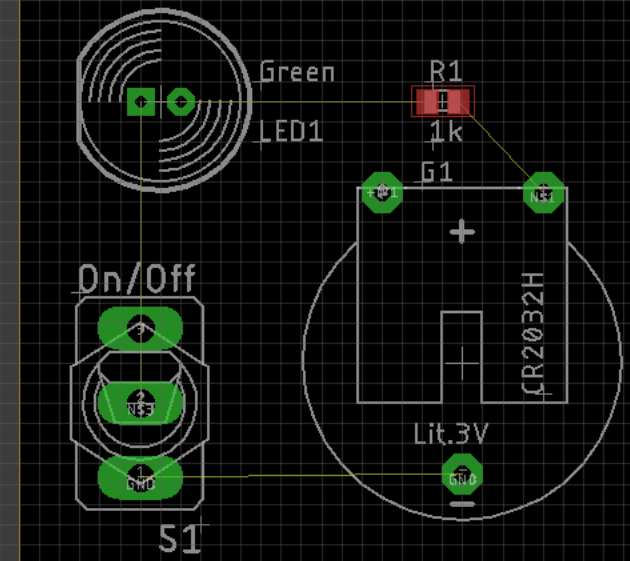
File Edit Draw View Tools Library Options Window Help

Layer: 1 Top Angle: 0

50 mil (-2400 1650)

Route Airwire

Now to route the board.



MANUFACTURING

FUSION 360

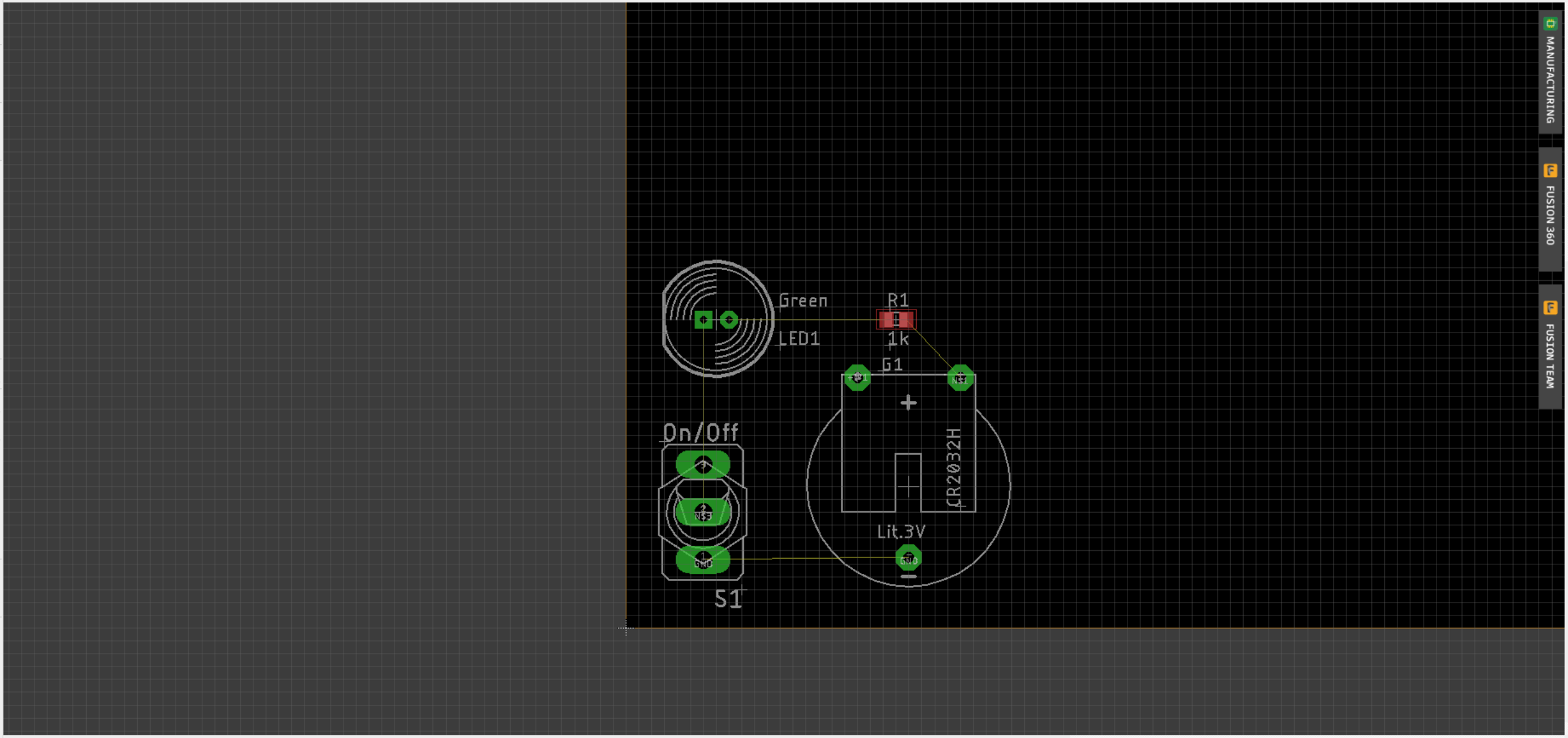
FUSION TEAM

Route Airwire

2 Board - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.brd - EAGLE 9.5.0 education

File Edit Draw View Tools Library Options Window Help

Layer: 1 Top | Width: 6 | Drill: 13.77953 | Diameter: auto | Radius: 100



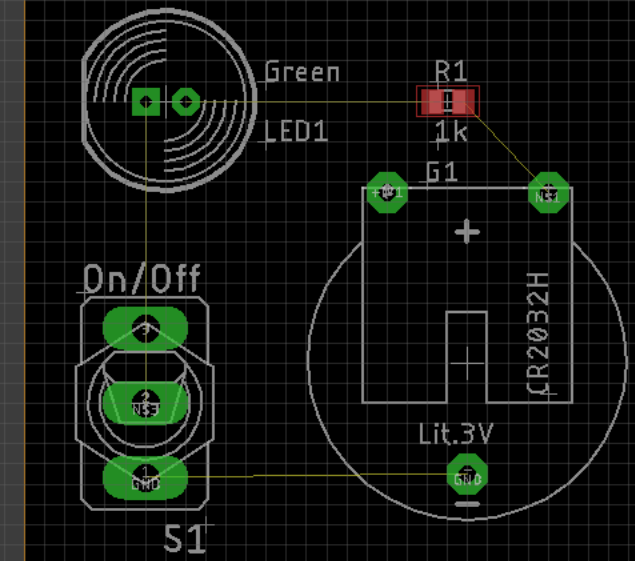
Left-click to select signal object to route

2 Board - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.brd - EAGLE 9.5.0 education

File Edit Draw View Tools Library Options Window Help

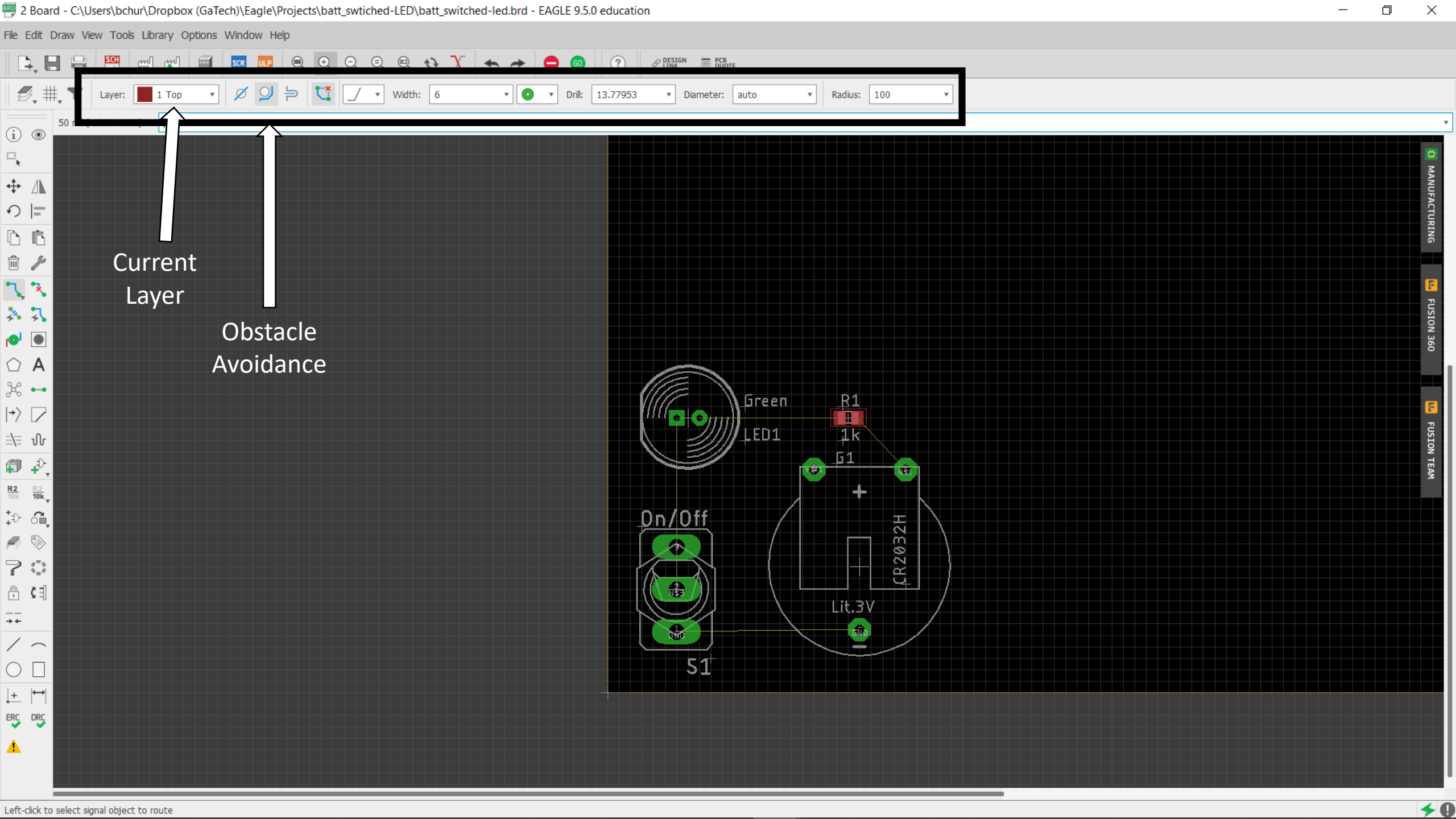
Layer: 1 Top | Width: 6 | Drill: 13.77953 | Diameter: auto | Radius: 100

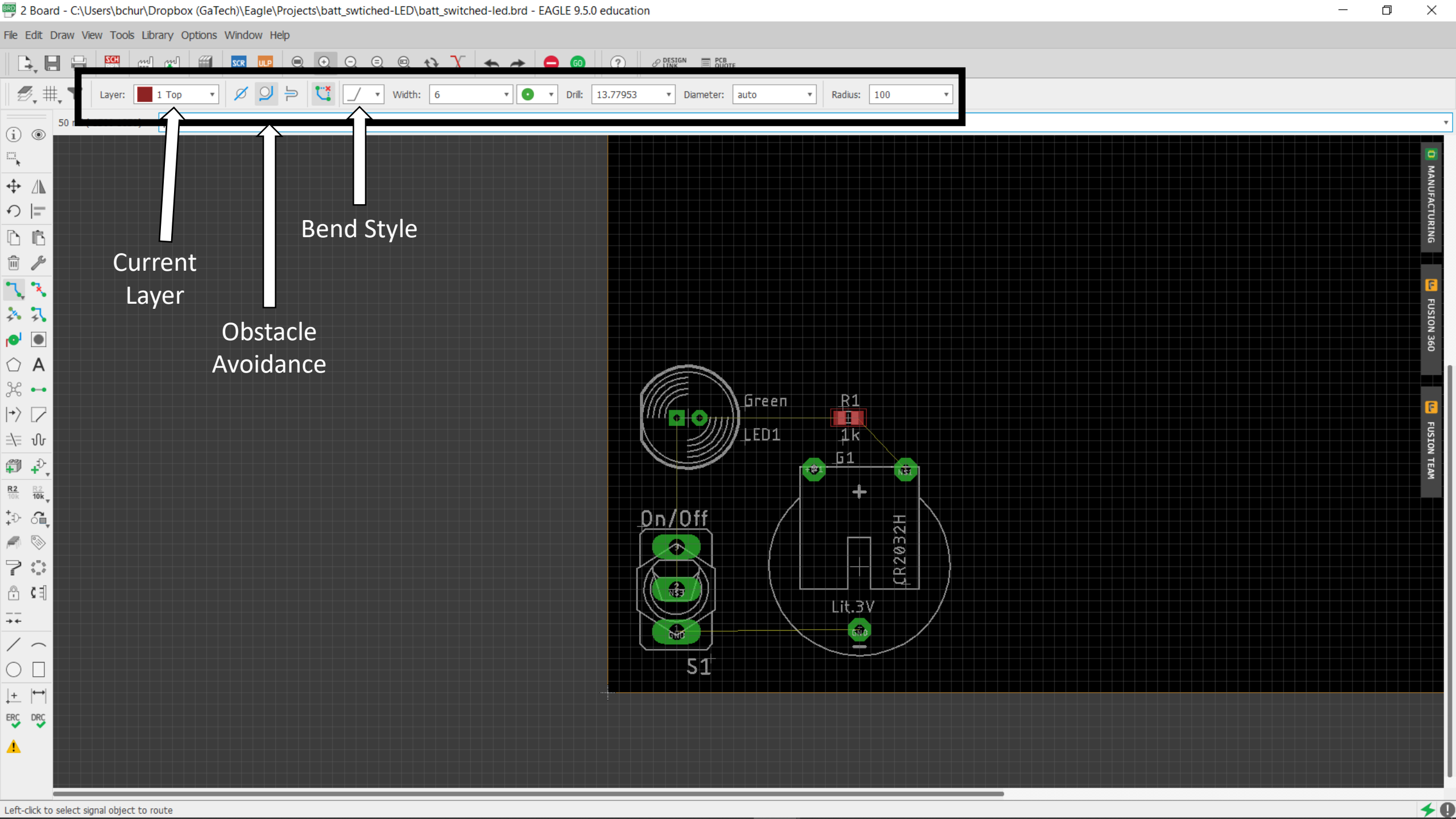
Current Layer

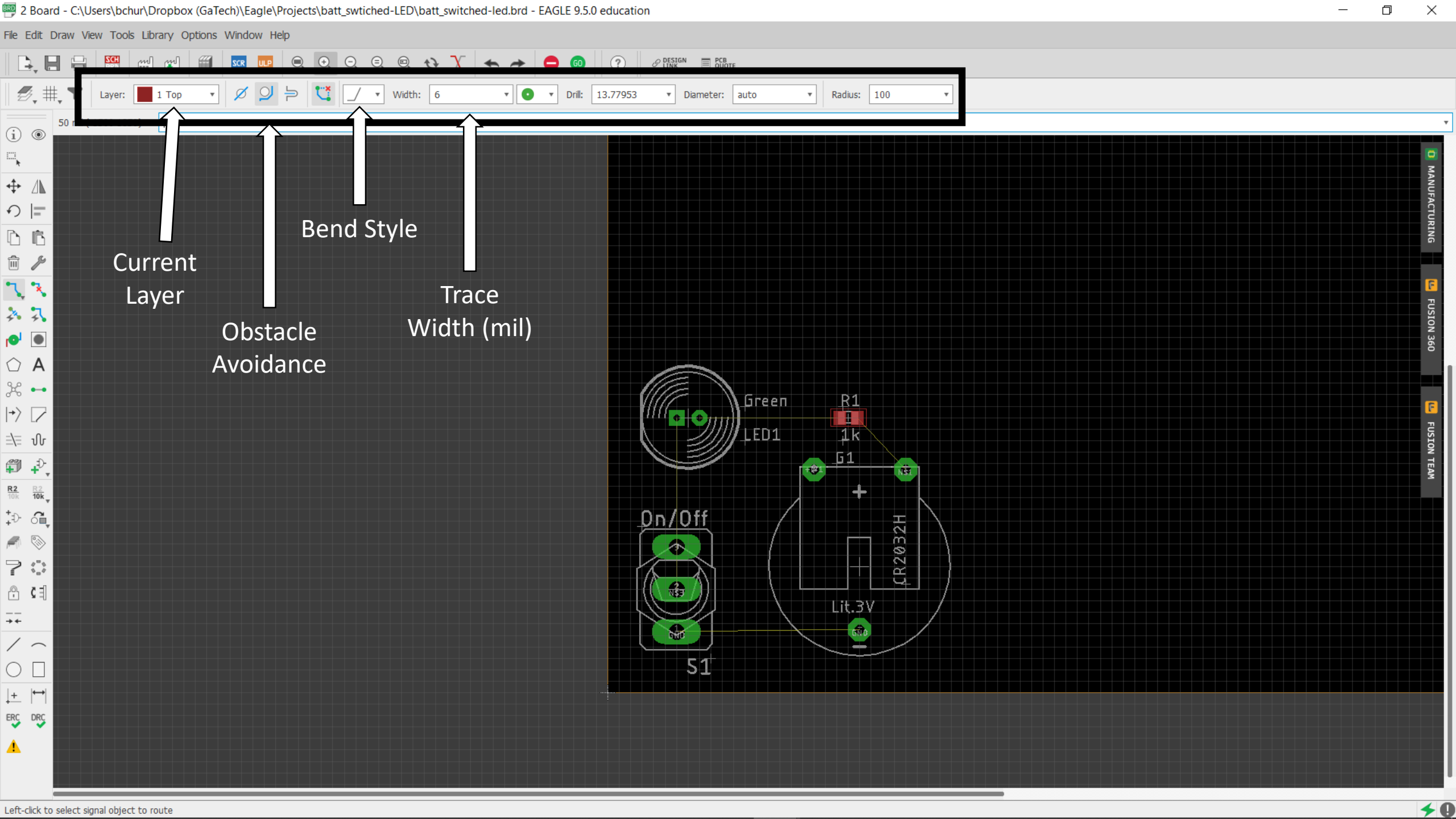


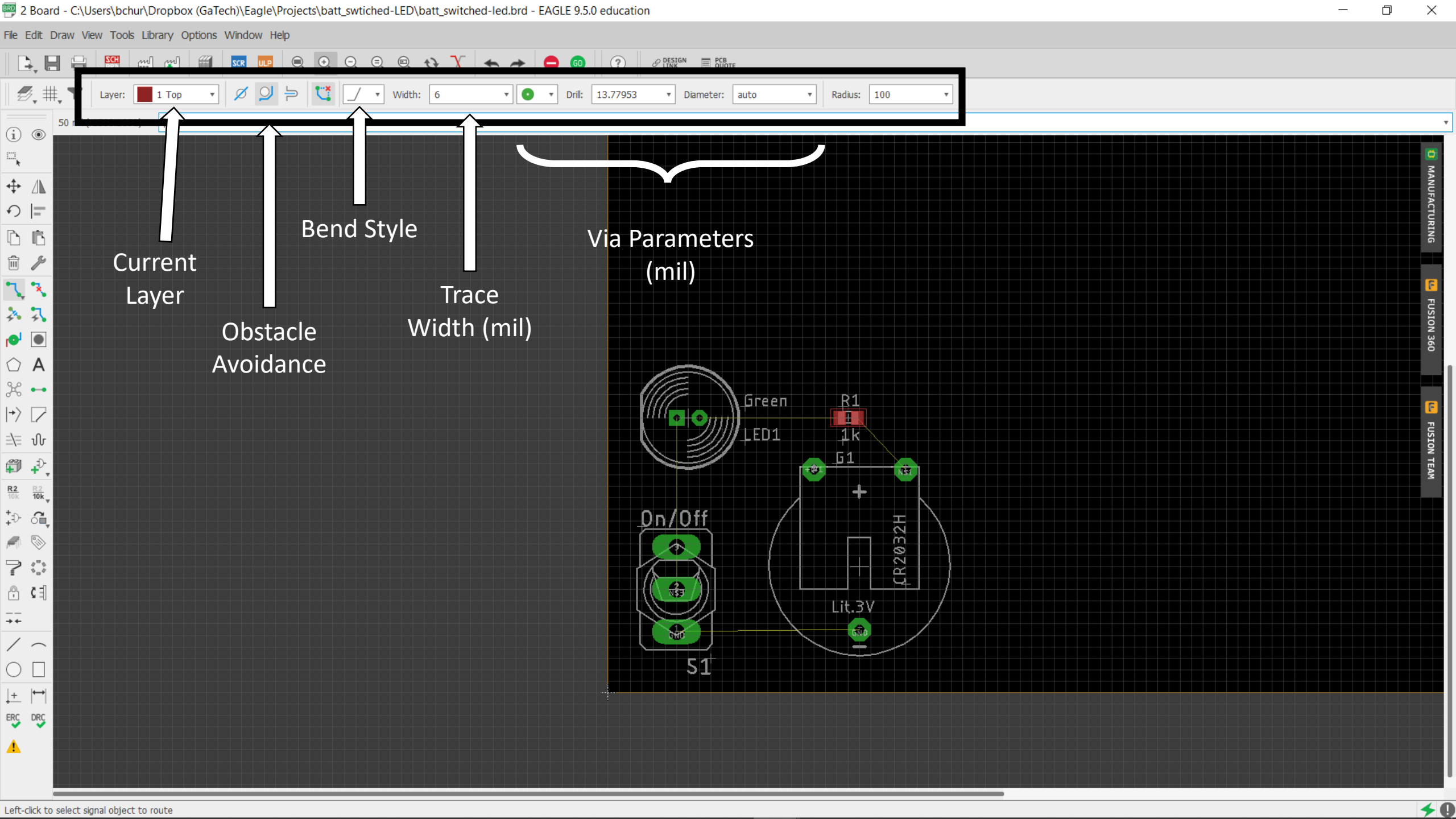
MANUFACTURING
FUSION 360
FUSION TEAM

Left-click to select signal object to route


2 Board - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.brd - EAGLE 9.5.0 education
File Edit Draw View Tools Library Options Window Help
Layer: 1 Top
Width: 6
Drill: 13.77953
Diameter: auto
Radius: 100
Current Layer
Obstacle Avoidance
Green
LED1
R1
1k
G1
On/Off
S1
CR2032H
Lit.3V
MANUFACTURING
FUSION 360
FUSION TEAM
Left-click to select signal object to route


2 Board - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.brd - EAGLE 9.5.0 education
File Edit Draw View Tools Library Options Window Help
Layer: 1 Top
Width: 6
Drill: 13.77953
Diameter: auto
Radius: 100
Current Layer
Obstacle Avoidance
Bend Style
Green
LED1
R1
1k
G1
On/Off
S1
CR2032H
Lit.3V
MANUFACTURING
FUSION 360
FUSION TEAM
Left-click to select signal object to route


2 Board - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.brd - EAGLE 9.5.0 education
File Edit Draw View Tools Library Options Window Help
Layer: 1 Top
Width: 6
Drill: 13.77953
Diameter: auto
Radius: 100
Current Layer
Obstacle Avoidance
Bend Style
Trace Width (mil)
Green
LED1
R1
1k
G1
On/Off
CR2032H
Lit.3V
S1
MANUFACTURING
FUSION 360
FUSION TEAM
Left-click to select signal object to route


2 Board - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.brd - EAGLE 9.5.0 education
File Edit Draw View Tools Library Options Window Help
Layer: 1 Top
Width: 6
Drill: 13.77953
Diameter: auto
Radius: 100
Current Layer
Obstacle Avoidance
Bend Style
Trace Width (mil)
Via Parameters (mil)
Green
LED1
R1
1k
G1
On/Off
CR2032H
Lit.3V
S1
MANUFACTURING
FUSION 360
FUSION TEAM
Left-click to select signal object to route

2 Board - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.brd - EAGLE 9.5.0 education

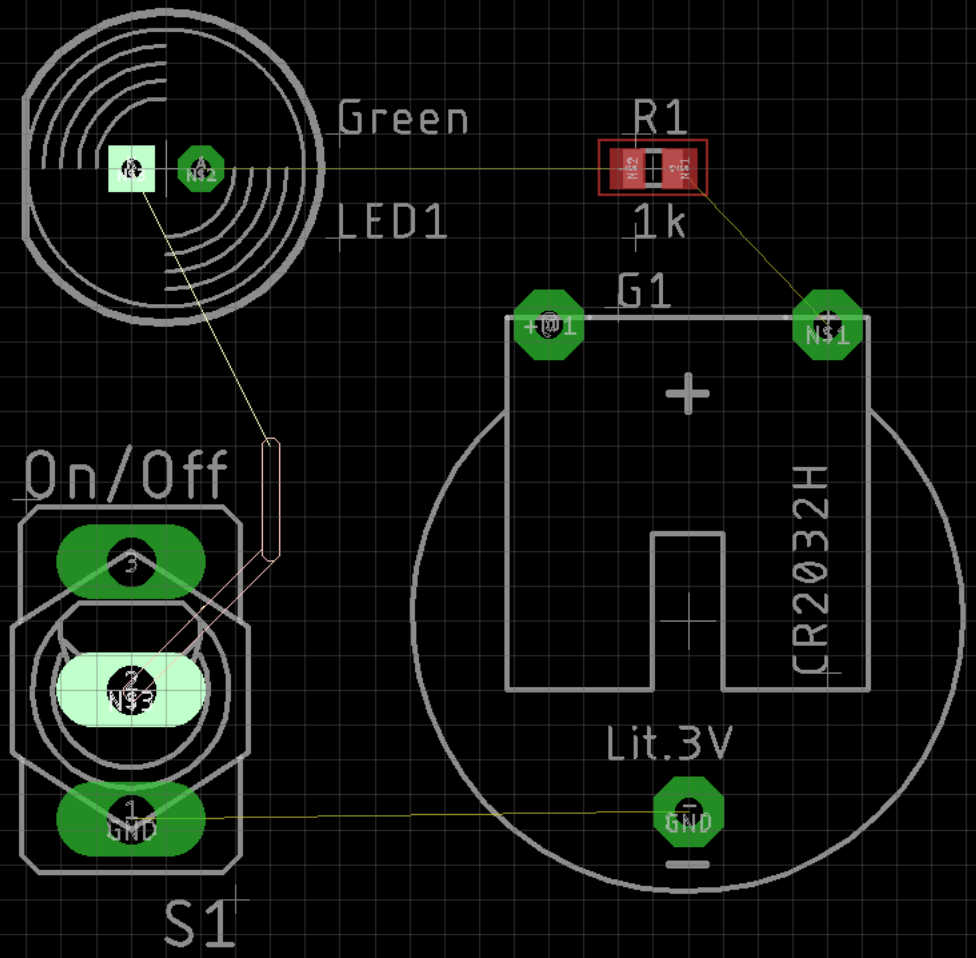
File Edit Draw View Tools Library Options Window Help

Layer: 1 Top | Width: 24 | Drill: 23.62205 | Diameter: auto | Radius: 100

50 mil (500 800)

- Traces should typically be minimum of 10 mils for signals, 24 mils for power
  - Wider is better!
- Right click to invert bend angle
- Ctrl + right click to change bend style
- Middle click to switch to another copper layer
  - This will place a via if you're in the middle of a trace

Question: Which side should the traces be on if our through-hole components are on the top layer?



MANUFACTURING
FUSION 360
FUSION TEAM

Signal: N$3, Class: 0 default Left-click to place wire (double-click ends wire), Press SPACE to change layers, or Press ENTER to complete the route using Quick Route.

2 Board - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.brd - EAGLE 9.5.0 education

File Edit Draw View Tools Library Options Window Help

Layer: 16 Bottom Angle: 0

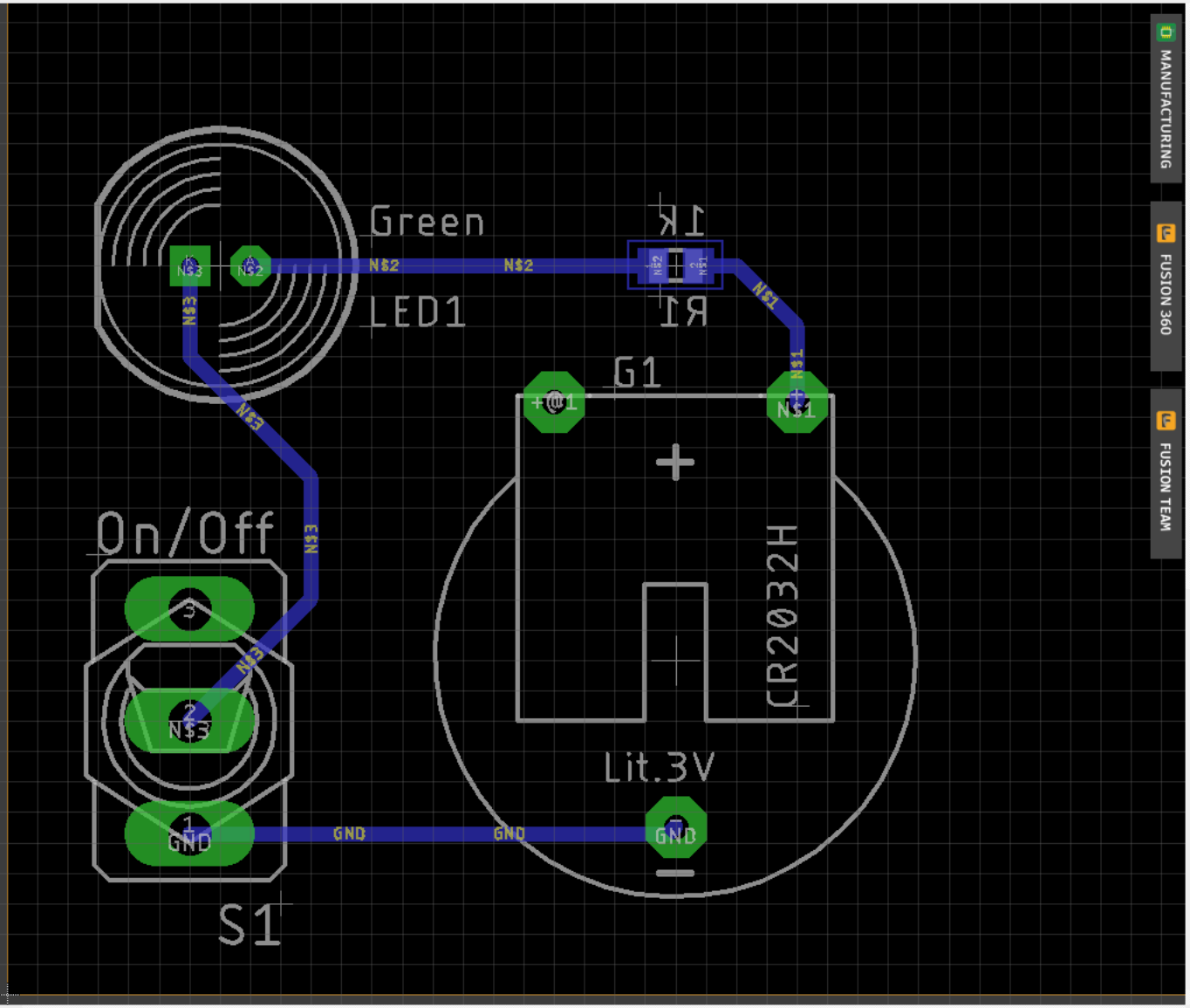
50 mil (-850 1100)

Question: Which side should the traces be on if our through-hole components are on the top layer?

Answer: The bottom! Why?

Notice that the resistor got flipped to the backside to facilitate this → no vias!

- This will reduce fabrication costs



'C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.brd' saved. Left-click to select object to move

2 Board - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.brd - EAGLE 9.5.0 education

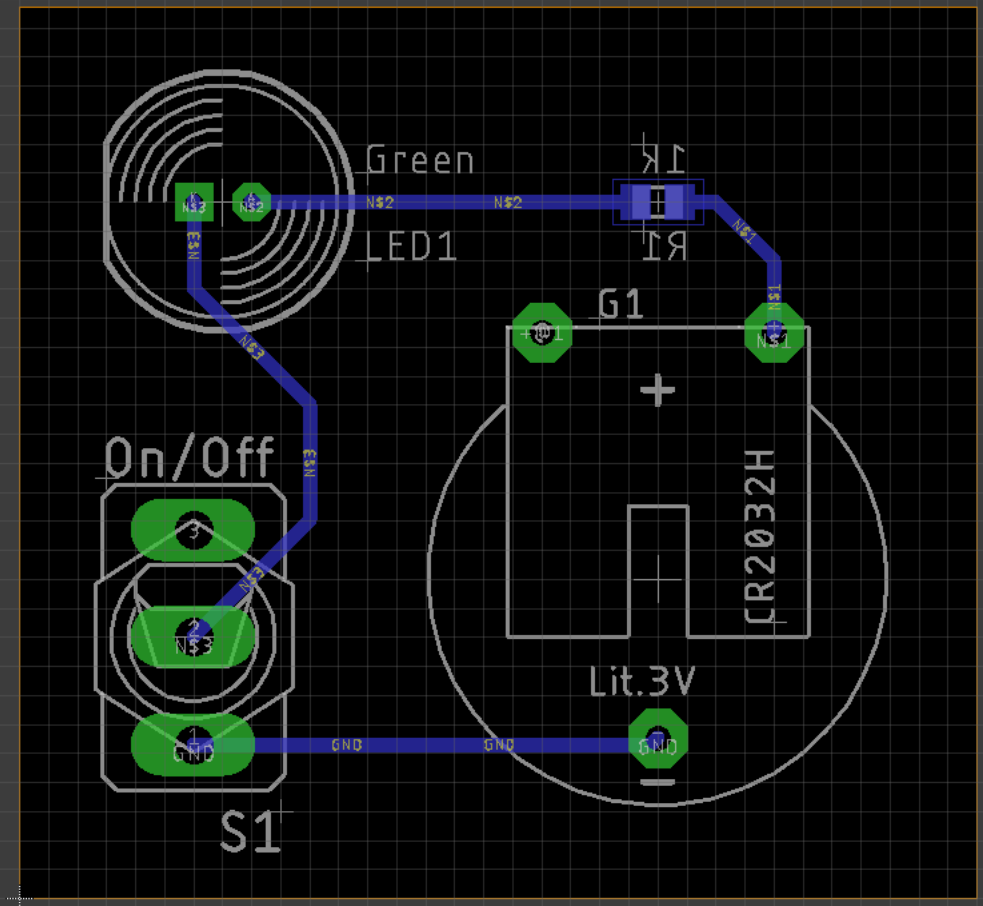
File Edit Draw View Tools Library Options Window Help

Layer: 16 Bottom Angle: 0

50 mil (-600 1150)

Use the move tool to adjust the dimensions of the board

- Squares and rectangles and easy and clean



MANUFACTURING
FUSION 360
FUSION TEAM

Left-click to select object to move

2 Board - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.brd - EAGLE 9.5.0 education

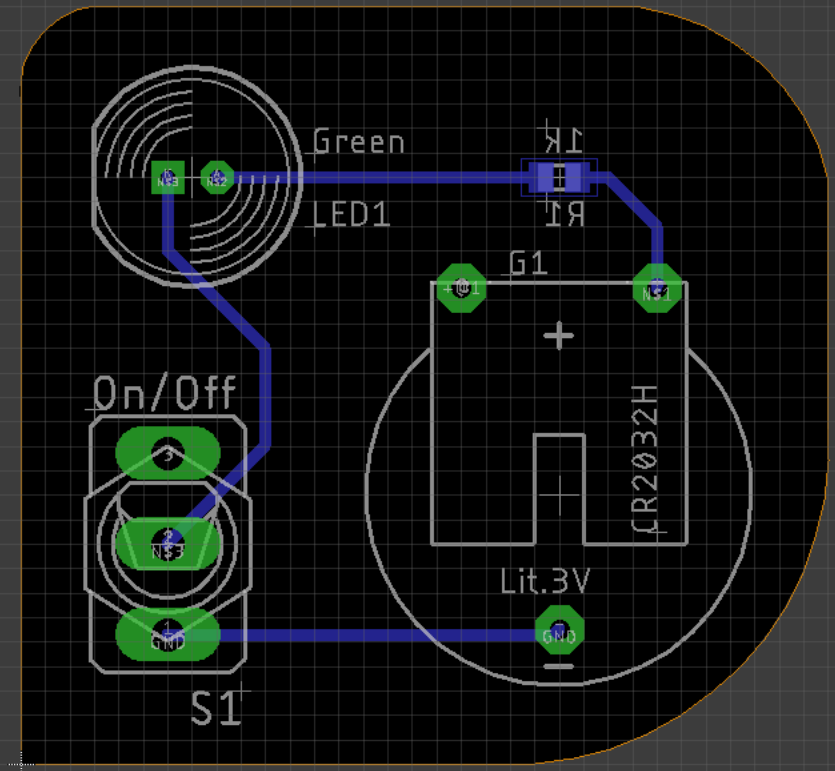
File Edit Draw View Tools Library Options Window Help

Layer: 20 Dimension

50 mil (-350 1150)

Use the move tool to adjust the dimensions of the board

- Squares and rectangles and easy and clean
- The arc tool can be used to make curves



MANUFACTURING
FUSION 360
FUSION TEAM

Redo: Arc (27s ago) Left-click to select object to delete

2 Board - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.brd - EAGLE 9.5.0 education

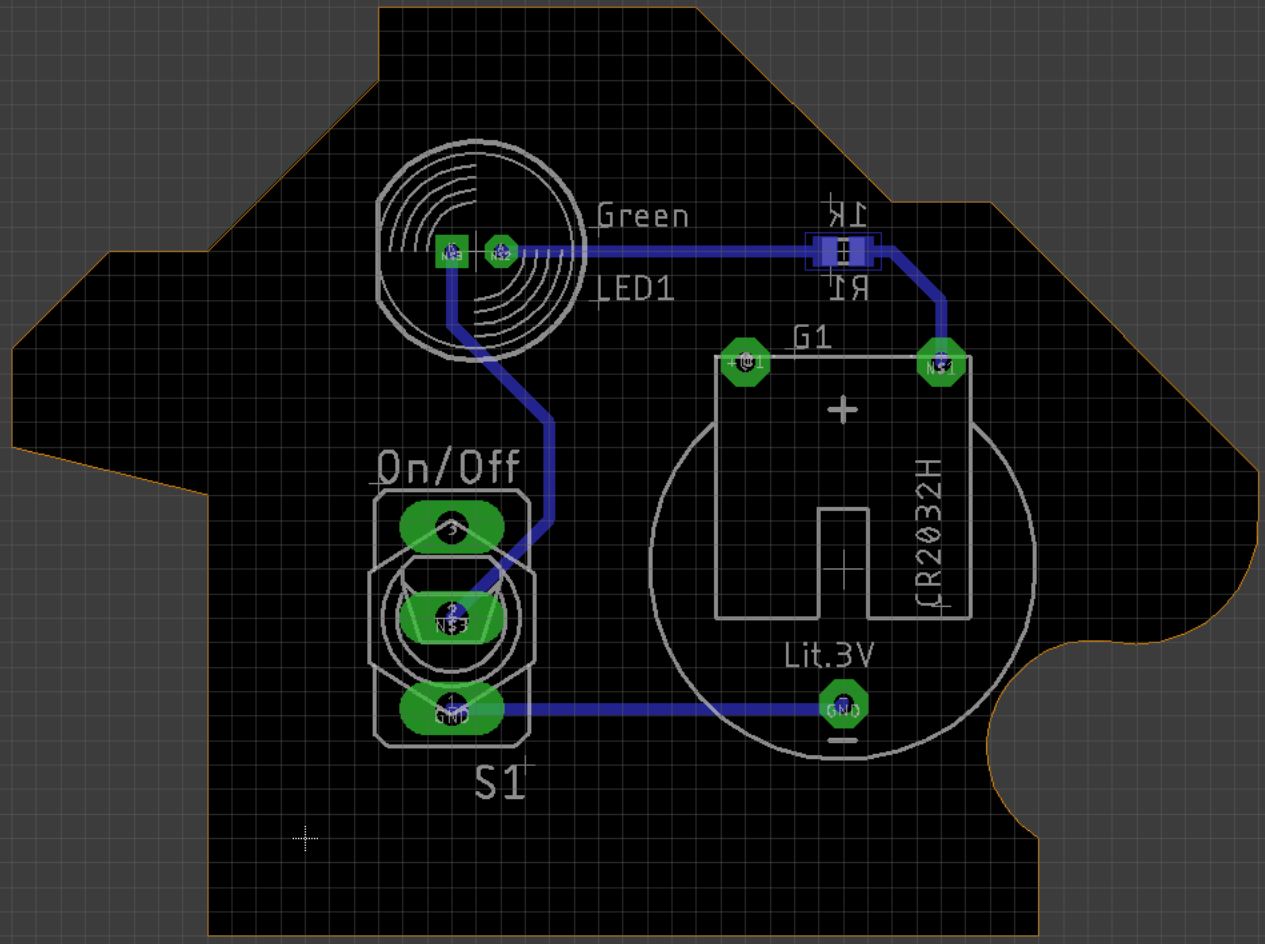
File Edit Draw View Tools Library Options Window Help

Layer: 20 Dimension Width: 0 Style: continuous Radius: 0

50 mil (-1650 1200)

Use the move and delete tools to adjust the dimensions of the board

- Squares and rectangles and easy and clean (the default)
- The arc tool can be used to make curves
- The line tool can be used with different bend styles to make your PCB nearly any shape you'd like!
- If you make new dimensions, make sure to delete the old ones!



MANUFACTURING FUSION 360 FUSION TEAM

Left-click to start line

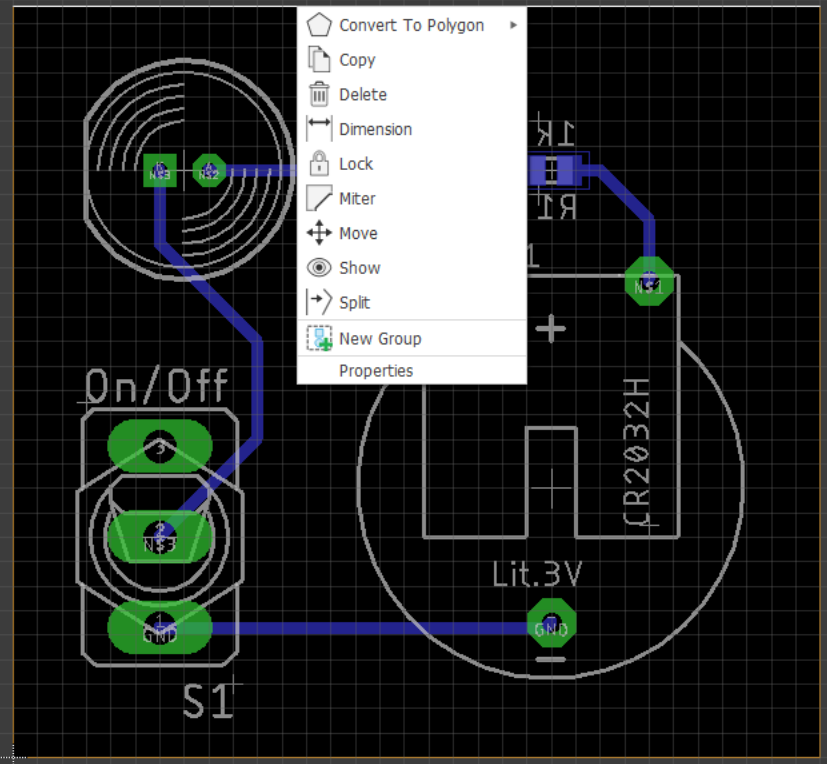
2 Board - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.brd - EAGLE 9.5.0 education

File Edit Draw View Tools Library Options Window Help

Layer: 20 Dimension Width: 0 Style: continuous Radius: 0

50 mil (600 1550) Click or press Ctrl+L key to activate command line mode

Left click on a dimension to see some other options



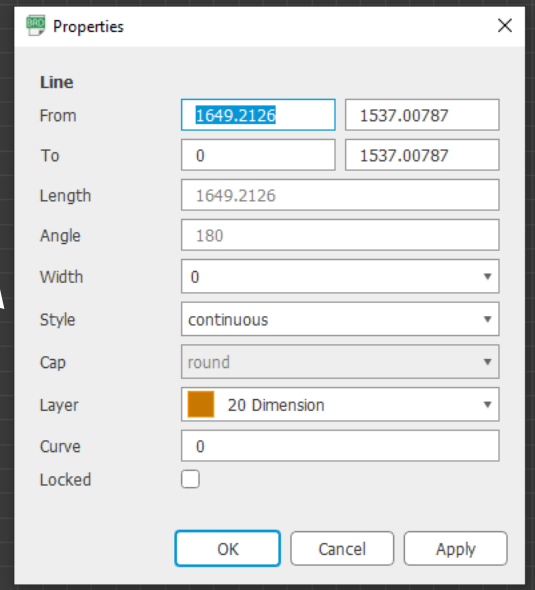
MANUFACTURING FUSION 360 FUSION TEAM

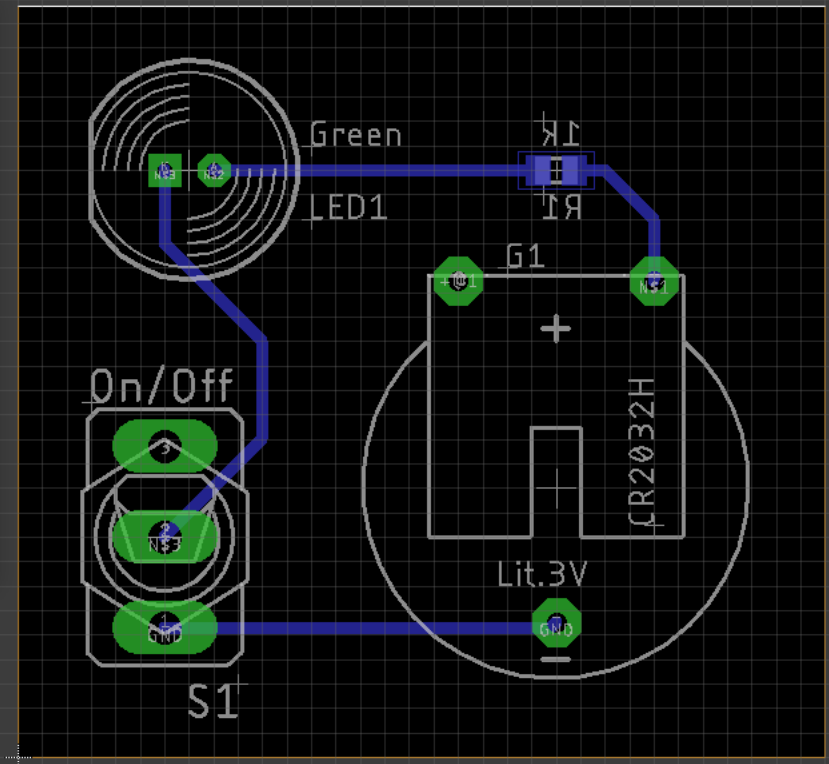
Left-click to start line

Notice that the line did not snap to the grid!

We can adjust these manually to position lines and curve more exactly.

Also notice that dimension lines are zero width.





2 Board - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.brd - EAGLE 9.5.0 education

File Edit Draw View Tools Library Options Window Help

Layer: 20 Dimension Angle: 0

50 mil (-2450 1750)

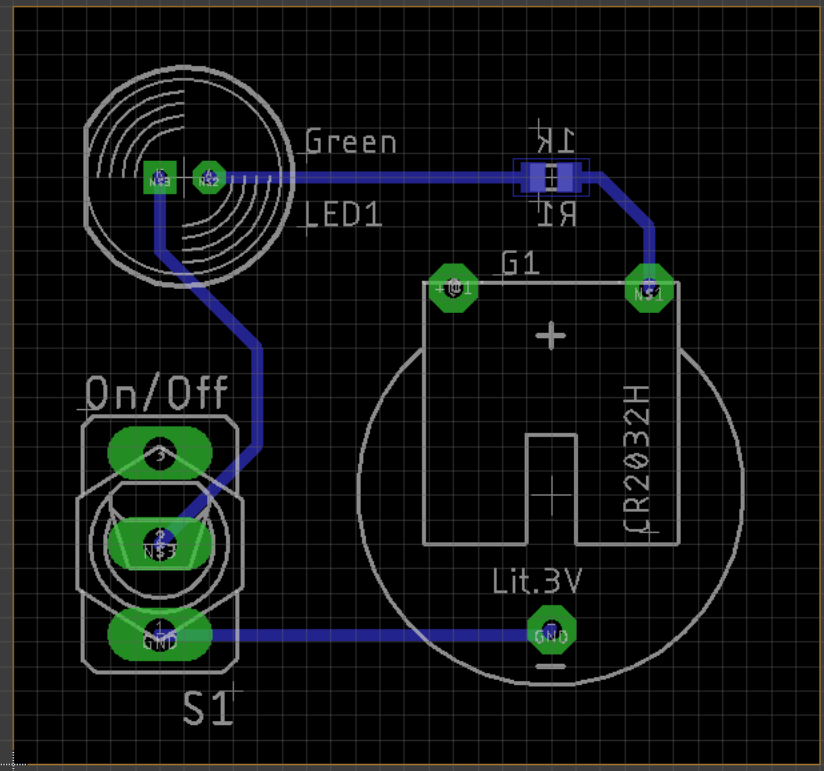
Polygon

Next, we introduce the *polygon tool*.

Polygons can be thought of as area traces, rather than point-to-point.

Typically, these are either ground or power signals

- Ground is good for reducing noise.
- Power is good for reducing losses.



MANUFACTURING
FUSION 360
FUSION TEAM

Draw a polygon

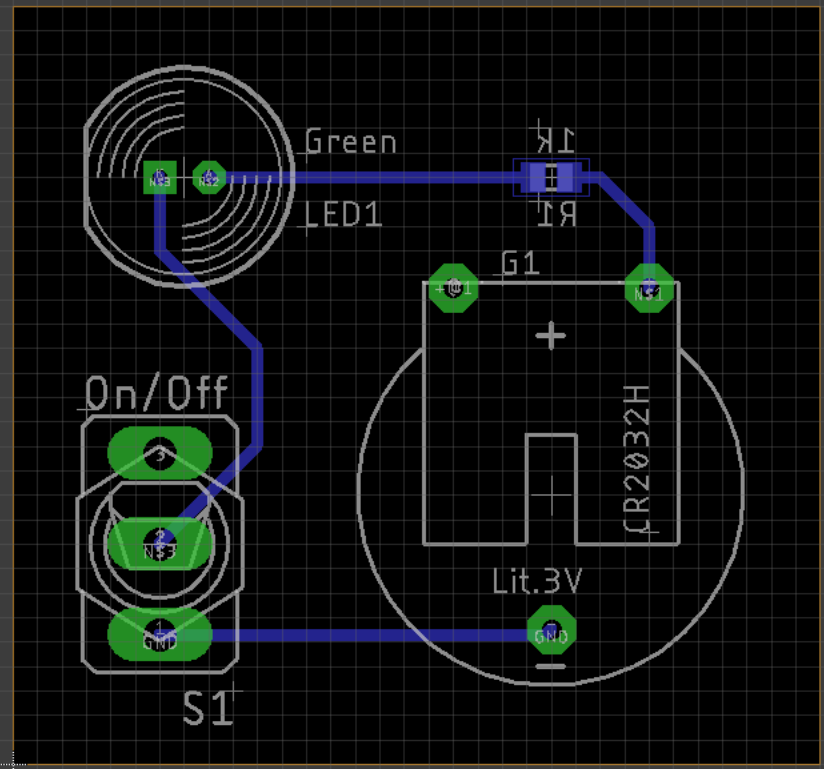
2 Board - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.brd - EAGLE 9.5.0 education

File Edit Draw View Tools Library Options Window Help

Layer: 20 Dimension | Width: 0 | Isolate: 0 | Spacing: 50 | Rank: 1 | Radius: 0

50 mil (-1400 1250)

Width
(kinda irrelevant)



MANUFACTURING
FUSION 360
FUSION TEAM

Left-click to start polygon

2 Board - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.brd - EAGLE 9.5.0 education

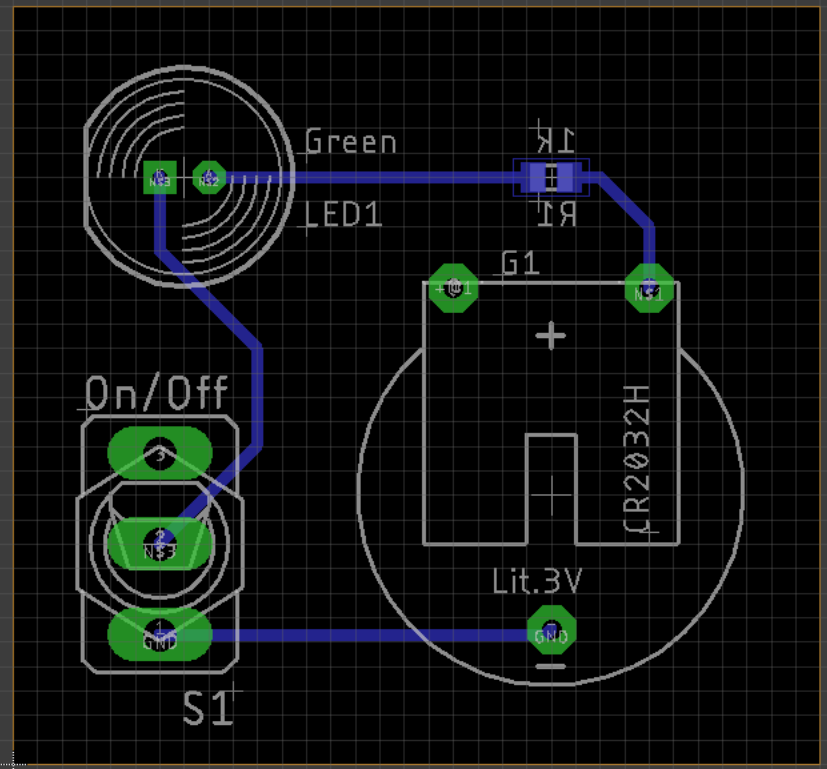
File Edit Draw View Tools Library Options Window Help

Layer: 20 Dimension | Width: 0 | Isolate: 0 | Spacing: 50 | Rank: 1 | Radius: 0

50 mil (-1400 1250)

Width
(kinda irrelevant)

Fill style



MANUFACTURING

FUSION 360

FUSION TEAM

Left-click to start polygon

2 Board - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.brd - EAGLE 9.5.0 education

File Edit Draw View Tools Library Options Window Help

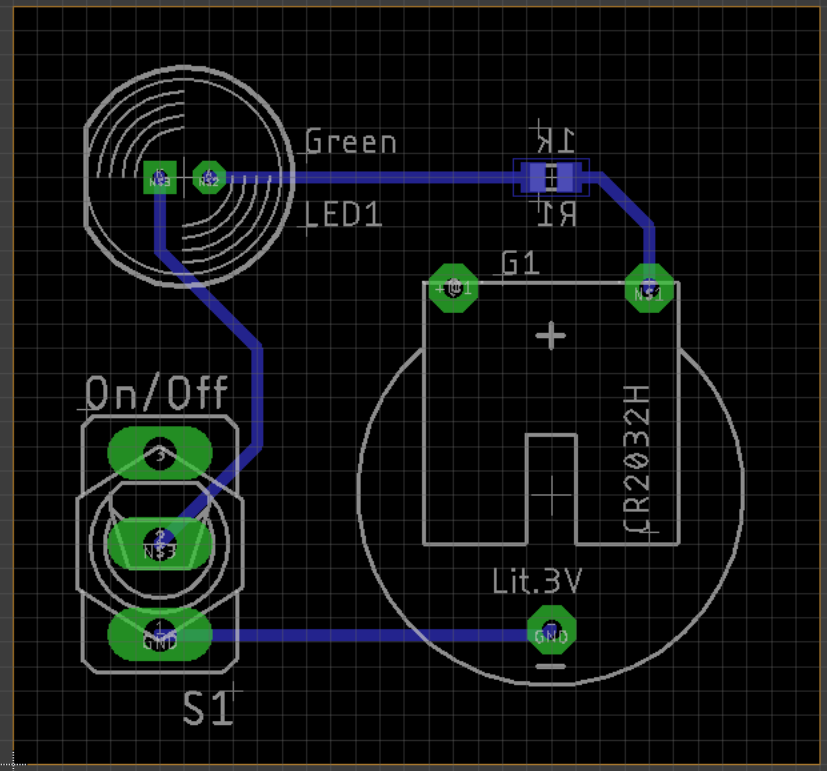
Layer: 20 Dimension | Width: 0 | Isolate: 0 | Spacing: 50 | Rank: 1 | Radius: 0

50 mil (-1400 1250)

Width
(kinda irrelevant)

Fill style

Thermals



MANUFACTURING
FUSION 360
FUSION TEAM

Left-click to start polygon

2 Board - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.brd - EAGLE 9.5.0 education

File Edit Draw View Tools Library Options Window Help

Layer: 20 Dimension | Width: 0 | Isolate: 0 | Spacing: 50 | Rank: 1 | Radius: 0

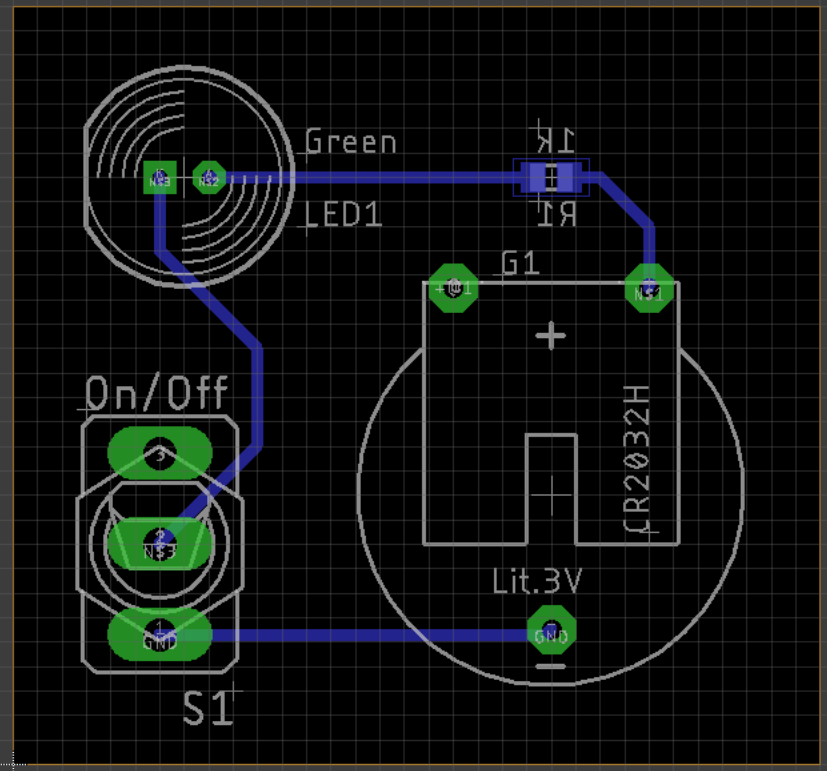
50 mil (-1400 1250)

Width
(kinda irrelevant)

Fill style

Thermals

Orphans



MANUFACTURING

FUSION 360

FUSION TEAM

Left-click to start polygon

2 Board - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.brd - EAGLE 9.5.0 education

File Edit Draw View Tools Library Options Window Help

Layer: 20 Dimension | Width: 0 | Isolate: 0 | Spacing: 50 | Rank: 1 | Radius: 0

50 mil (-1400 1250)

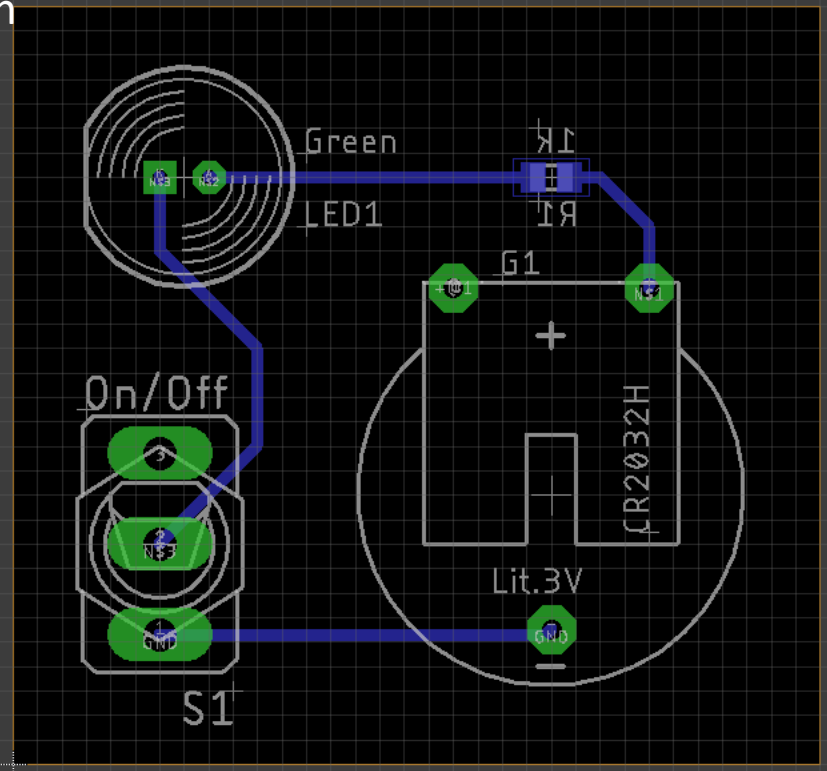
Width
(kinda irrelevant)

Fill style

Thermals

Orphans

Isolation



MANUFACTURING

FUSION 360

FUSION TEAM

Left-click to start polygon

2 Board - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.brd - EAGLE 9.5.0 education

File Edit Draw View Tools Library Options Window Help

Layer: 20 Dimension | Width: 0 | Isolate: 0 | Spacing: 50 | Rank: 1 | Radius: 0

50 mil (-1400 1250)

Width
(kinda irrelevant)

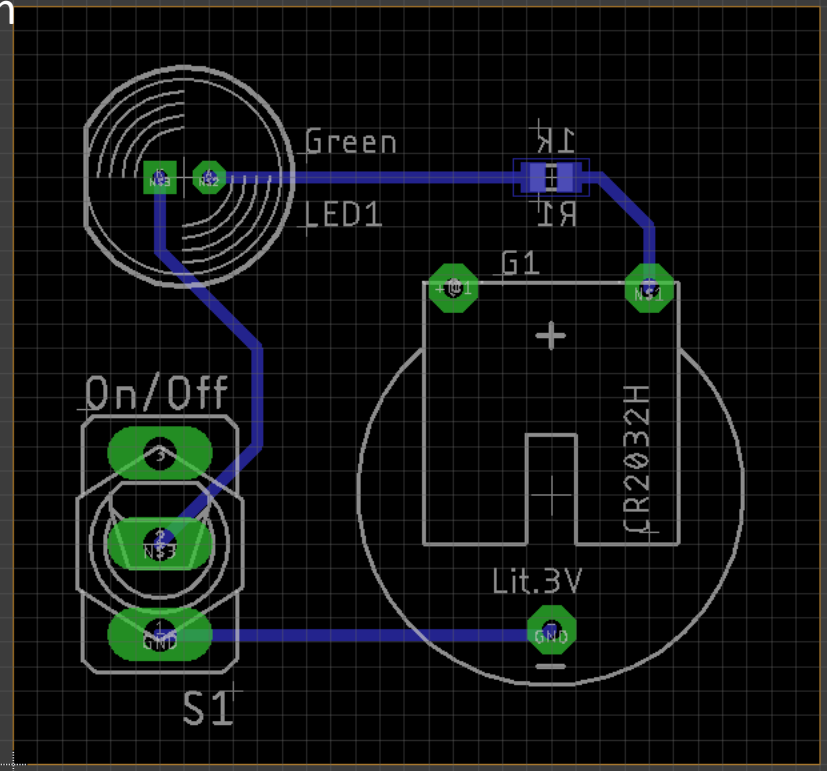
Fill style

Thermals

Orphans

Isolation

Rank



MANUFACTURING
FUSION 360
FUSION TEAM

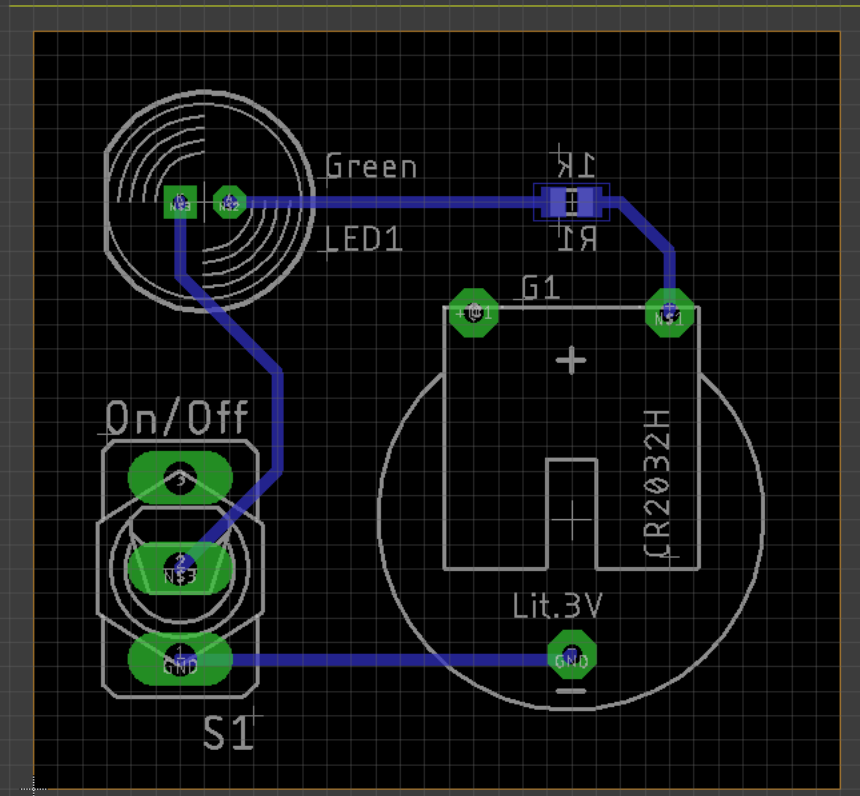
Left-click to start polygon

Polygons are drawn like traces

- Confirm the layer you're on
- Right click to mirror the bend
- Ctrl + right click to switch bend style

Notice that we're on the bottom layer, and we've increased the isolation.

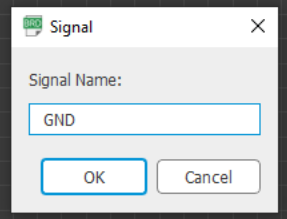
Also, polygons can be drawn outside the dimensions, but will only fill within the dimensions.

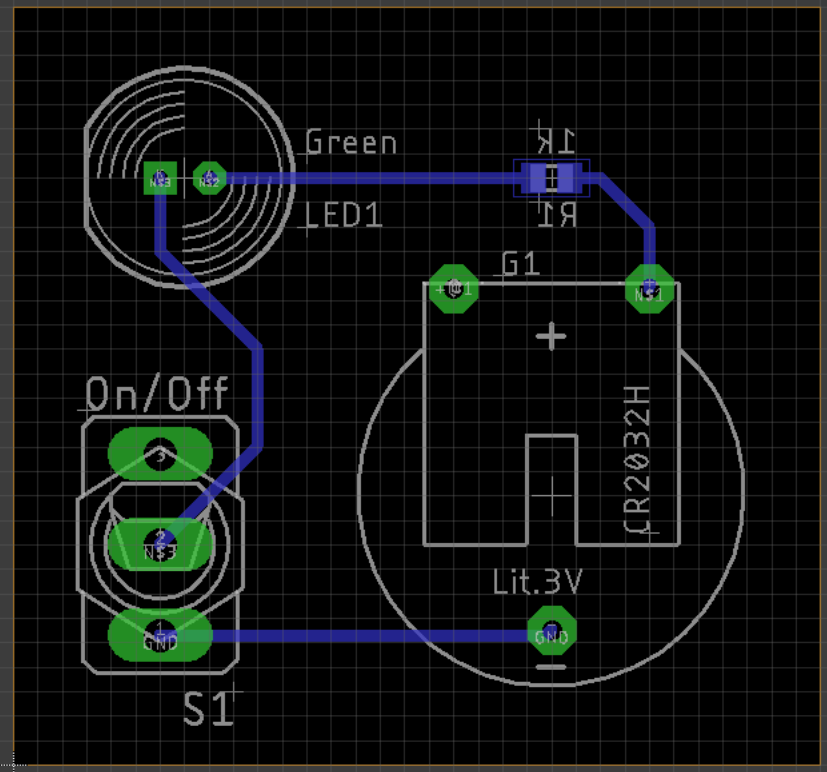


Once you've closed the polygon, it will ask for a name.

This is the net name you're connecting to, which in this case is GND.

... your polygon's outline should be visible.





2 Board - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.brd - EAGLE 9.5.0 education

File Edit Draw View Tools Library Options Window Help

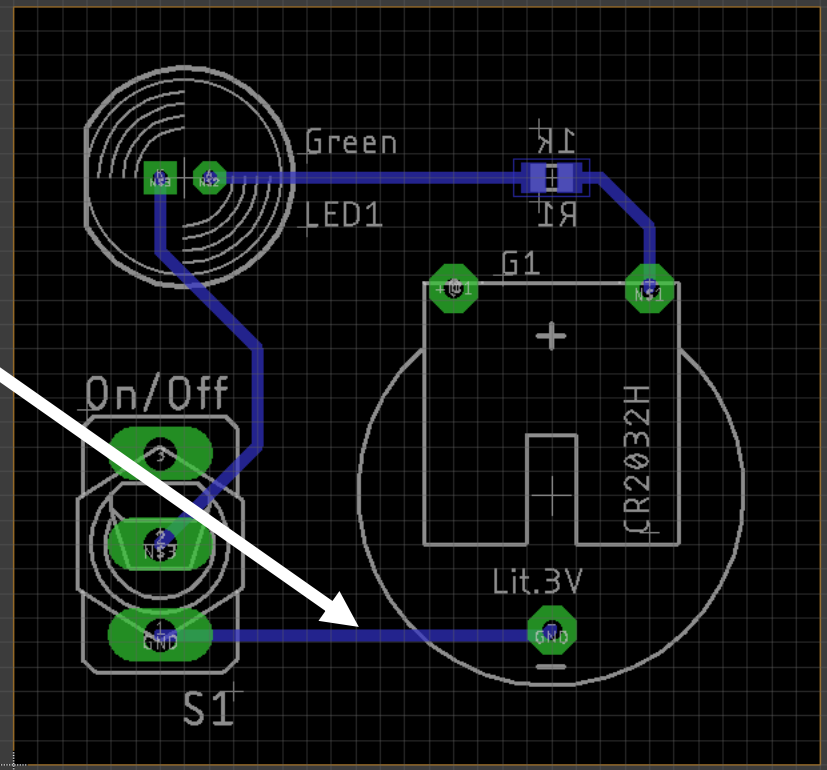
Layer: 16 Bottom Width: 0 Isolate: 32 Spacing: 50 Rank: 1 Radius: 0

50 mil (-2450 1350)

Ripup

To demonstrate the power of polygons, I'll remove the GND trace using the *ripup* tool.

Ripup is how you delete a trace.
You can't use the delete tool!



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Ripup routed tracks to airwires

2 Board - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.brd - EAGLE 9.5.0 education

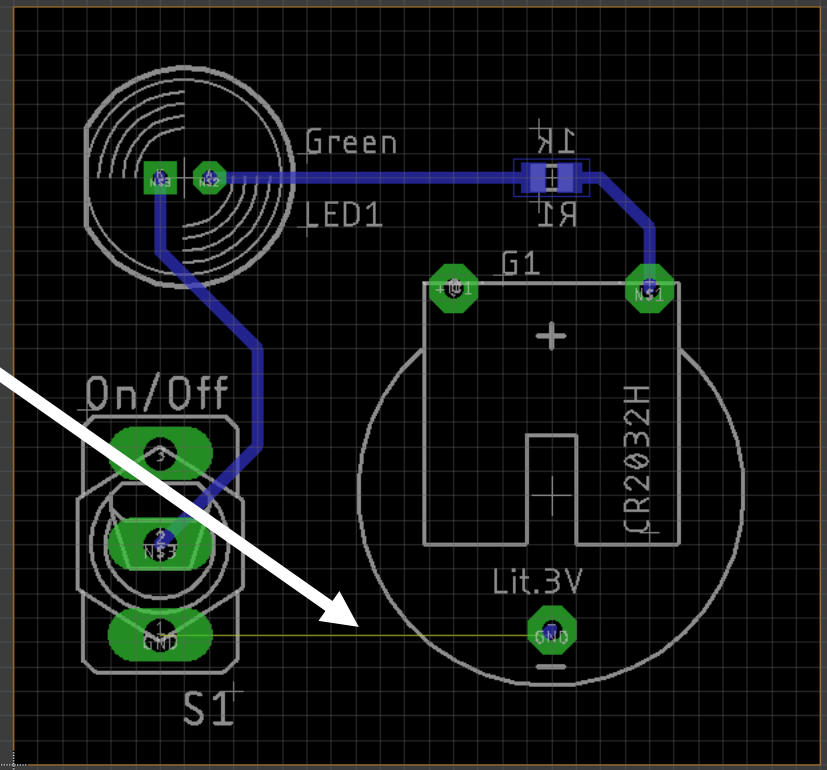
File Edit Draw View Tools Library Options Window Help

Layer: 16 Bottom

50 mil (-1000 500)

Ripping up the trace leaves an airwire where it used to be.

We will fill this with the polygon.



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Left-click to select signal to ripup

2 Board - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.brd - EAGLE 9.5.0 education

File Edit Draw View Tools Library Options Window Help

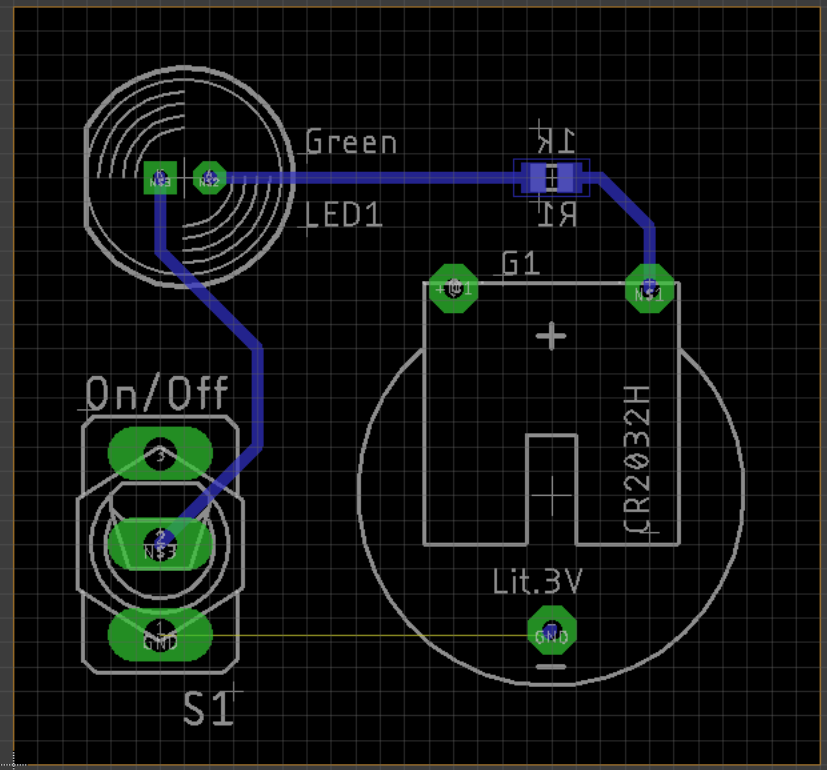
Layer: 16 Bottom

50 mil (-2450 1300)

Ratsnest

To fill the polygon, we use the *ratsnest* tool.

The “ratsnest” is the jumble of airwires, and this tool fills polygons and eliminates any completed airwires.



MANUFACTURING

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Calculate shortest airwires

2 Board - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.brd - EAGLE 9.5.0 education

File Edit Draw View Tools Library Options Window Help

Layer: 16 Bottom

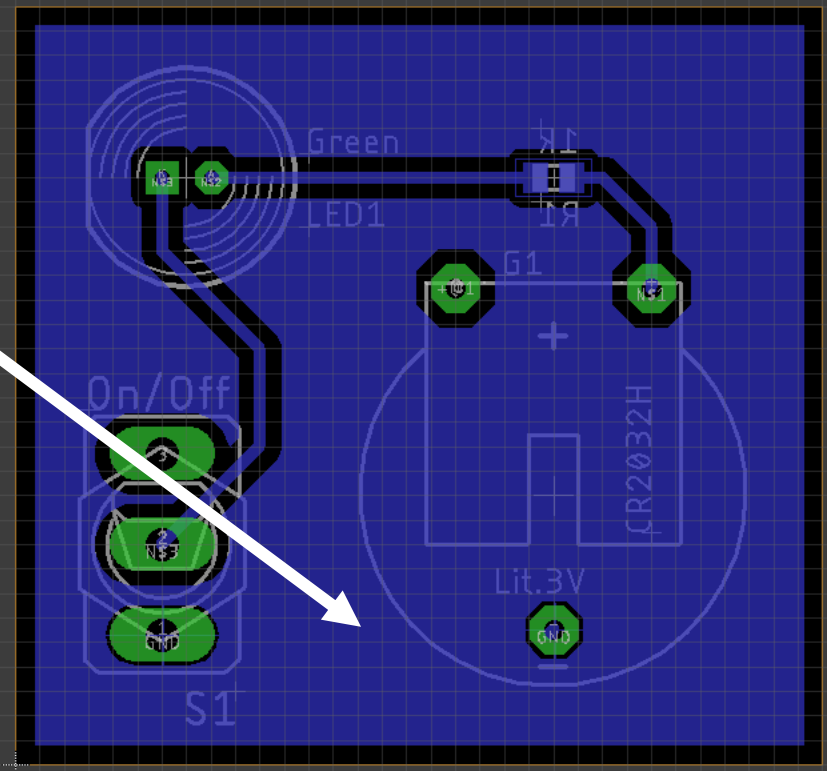
50 mil (-2450 1050)

Split

Notice that the airwire is gone! The polygon connected the net.

This is especially useful if there are many connections to that net.

Isolation is prominent as well.



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Split/bend a line

2 Board - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.brd - EAGLE 9.5.0 education

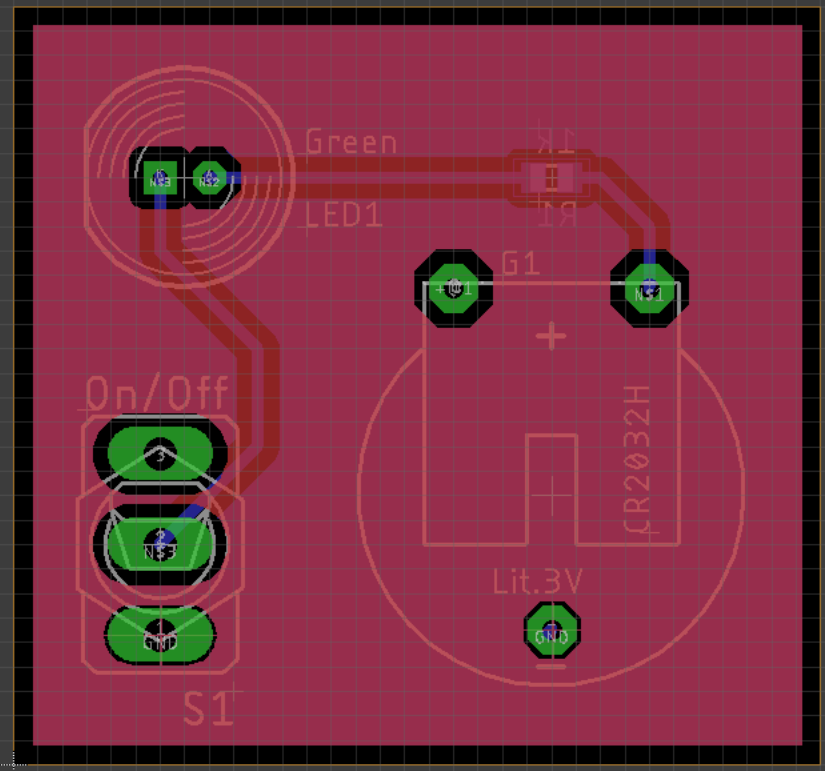
File Edit Draw View Tools Library Options Window Help

Layer: 1 Top Width: 0 Isolate: 32 Spacing: 50 Rank: 1 Radius: 0

50 mil (-550 1150)

We make a second GND polygon on the top layer to reduce stray noise and coupling.

Also helps speed up fabrication.



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Ratsnest: Nothing to do! Left-click to start polygon

2 Board - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.brd - EAGLE 9.5.0 education

File Edit Draw View Tools Library Options Window Help

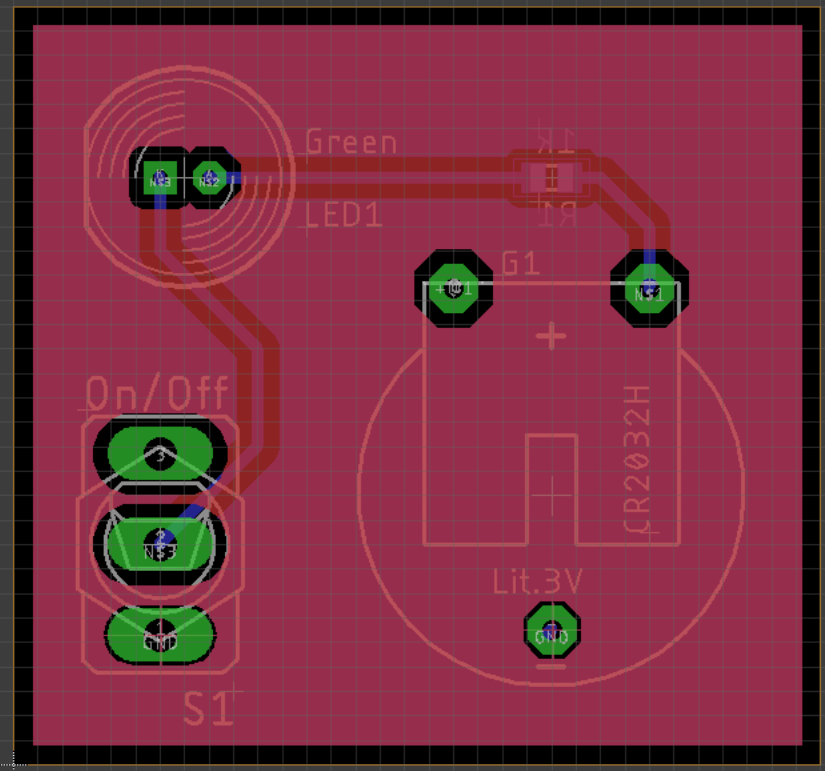
Layer: 1 Top Width: 0 Isolate: 32 Spacing: 50 Rank: 1 Radius: 0

50 mil (-2450 -100)

Last step – Design Rule Check (DRC)

The DRC checks your design against a standard set of fabrication parameters – sizes, spacings, and more.

DRC files (.dru) can be found from fab houses (e.g. OshPark, Advanced Circuits) and other websites (e.g. SparkFun, Adafruit).



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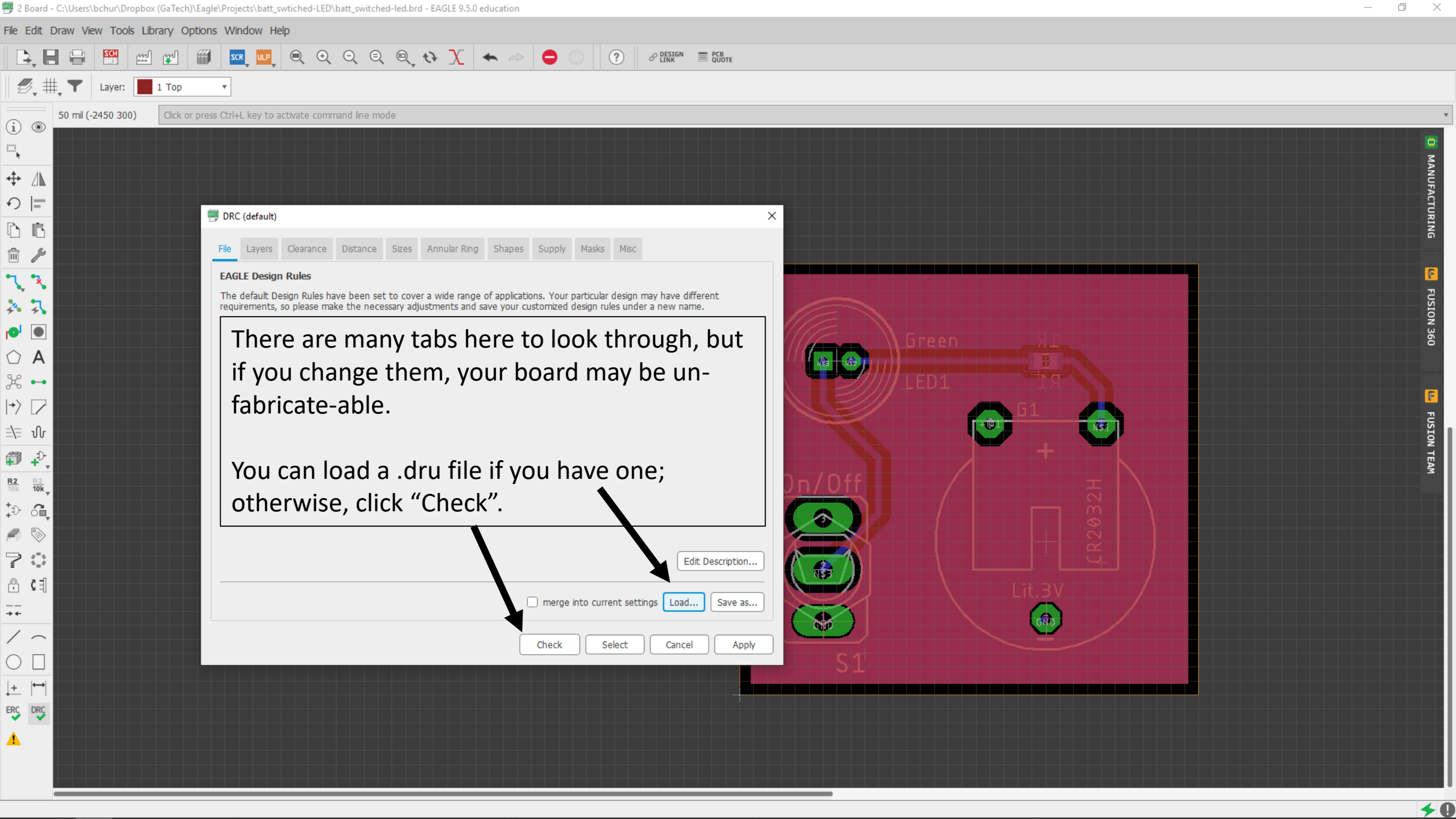
DRC

Design Rule Check


2 Board - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.brd - EAGLE 9.5.0 education
File Edit Draw View Tools Library Options Window Help
Layer: 1 Top
50 mil (-2450 300)
Click or press Ctrl+L key to activate command line mode
DRC (default)
File Layers Clearance Distance Sizes Annular Ring Shapes Supply Masks Misc
EAGLE Design Rules
The default Design Rules have been set to cover a wide range of applications. Your particular design may have different requirements, so please make the necessary adjustments and save your customized design rules under a new name.
There are many tabs here to look through, but if you change them, your board may be un-fabricate-able.
You can load a .dru file if you have one; otherwise, click “Check”.
Edit Description...
merge into current settings
Load...
Save as...
Check
Select
Cancel
Apply
Green
LED1
On/Off
CR2032H
Lit.3V
S1
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File Edit Draw View Tools Library Options Window Help

Layer: 1 Top | Width: 0 | Isolate: 32 | Spacing: 50 | Rank: 1 | Radius: 0

50 mil (-1550 1550) | Click or press Ctrl+L key to activate command line mode

DRC Errors

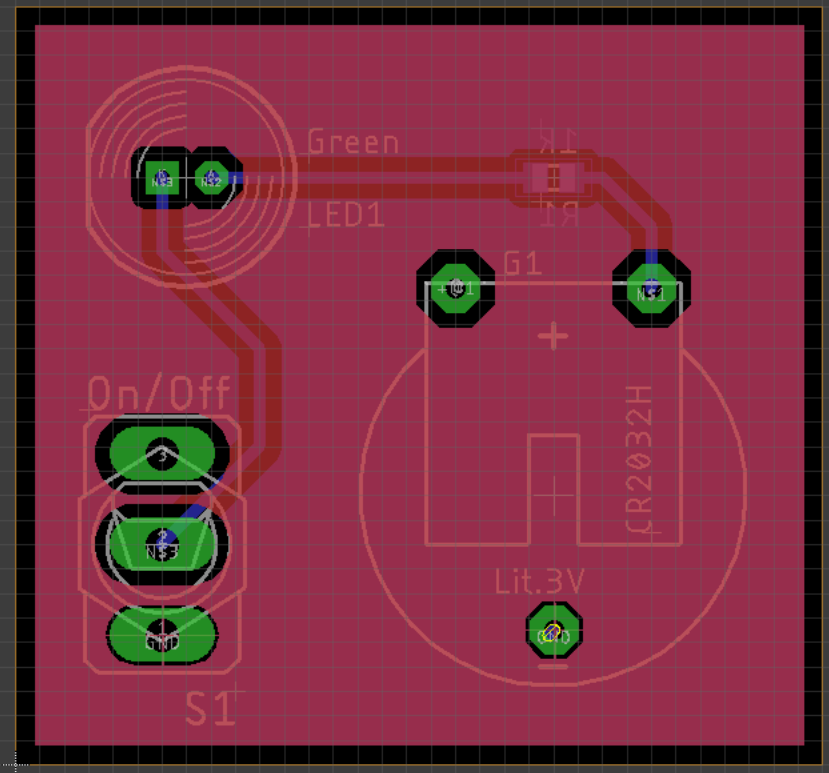
Type | Layer

- Errors (0)
- Warnings (1)
  - Wire Stub (1)
- Approved (0)

Remember: warnings are okay.

Click a warning or an error to zoom into it on the design.

Centered | Clear all | Approve



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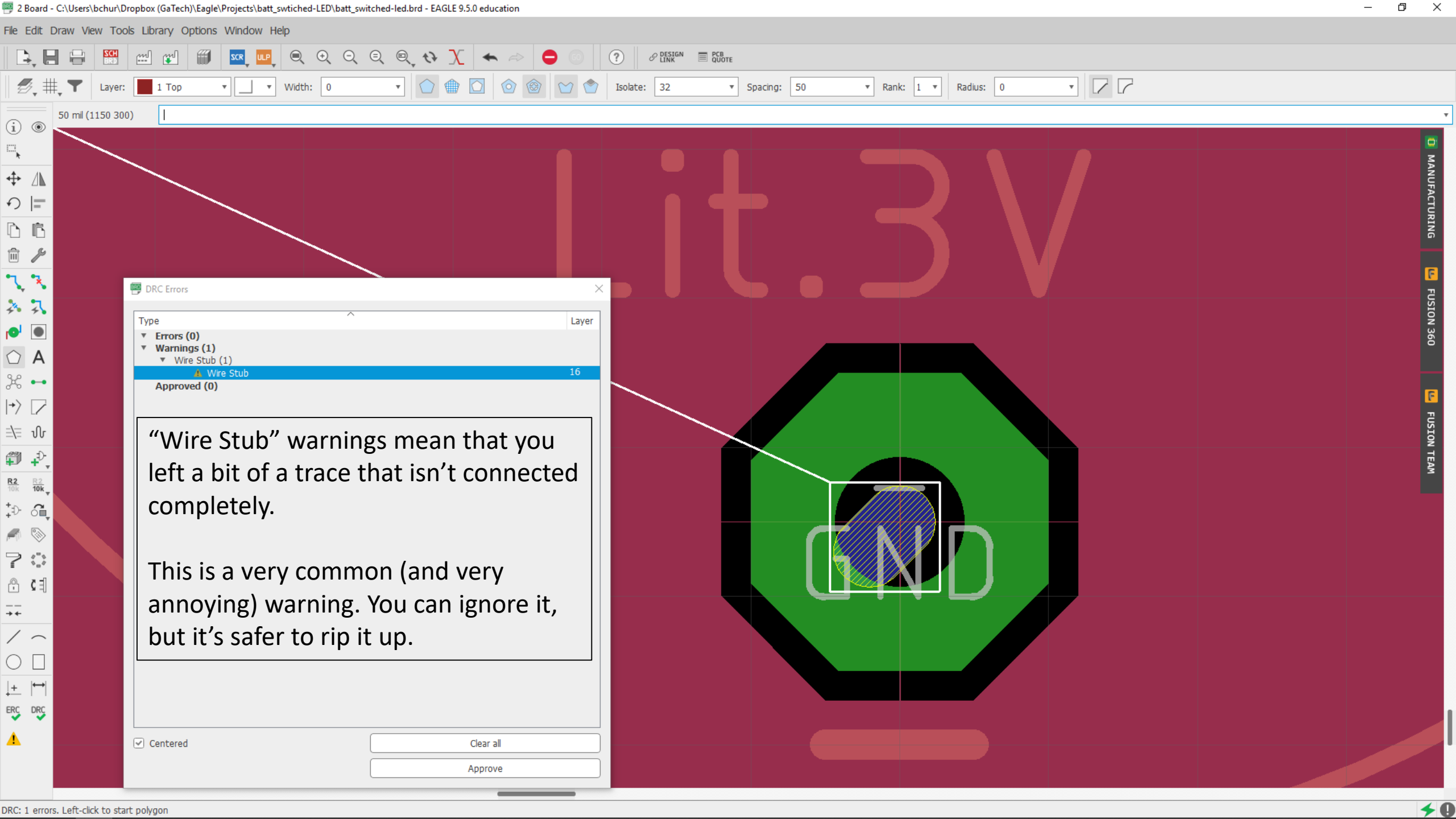
DRC: 1 errors. Left-click to start polygon


2 Board - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.brd - EAGLE 9.5.0 education
File Edit Draw View Tools Library Options Window Help
Layer: 1 Top
Width: 0
Isolate: 32
Spacing: 50
Rank: 1
Radius: 0
50 mil (1150 300)
DRC Errors
Type
Layer
Errors (0)
Warnings (1)
Wire Stub (1)
Wire Stub
16
Approved (0)
“Wire Stub” warnings mean that you left a bit of a trace that isn’t connected completely.
This is a very common (and very annoying) warning. You can ignore it, but it’s safer to rip it up.
Centered
Clear all
Approve
MANUFACTURING
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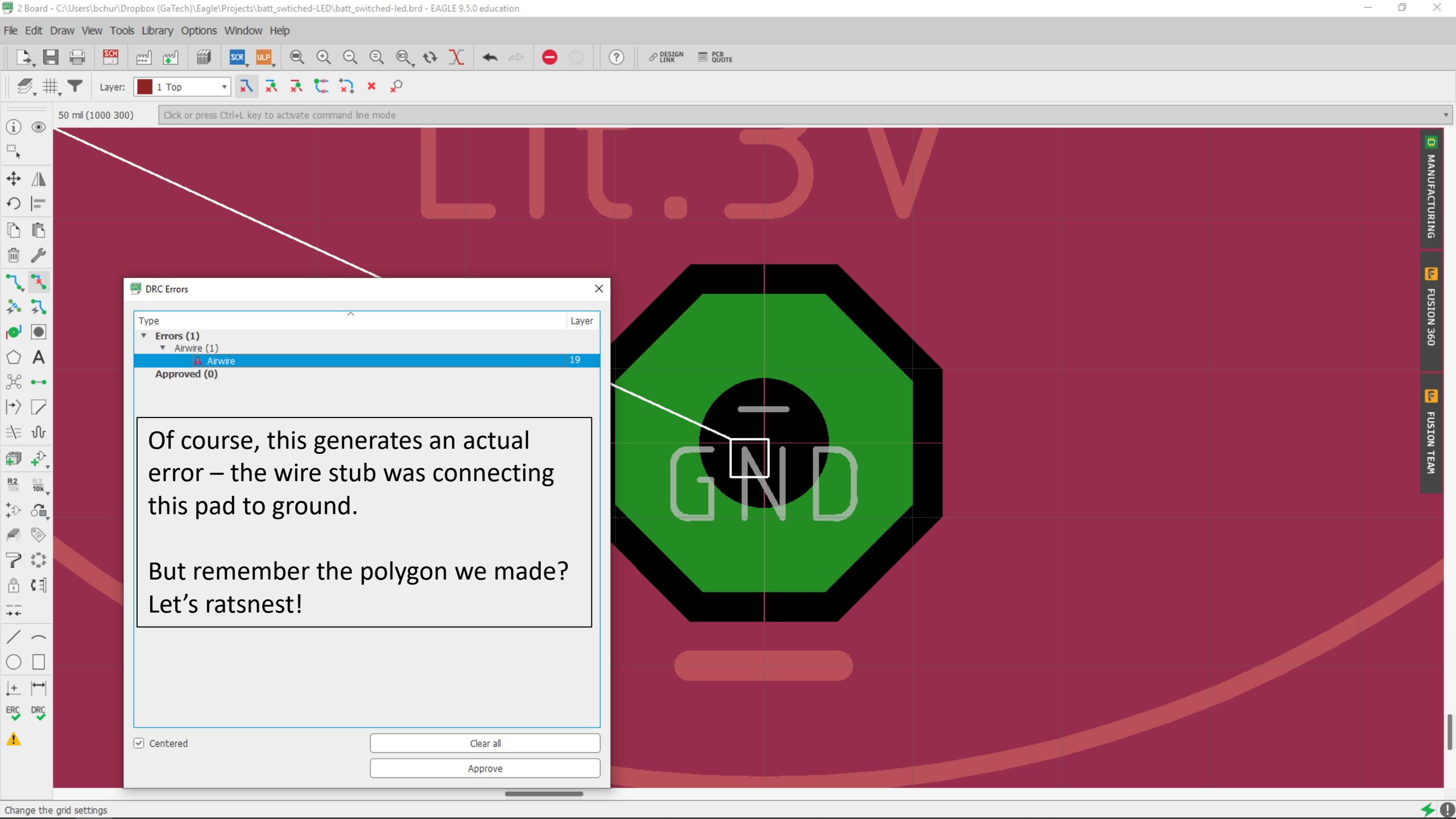
DRC: 1 errors. Left-click to start polygon


2 Board - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.brd - EAGLE 9.5.0 education
File Edit Draw View Tools Library Options Window Help
Layer: 1 Top
50 mil (1000 300)
Click or press Ctrl+L key to activate command line mode
DRC Errors
Type
Layer
Errors (1)
Airwire (1)
Airwire
19
Approved (0)
Of course, this generates an actual error – the wire stub was connecting this pad to ground.
But remember the polygon we made? Let's ratsnest!
Centered
Clear all
Approve
MANUFACTURING
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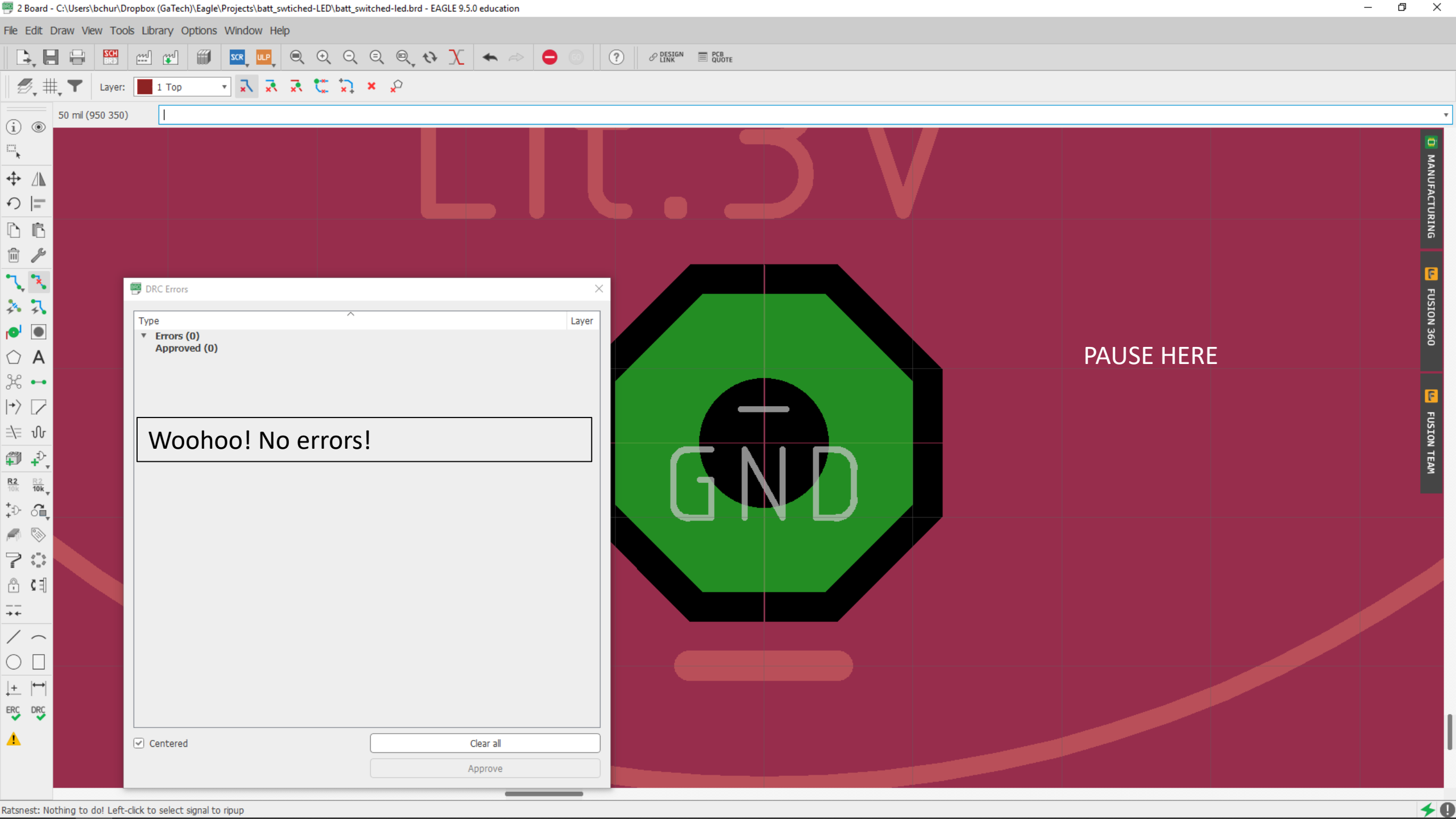
Change the grid settings


2 Board - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.brd - EAGLE 9.5.0 education
File Edit Draw View Tools Library Options Window Help
Layer: 1 Top
50 mil (950 350)
DRC Errors
Type
Layer
Errors (0)
Approved (0)
Woohoo! No errors!
Centered
Clear all
Approve
PAUSE HERE
GND
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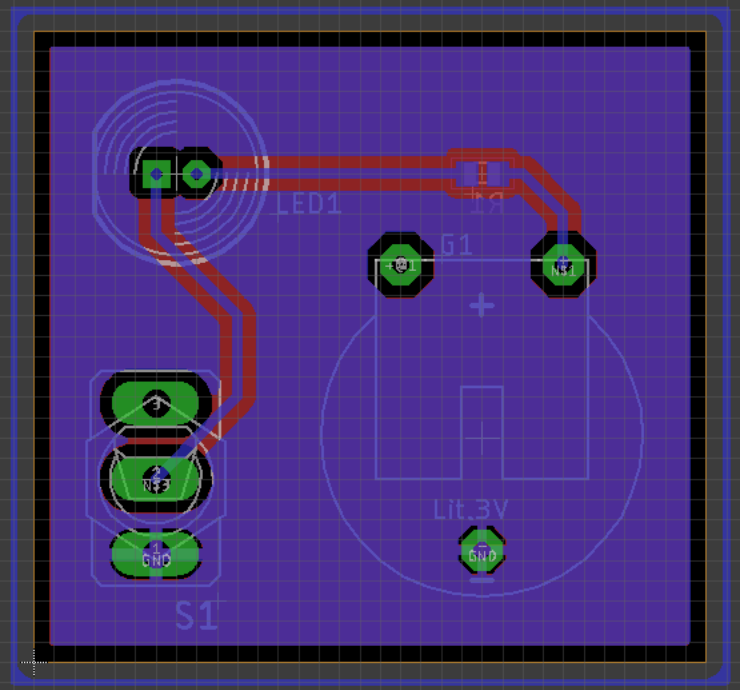
Ratsnest: Nothing to do! Left-click to select signal to ripup

Great, so you're board passed DRC – now what?

If you want to add text, you can do that using the *text tool.*

- Add it to the **tPlace** or **bPlace** layer to make it in silkscreen.
- Add it to another layer to make it in that layer, e.g. **Top** for copper on the top.



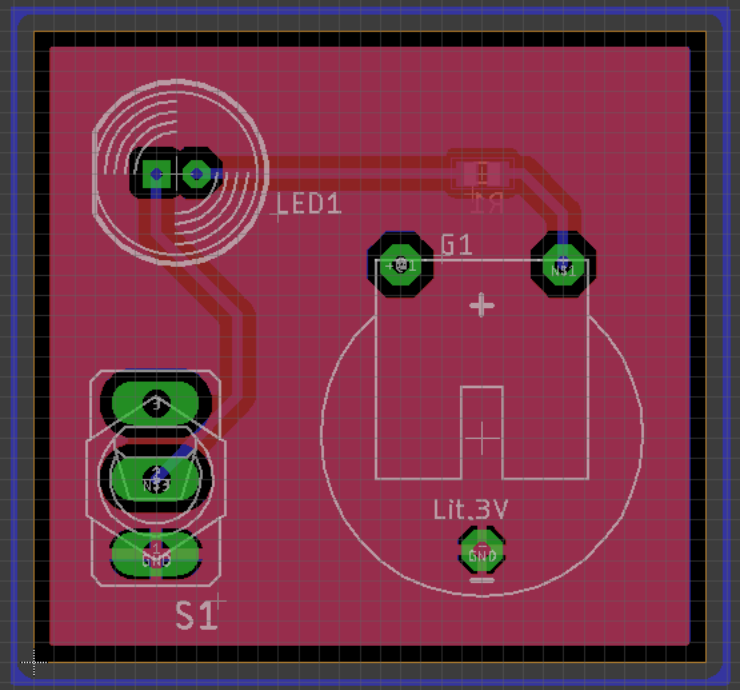
2 Board - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.brd - EAGLE 9.5.0 education

File Edit Draw View Tools Library Options Window Help

Layer: 21 tPlace | Angle: 0 | Size: 70 | Ratio: 8 % | Font: proportional | Align: bottom-left | Line Distance: 50 %

50 mil (-1700 550)

Click or press Ctrl+L key to activate command line mode



Text

Enter text:

Ben's LED board

Shift+Enter to add a new line

OK Cancel

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Type in the text

2 Board - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.brd - EAGLE 9.5.0 education

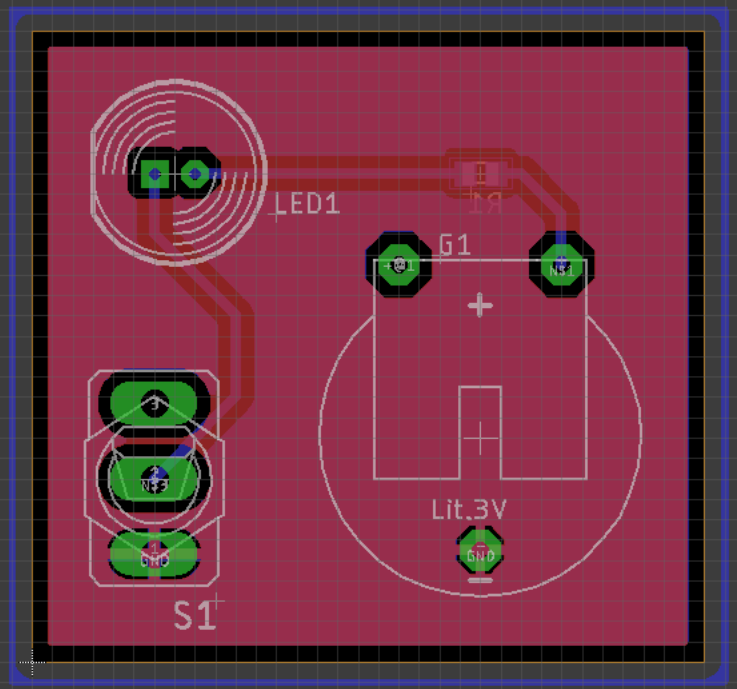
File Edit Draw View Tools Library Options Window Help

Layer: 16 Bottom Angle: 0 Size: 70 Ratio: 8 % Font: proportional Align: bottom-left Line Distance: 50 %

50 mil (-550 800)

Middle click to change layers!

Ben's LED board



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Left-click to place text (or type in new text)

2 Board - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.brd - EAGLE 9.5.0 education

File Edit Draw View Tools Library Options Window Help

Layer: 21 tPlace Angle: 0 Size: 70 Ratio: 8 % Font: proportional Align: bottom-left Line Distance: 50 %

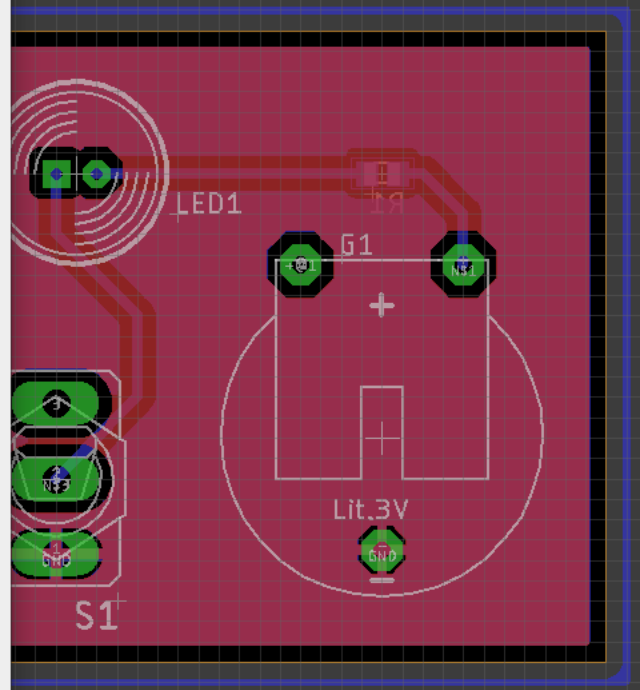
50 mil (-1050 800)

Click or press Ctrl+L key to activate command line mode

Layer

#		Name
1		Top
16		Bottom
17		Pads
18		Vias
19		Unrouted
20		Dimension
21		tPlace
22		bPlace
23		tOrigins
24		bOrigins
25		tNames
26		bNames
27		tValues
28		bValues
29		tStop
30		bStop
31		tCream
32		bCream
33		tFinish
34		bFinish
35		tGlue
36		bGlue
37		tTest
38		bTest
39		tKeepout
40		bKeepout

OK Cancel



MANUFACTURING FUSION 360 FUSION TEAM

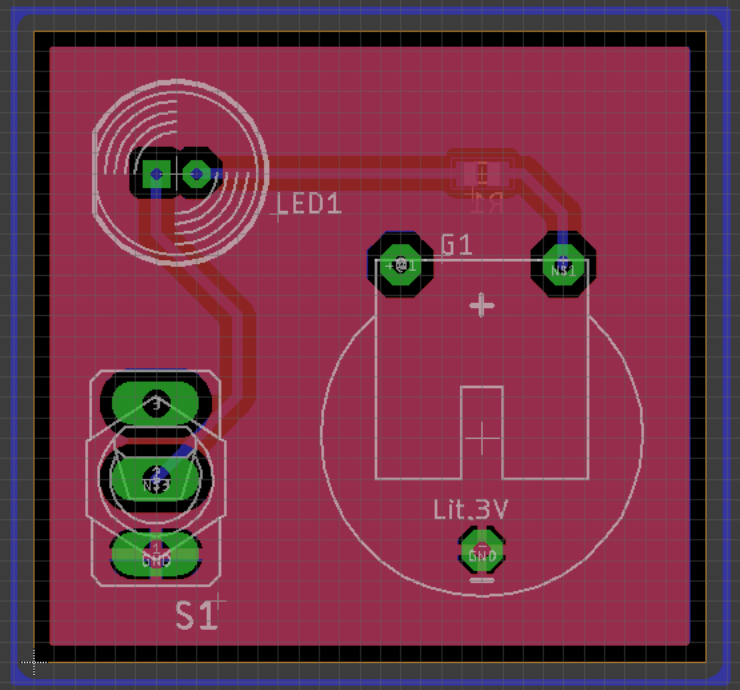
Left-click to place text (or type in new text)

2 Board - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.brd - EAGLE 9.5.0 education

File Edit Draw View Tools Library Options Window Help

Layer: 21 tPlace | Angle: 0 | Size: 70 | Ratio: 8 % | Font: proportional | Align: bottom-left | Line Distance: 50 %

50 mil (-1150 800)



MANUFACTURING
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Left-click to place text (or type in new text)

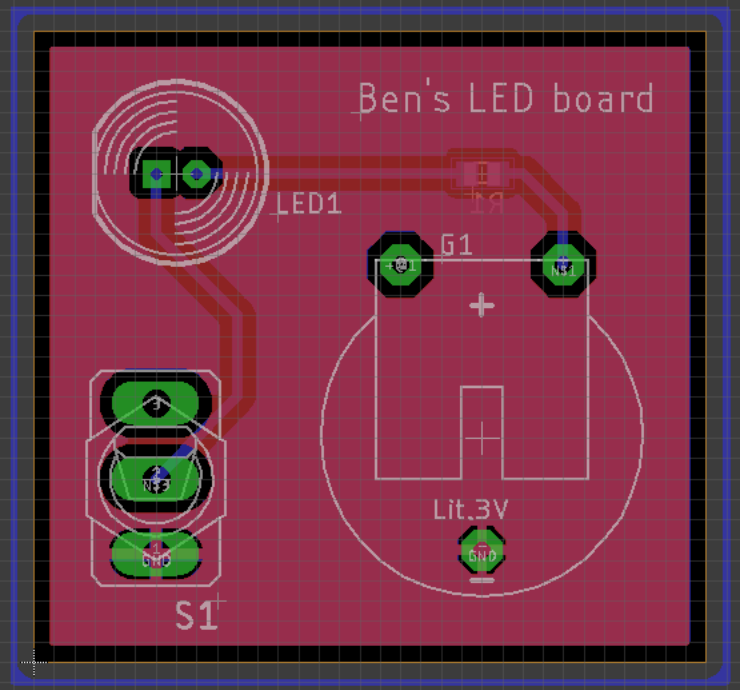
2 Board - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.brd - EAGLE 9.5.0 education

File Edit Draw View Tools Library Options Window Help

Layer: 21 tPlace

50 mil (-556 1539)

Designers will often put their name, the board name and version, and a date (or year).



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Redo: Text (2m ago) Left-click & drag to define group (or left-click to start defining a group polygon)

2 Board - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.brd - EAGLE 9.5.0 education

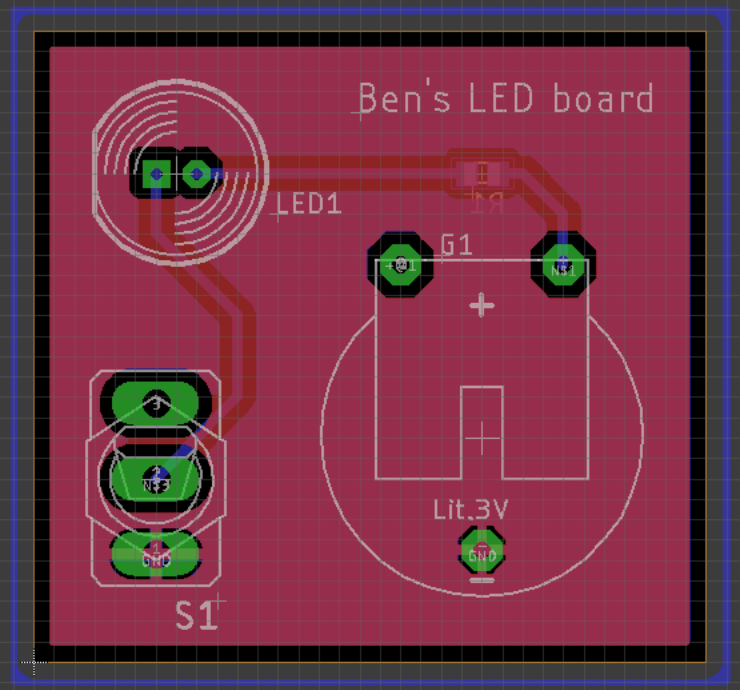
File Edit Draw View Tools Library Options Window Help

Layer: 21 Generate CAM data

50 mil (-1904 2102)

Now that we're completely done, we will generate the Gerber files needed for fabrication.

It's easy! Click the "Generate CAM data" button in the top toolbar.



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Generate CAM data

2 Board - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.brd - EAGLE 9.5.0 education

File Edit Draw View Tools Library Options Window Help

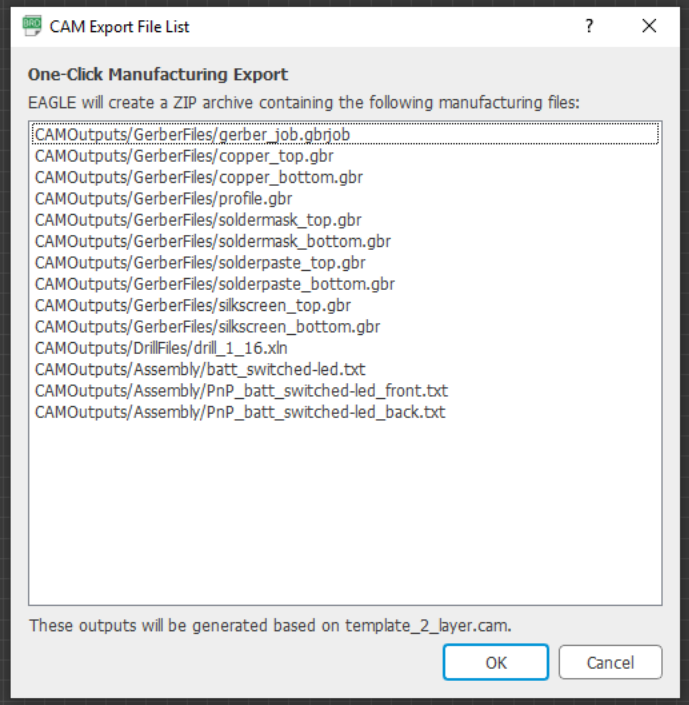
Layer: 21 tPlace

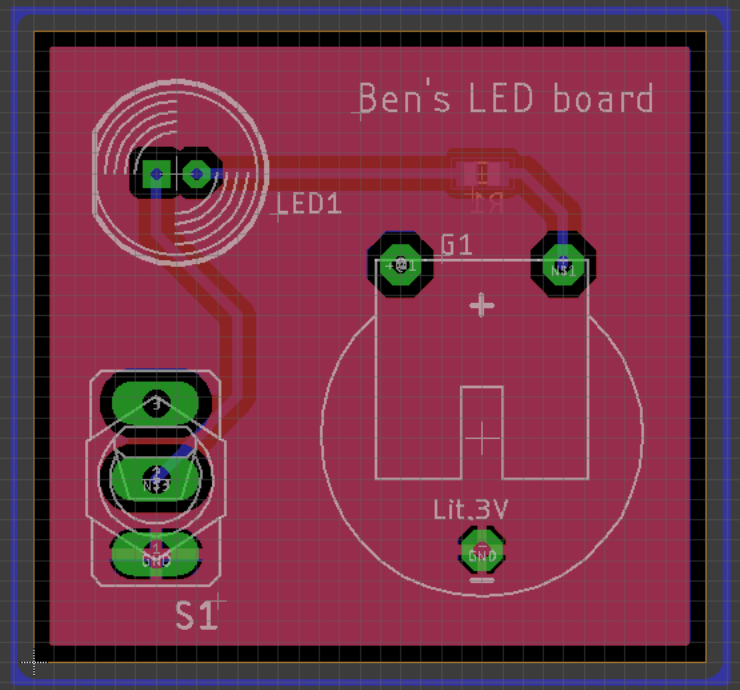
50 mil (-2332 2164)

Click or press Ctrl+L key to activate command line mode

For typical boards, these Gerber and Drill files will be fine.

If you need more complicated Gerbers, you're probably qualified to figure out the CAM processor to generate custom sets of Gerbers.





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'C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.brd' saved.

Congratulations!

You've designed a board, and it's ready for fab!

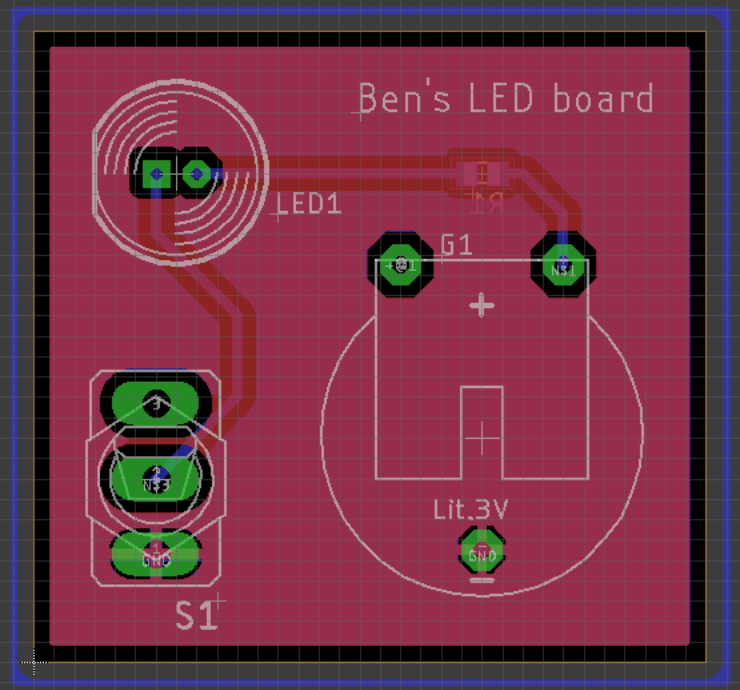
But wait!

Let’s look at this board again….

These footprints… is this the exact set of parts you have?

Probably not – we just selected a random set of components.

In a “real” design, we would have selected the right components from the beginning!



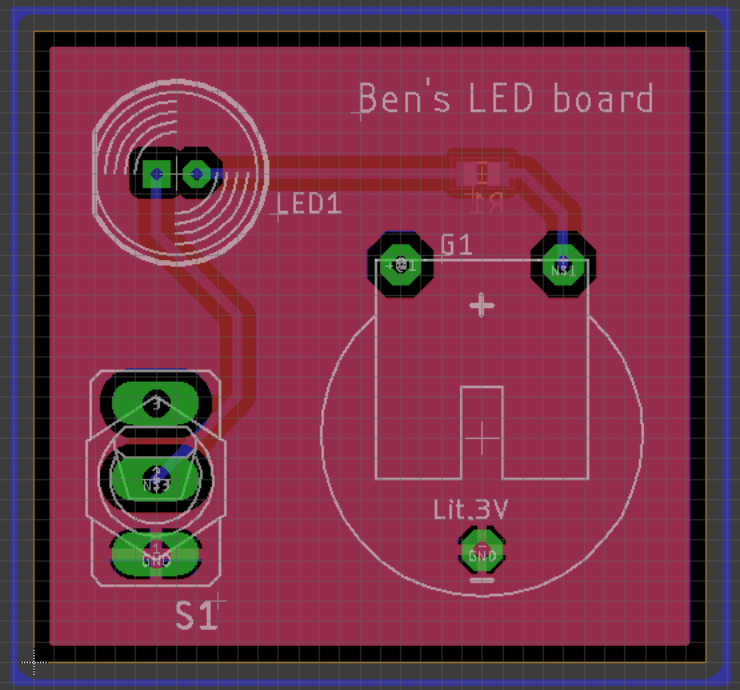
2 Board - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.brd - EAGLE 9.5.0 education

File Edit Draw View Tools Library Options Window Help

Layer: 21 tPlace

50 mil (-2682 678)

So what do we do?



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'C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.brd' saved. Left-click & drag to define group (or left-click to start defining a group polygon)

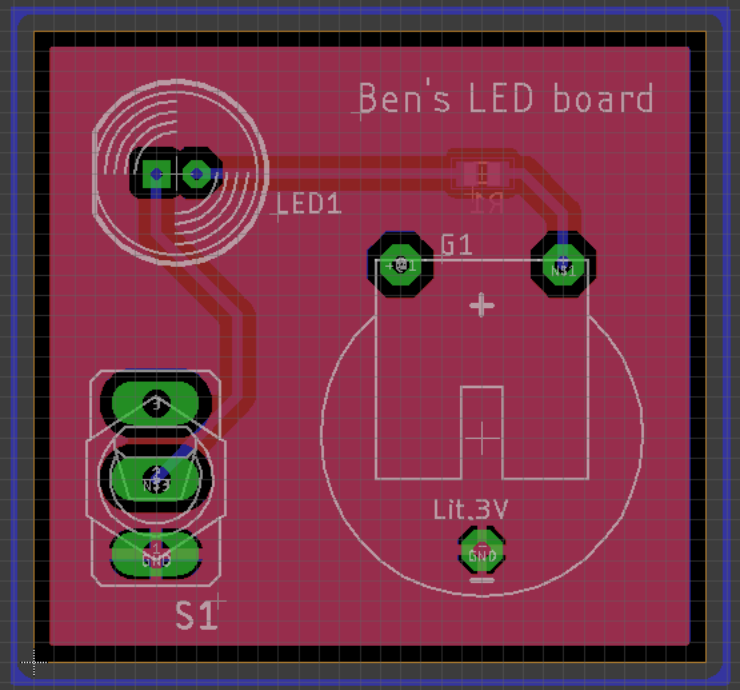
2 Board - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.brd - EAGLE 9.5.0 education

File Edit Draw View Tools Library Options Window Help

Layer: 21 tPlace

50 mil (-2682 678)

The resistor we have – the 0805 package is very standard for passives and LEDs.



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'C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.brd' saved. Left-click & drag to define group (or left-click to start defining a group polygon)

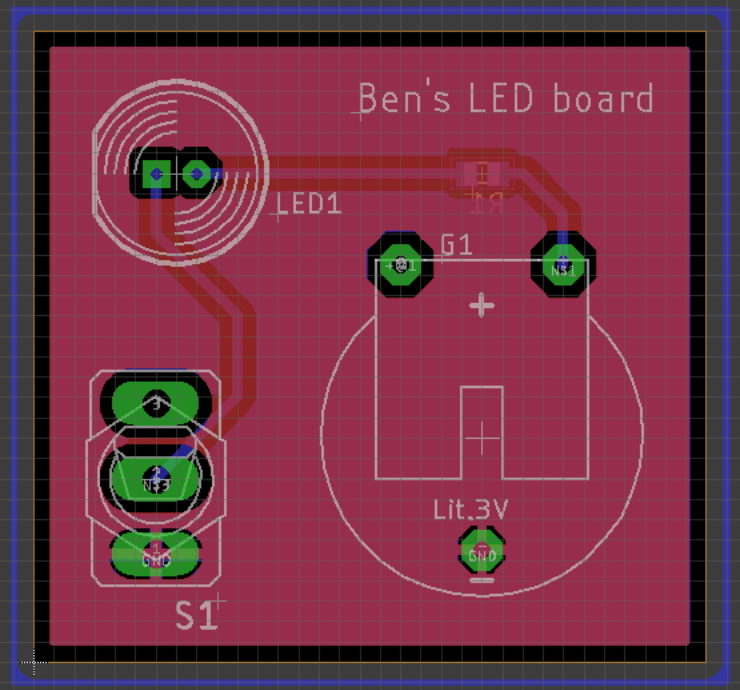
2 Board - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.brd - EAGLE 9.5.0 education

File Edit Draw View Tools Library Options Window Help

Layer: 21 tPlace

50 mil (-2682 678)

The LED is close – The Hive carries 5mm LEDs, not the 10mm I selected here.



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'C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.brd' saved. Left-click & drag to define group (or left-click to start defining a group polygon)

2 Board - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.brd - EAGLE 9.5.0 education

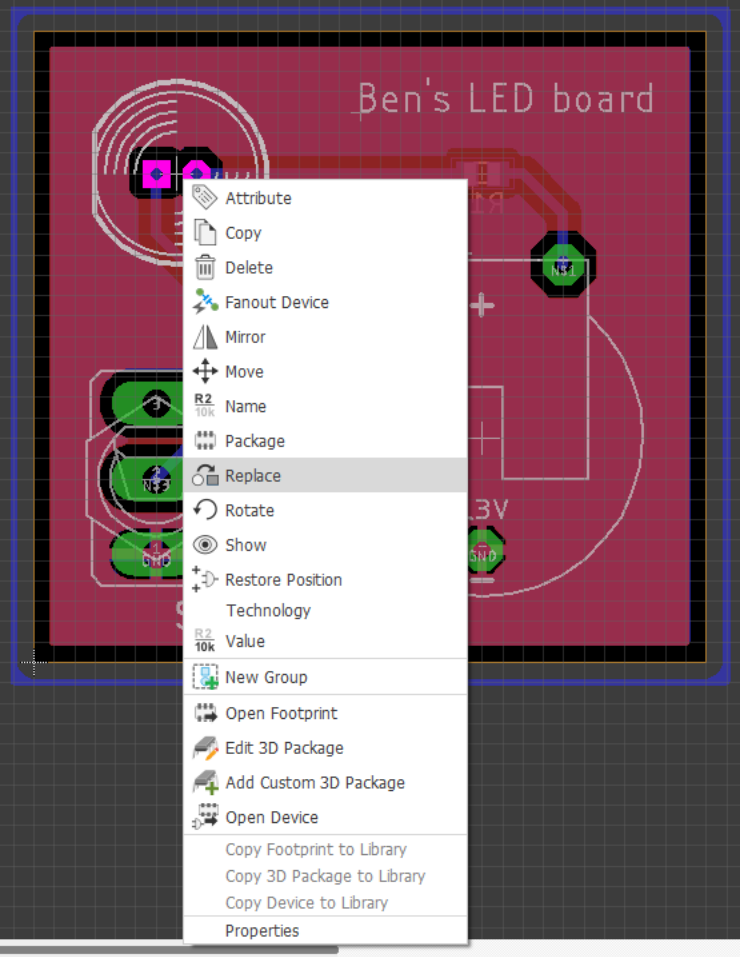
File Edit Draw View Tools Library Options Window Help

Layer: 21 tPlace

50 mil (366 1185)

Click or press Ctrl+L key to activate command line mode

Right click the LED to bring up the context menu, and select *Replace*.



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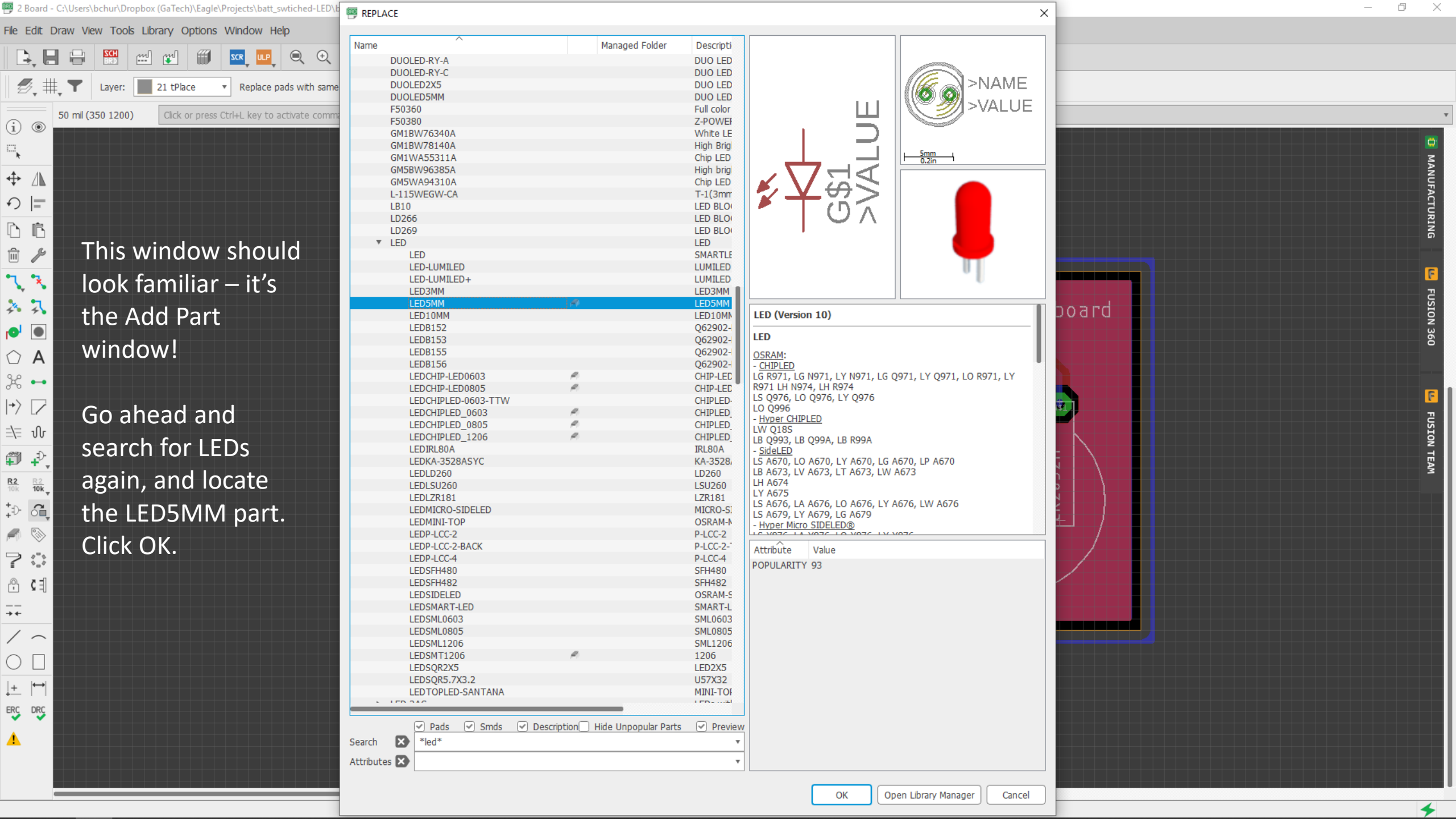
Element: LED1, LED10MM, led, Value: Green Left-click & drag to define group (or left-click to start defining a group polygon)

This window should look familiar – it's the Add Part window!

Go ahead and search for LEDs again, and locate the LED5MM part. Click OK.



2 Board - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.brd - EAGLE 9.5.0 education

File Edit Draw View Tools Library Options Window Help

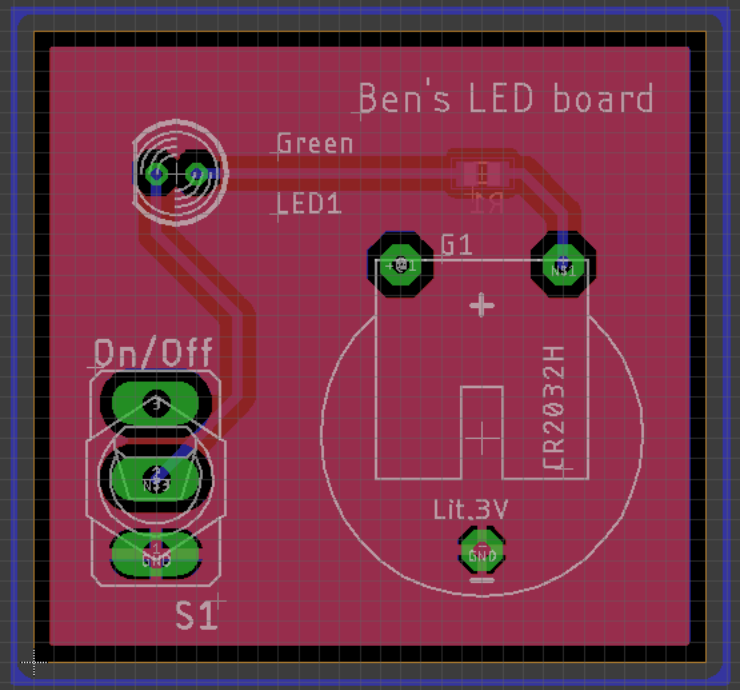
Layer: 21 tPlace

50 mil (-1423 1588)

Voilà! The 5mm LED is inserted!
Ratsnest to clean up the spacing.

Note: this replacement only works when the two parts have the same pin and pad names!

Thus, it's typically easier to actually go back to the schematic to change parts.



MANUFACTURING
FUSION 360
FUSION TEAM

Ratsnest: Nothing to do! Left-click & drag to define group (or left-click to start defining a group polygon)

The switch is similar, though finding the part is not as obvious – it's called "255SB", which you can find by searching *sliding switch*.

If you're planning to use a different switch, by all means, find that one instead.

How do I know this? Simple – I found the switch before I designed the board.

This is good practice. Know the parts you're using before fabbing.

2 Board - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.brd - EAGLE 9.5.0 education

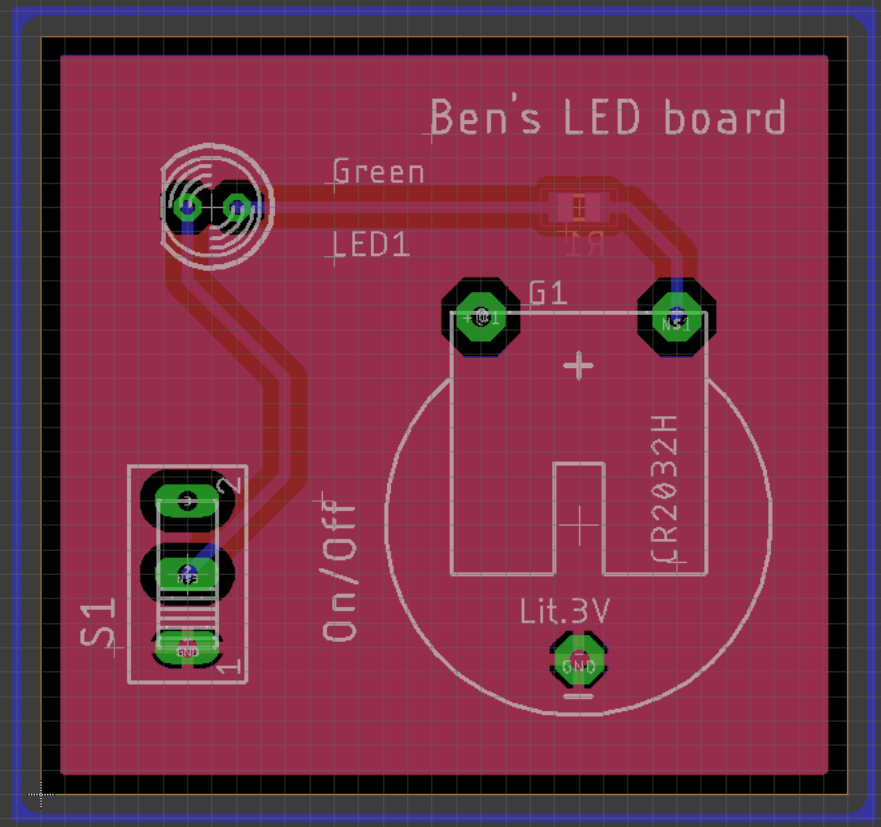
File Edit Draw View Tools Library Options Window Help

Layer: 21 tPlace Angle: 0

50 mil (-1450 350)

You'll probably have to rotate the new part, or move it around, and then re-ratsnest, to get it back to DRC-shape.

Run the DRC again. It should tell you "DRC: No errors." in the lower left corner of the window.



MANUFACTURING FUSION 360 FUSION TEAM

DRC: No errors. Left-click to select object to move (Ctrl+right-click to move group)

2 Board - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED\batt_switched-led.brd - EAGLE 9.5.0 education

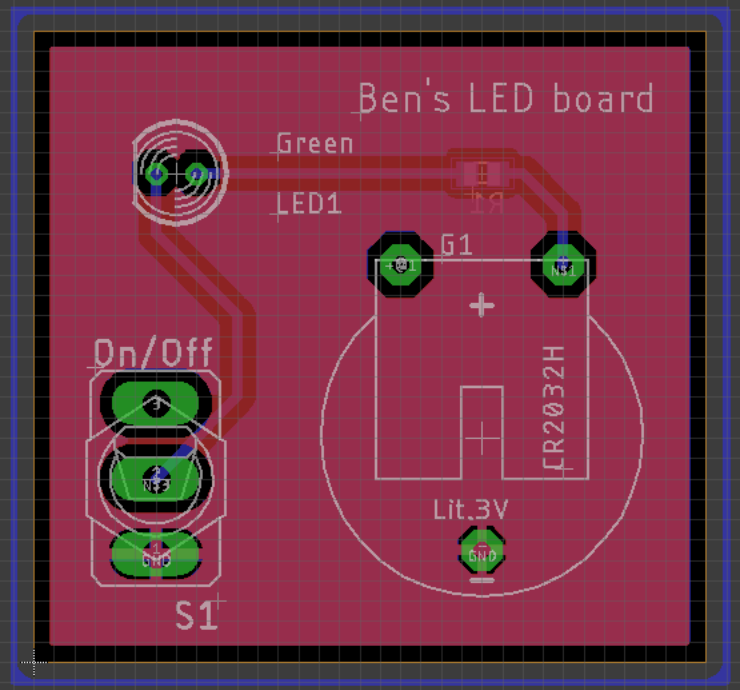
File Edit Draw View Tools Library Options Window Help

Layer: 21 tPlace

50 mil (-1423 1588)

The battery holder is trickier because EAGLE's default libraries do not have the correct parts.

So we must create our own.



MANUFACTURING
FUSION 360
FUSION TEAM

Ratsnest: Nothing to do! Left-click & drag to define group (or left-click to start defining a group polygon)

To do that, we’re going back

Way back to the beginning.

Control Panel - EAGLE 9.5.0 education

File View Options Window Help

New
Open
Open recent projects
Save all
Close project
Exit Alt+X

Project
Schematic
Board
Library
Design Block
CAM Job
ULP
Script
Text

Description

SPICE Models — User SPICE Models
Projects

Remember this window?

Go to File > New > Library.

Libraries are the structures that EAGLE uses to hold parts that you generate.

You can have as many as you'd like, divided however you want. Common ways are by manufacturer, part type, or project.

Home Preview

Ben Hurwitz

Recent Files

nameTag.brd
switchBoard_revB_single.sch
switchBoard_revB_single.brd
eagle-class.sch

Recently Generated 3D Files

Your recent generated 3d files will be visible here.

What's New in Eagle 9.5.0

Shared Managed Libraries
Sharing Managed Libraries. Invite members to collaborate, share and edit content on your Managed Folder.

Read more

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What's New in Autodesk EAGLE 9.5 Read more
What's New in Autodesk EAGLE 9.5 Hi Everyone and welcome back for those of you that have...

How does ground work in electronics? Read more
Few topics in electronics have produced as much misinformation and

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Learn how to quickly start designing with our product tutorials and resources in our Learning Center. Or if you're having a specific issue, ask our experts on the forum!

Learning Center >

Upcoming Webinars

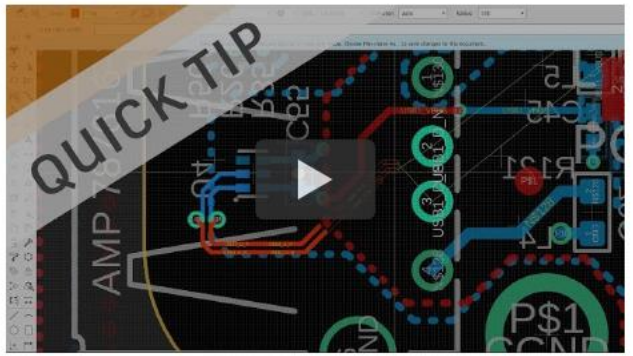
Signal Quality Part 2: Physical Basis of Inductance and Capacitance
Tue Sep 17 2019 02:00 PM Register

Electromechanical Workflow: Component Placement
Thu Sep 19 2019 02:00 PM Register

30 EAGLE QUICK TIPS in 30 Minutes
Tue Sep 24 2019 02:00 PM Register

See previous webinars

Quick Tips & Tricks



Differential Pair Routing mode in EAGLE 9.4!
See your Differential Pairs in highlight for easy viewing and leverage the power of Walkaround and Push/Shove Obstacle Avoidance in

3 C:\Users\bchur\Documents\EAGLE\libraries\untitled.lbr - EAGLE 9.5.0 education

File Edit Draw View Library Options Window Help

Layer: 16 Bottom

Device | Footprint | 3D Package | Symbol

Each part consists of (up to) four parts:

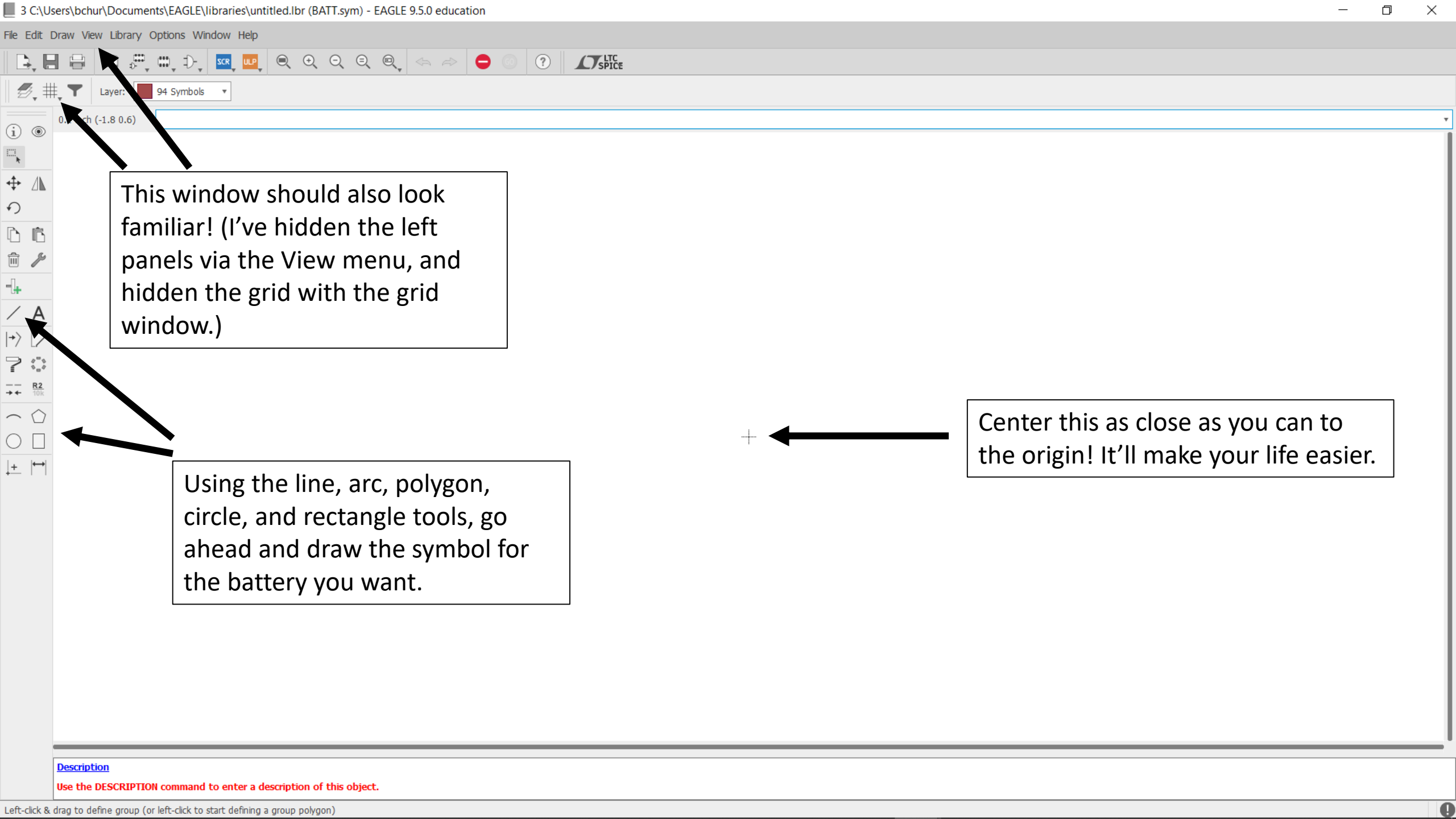
1. The *symbol* is the schematic icon.
2. The *3D package* is the 3D representation of the package.
3. The *footprint* is the layout of the part in real space, and is associated with a 3D package
4. The *device* is the completed part that associates a symbol with one or more footprints and 3D packages.

Typically, one starts by creating a symbol, so let's do that. Click "Add Symbol". Give the symbol a name in the ensuing popup – maybe "battery" or "CR2032 holder".

Package | Variant

Add Device... | Add Footprint... | Import 3D Package | Add Symbol...

Left-click & drag to define group (or left-click to start defining a group polygon)


3 C:\Users\bchur\Documents\EAGLE\libraries\untitled.lbr (BATT.sym) - EAGLE 9.5.0 education
File Edit Draw View Library Options Window Help
Layer: 94 Symbols
This window should also look familiar! (I've hidden the left panels via the View menu, and hidden the grid with the grid window.)
Using the line, arc, polygon, circle, and rectangle tools, go ahead and draw the symbol for the battery you want.
Center this as close as you can to the origin! It'll make your life easier.
Description
Use the DESCRIPTION command to enter a description of this object.
Left-click & drag to define group (or left-click to start defining a group polygon)

3 C:\Users\bchur\Documents\EAGLE\libraries\untitled.lbr (BATT.sym) - EAGLE 9.5.0 education

File Edit Draw View Library Options Window Help

Layer: 94 Symbols Width: 0.01 Style: continuous Radius: 0

0.1 inch (-0.7 0.4)

Now we must add pins.

These are what the nets/wires connect to.

Notice how I centered mine.

Description

Use the DESCRIPTION command to enter a description of this object.

Left-click to start line

3 C:\Users\bchur\Documents\EAGLE\libraries\untitled.lbr (BATT.sym) - EAGLE 9.5.0 education

File Edit Draw View Library Options Window Help

Layer: 94 Symbols

Direction: io Swaplevel: 0

0.1 inch (-0.5 0.1)

Pins have a few parameters that can be set in the top toolbar:

1. Rotation (right click)
2. Type (clock, inverted)
3. Length of pin
4. Display (pin name and/or pad name)
5. Direction (e.g. IO, pwr, gnd)

Most of these you don't have to set, though Length and Display are nice. (I will set Display to Pad Name only because this isn't an IC)

This is a pin. The net will connect to the circle side.

Description

Use the DESCRIPTION command to enter a description of this object.

Undo: Pin (6s ago) Left-click to place pin

3 C:\Users\bchur\Documents\EAGLE\libraries\untitled.lbr (BATT.sym) - EAGLE 9.5.0 education

File Edit Draw View Library Options Window Help

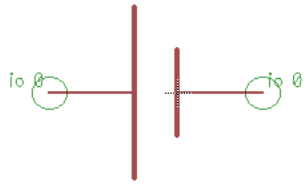
Layer: 94 Symbols

0.1 inch (-2.9 0.2)

Use the *name* tool to give your pins names so you can find them later.

Here, I recommend something like POS and NEG, but in an IC, the names come from the datasheet.

Name



Description

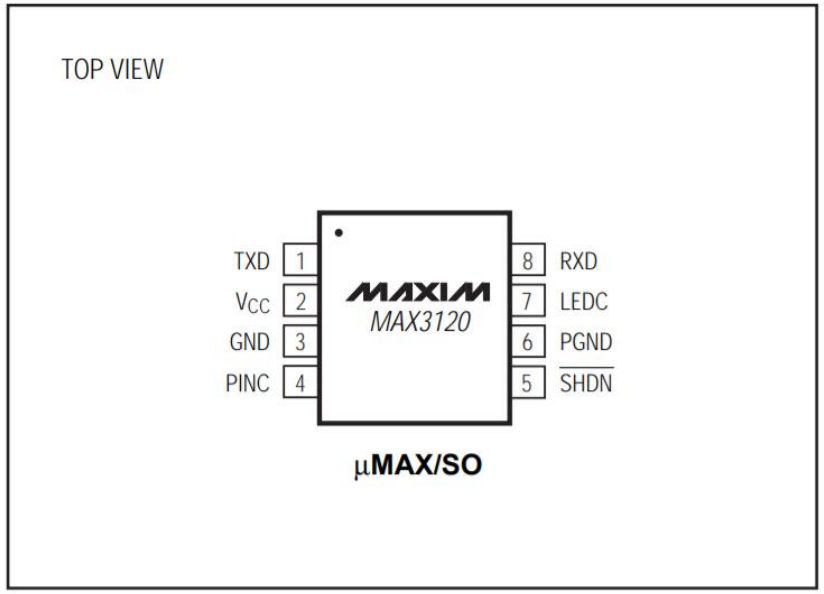
Use the DESCRIPTION command to enter a description of this object.

Define the name of an object

Here's an example of an IC with pin names and numbers from a datasheet.

Not all datasheets will look like this, but all IC datasheets will have this information.

Pin Configuration



Pin Description

PIN	NAME	FUNCTION
1	TXD	IR Transmitter TTL/CMOS Data Input. High = LED on.
2	V_{CC}	Supply Voltage
3	GND	Ground. Connect anode of PIN diode to GND. Connect GND to PGND.
4	PINC	PIN Diode Cathode Input. Connect cathode of PIN diode to PINC.
5	$\overline{SHDN}$	Shutdown Input. Active low.
6	PGND	Power Ground. Ground for IR LED driver. Connect PGND to GND.
7	LEDC	LED Driver Output. Connect cathode of IR-emitting LED to LEDC.
8	RXD	IR Receiver TTL/CMOS Data Output. Pulses low for IR input pulse.

3 C:\Users\bchur\Documents\EAGLE\libraries\untitled.lbr (BATT.sym) - EAGLE 9.5.0 education

File Edit Draw View Library Options Window Help

Layer: 94 Symbols

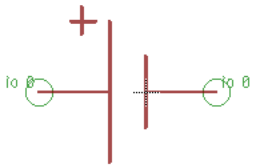
0.1 inch (-3.3 0.7)

Once you're satisfied with your symbol and have named your pins, you need to add two very special bits of text.

Open the *text* tool.

Text

Notice the little (+) indicator I added for visual reference.



Description

Use the DESCRIPTION command to enter a description of this object.

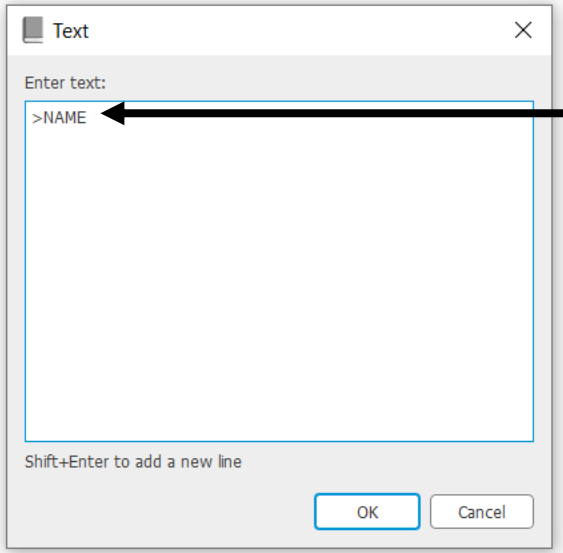
Draw a text

3 C:\Users\bchur\Documents\EAGLE\libraries\untitled.lbr (BATT.sym) - EAGLE 9.5.0 education

File Edit Draw View Library Options Window Help

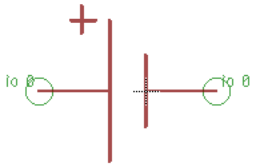
Layer: 94 Symbols | Size: 0.07 | Ratio: 8 % | Font: proportional | Align: bottom-left | Line Distance: 50 %

0.1 inch (-3.3 0.6) | Click or press Ctrl+L key to activate command line mode



This must be “>NAME” (capitals, no quotes).

This is the “Name” field. This will auto-populate in the schematic with the part name.



Description

Use the DESCRIPTION command to enter a description of this object.

3 C:\Users\bchur\Documents\EAGLE\libraries\untitled.lbr (BATT.sym) - EAGLE 9.5.0 education

File Edit Draw View Library Options Window Help

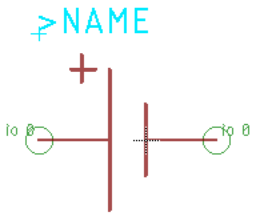
Layer: 94 Symbols | Size: 0.07 | Ratio: 8 % | Font: proportional | Align: bottom-left | Line Distance: 50 %

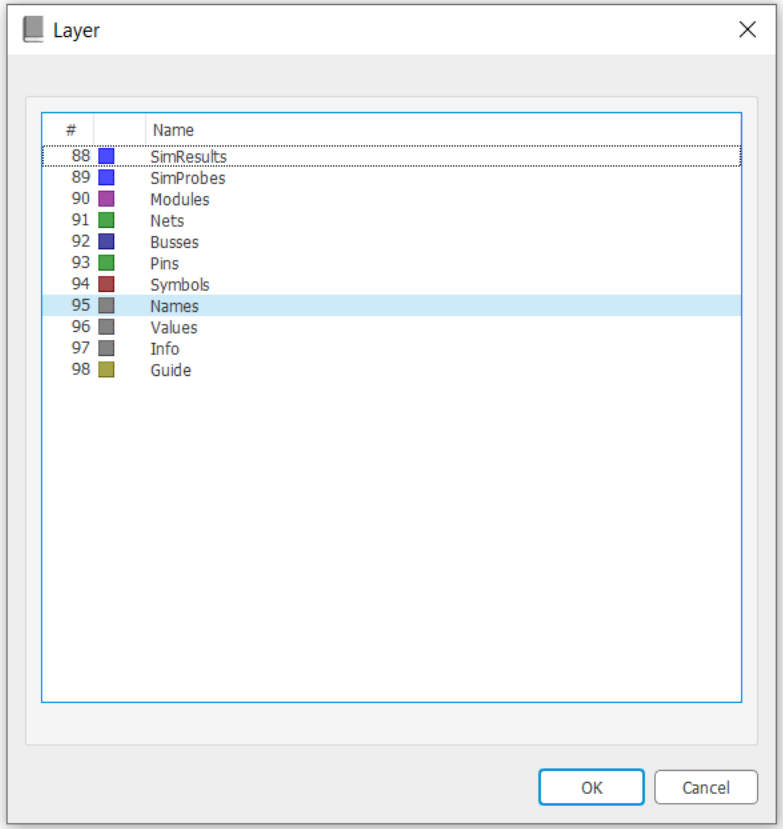
0.1 inch (-0.3 0.3) | Click or press Ctrl+L key to activate command line mode

Middle click to change the layer to the "Names" layer.

Add this to the symbol nearby.

Repeat with ">VALUE" on the "Values" layer. This will auto-populate with the part's assigned value.





Description

Use the DESCRIPTION command to enter a description of this object.

Left-click to place text (or type in new text)

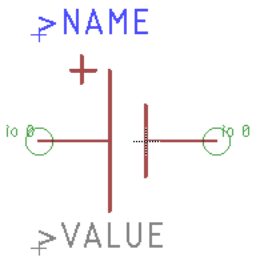
3 C:\Users\bchur\Documents\EAGLE\libraries\untitled.lbr (BATT.sym) - EAGLE 9.5.0 education

File Edit Draw View Library Options Window Help

Layer: 96 Values

0.1 inch (-1.9 1.0)

The finished symbol! That was easy.



Description

Use the DESCRIPTION command to enter a description of this object.

Left-click & drag to define group (or left-click to start defining a group polygon)

3 C:\Users\bchur\Documents\EAGLE\libraries\untitled.lbr (BATT.sym) - EAGLE 9.5.0 education

File Edit Draw View Library Options Window Help

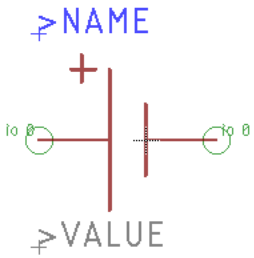
Layer: Footprint

0.1 inch (-0.6 1.6)

Now we need to make the footprint.

Click the “Footprint” button in the top toolbar.

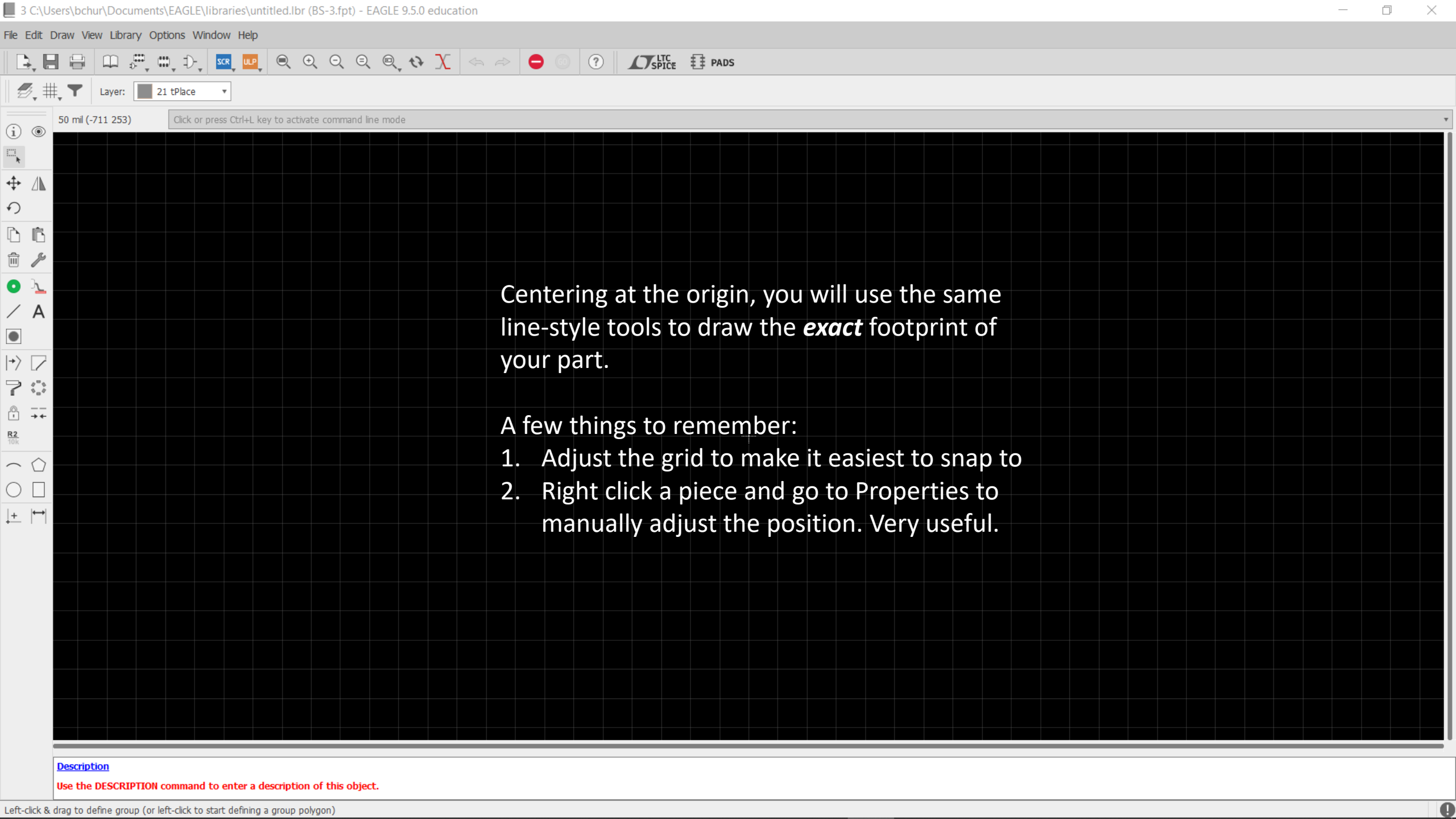
Call it “BS-3”.

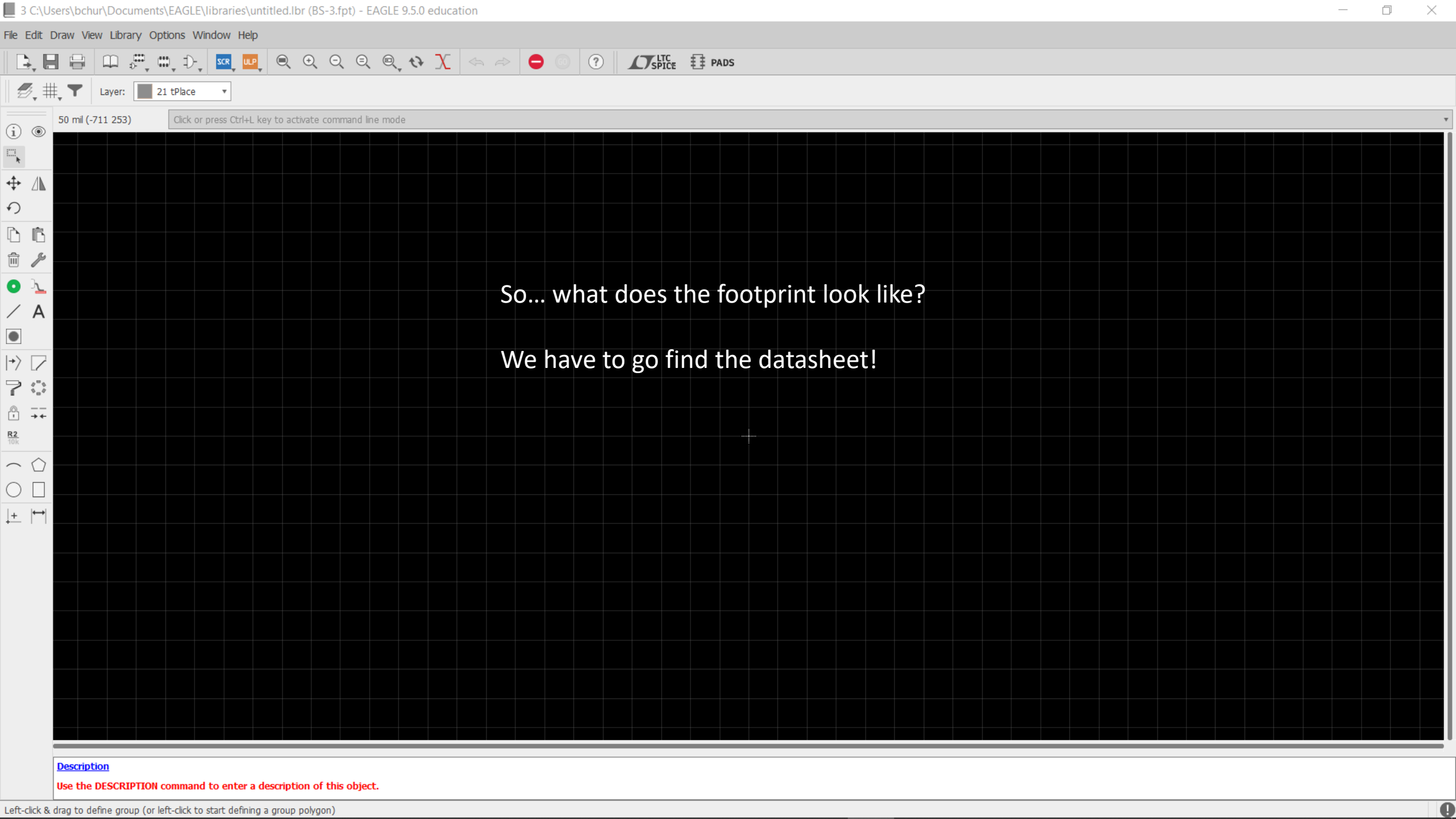


Description

Use the DESCRIPTION command to enter a description of this object.

Edit a package

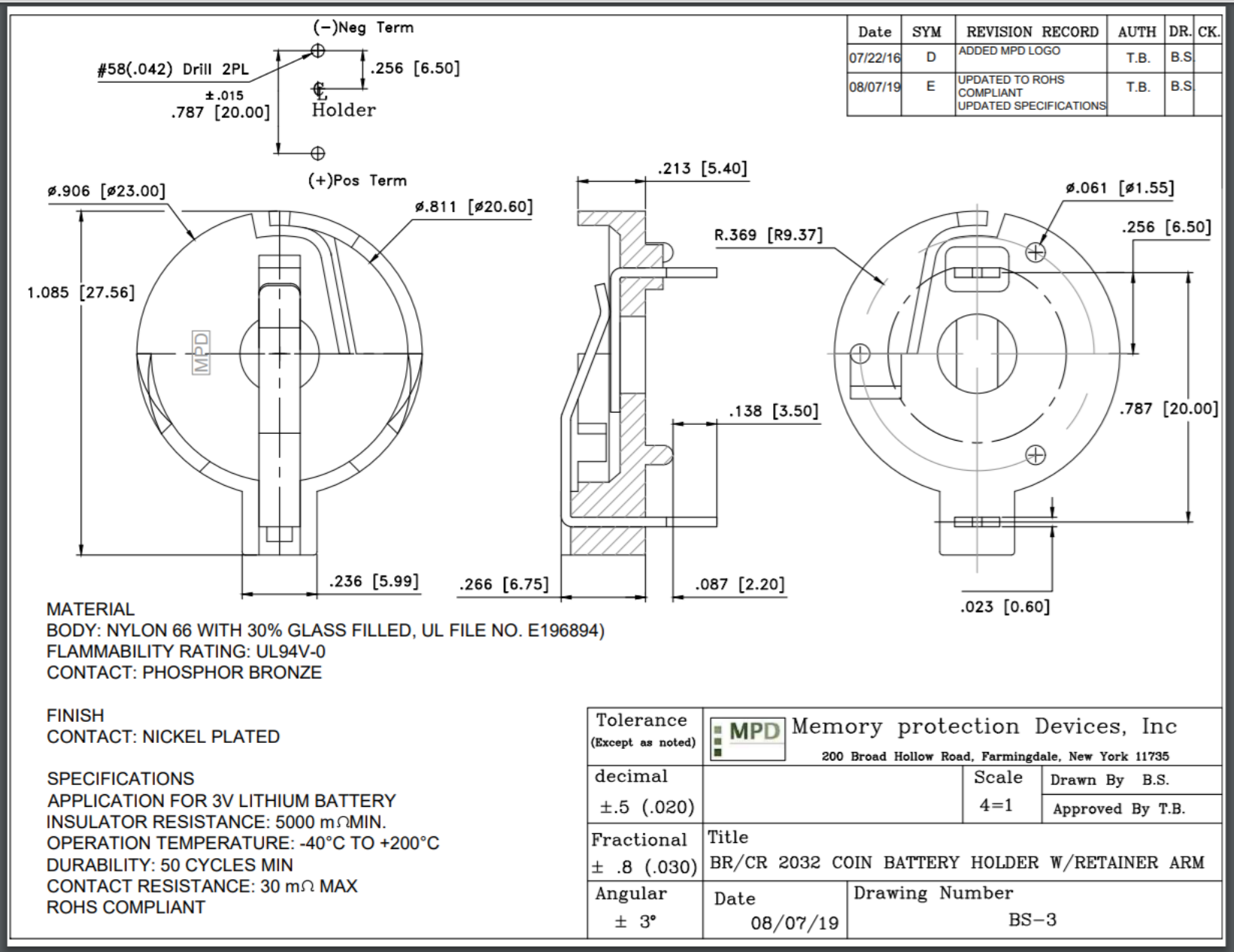

3 C:\Users\bchur\Documents\EAGLE\libraries\untitled.lbr (BS-3.fpt) - EAGLE 9.5.0 education
File Edit Draw View Library Options Window Help
Layer: 21 tPlace
50 mil (-711 253)
Click or press Ctrl+L key to activate command line mode
Centering at the origin, you will use the same line-style tools to draw the *exact* footprint of your part.
A few things to remember:
1. Adjust the grid to make it easiest to snap to
2. Right click a piece and go to Properties to manually adjust the position. Very useful.
Description
Use the DESCRIPTION command to enter a description of this object.
Left-click & drag to define group (or left-click to start defining a group polygon)


3 C:\Users\bchur\Documents\EAGLE\libraries\untitled.lbr (BS-3.fpt) - EAGLE 9.5.0 education
File Edit Draw View Library Options Window Help
Layer: 21 tPlace
50 mil (-711 253)
Click or press Ctrl+L key to activate command line mode
So… what does the footprint look like?
We have to go find the datasheet!
Description
Use the DESCRIPTION command to enter a description of this object.
Left-click & drag to define group (or left-click to start defining a group polygon)

Holy moly.

This is a particularly annoying part to draw.

We will not be drawing it.



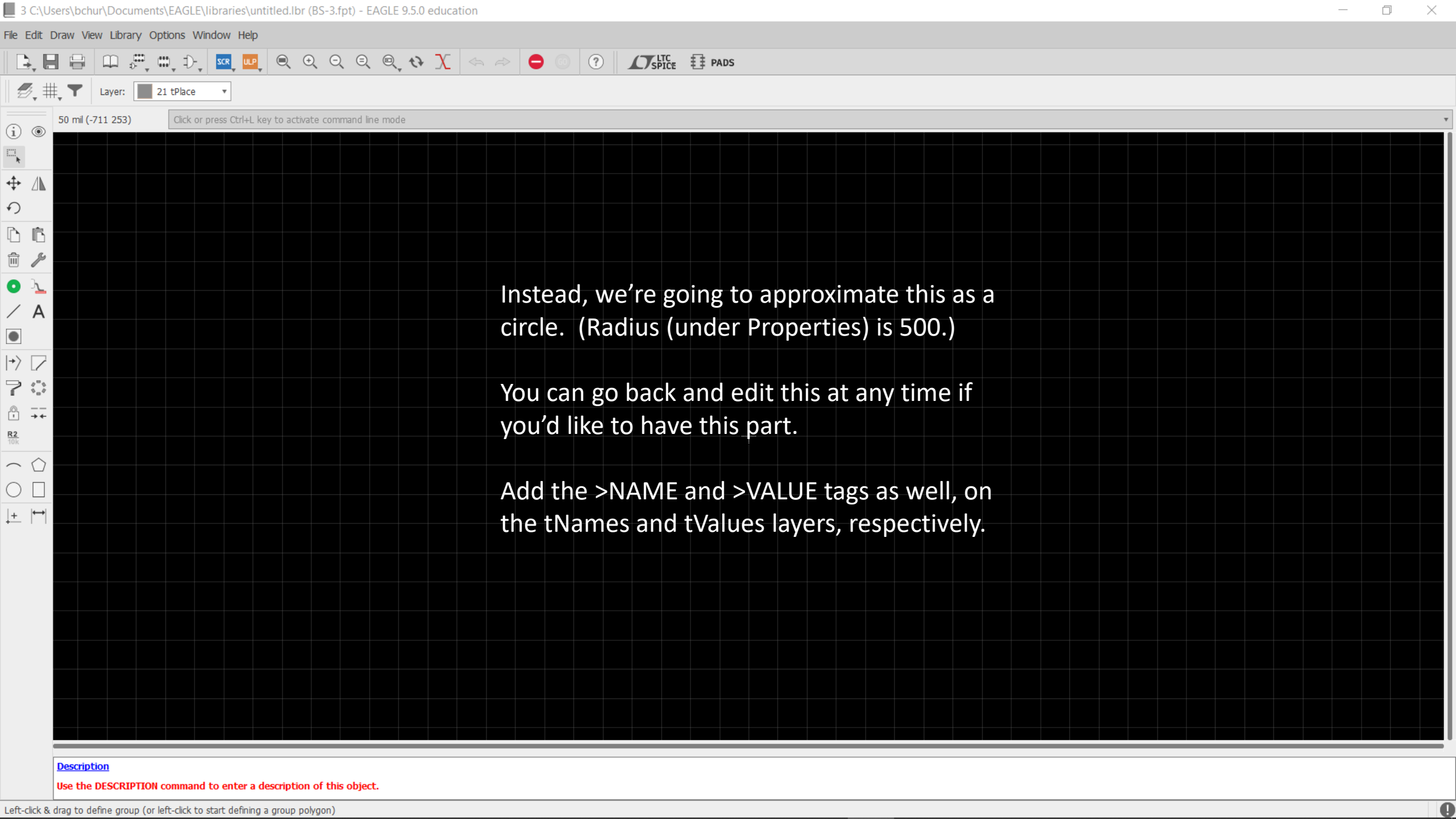
Date	SYM	REVISION RECORD	AUTH	DR.	CK.
07/22/16	D	ADDED MPD LOGO	T.B.	B.S.	
08/07/19	E	UPDATED TO ROHS COMPLIANT UPDATED SPECIFICATIONS	T.B.	B.S.	

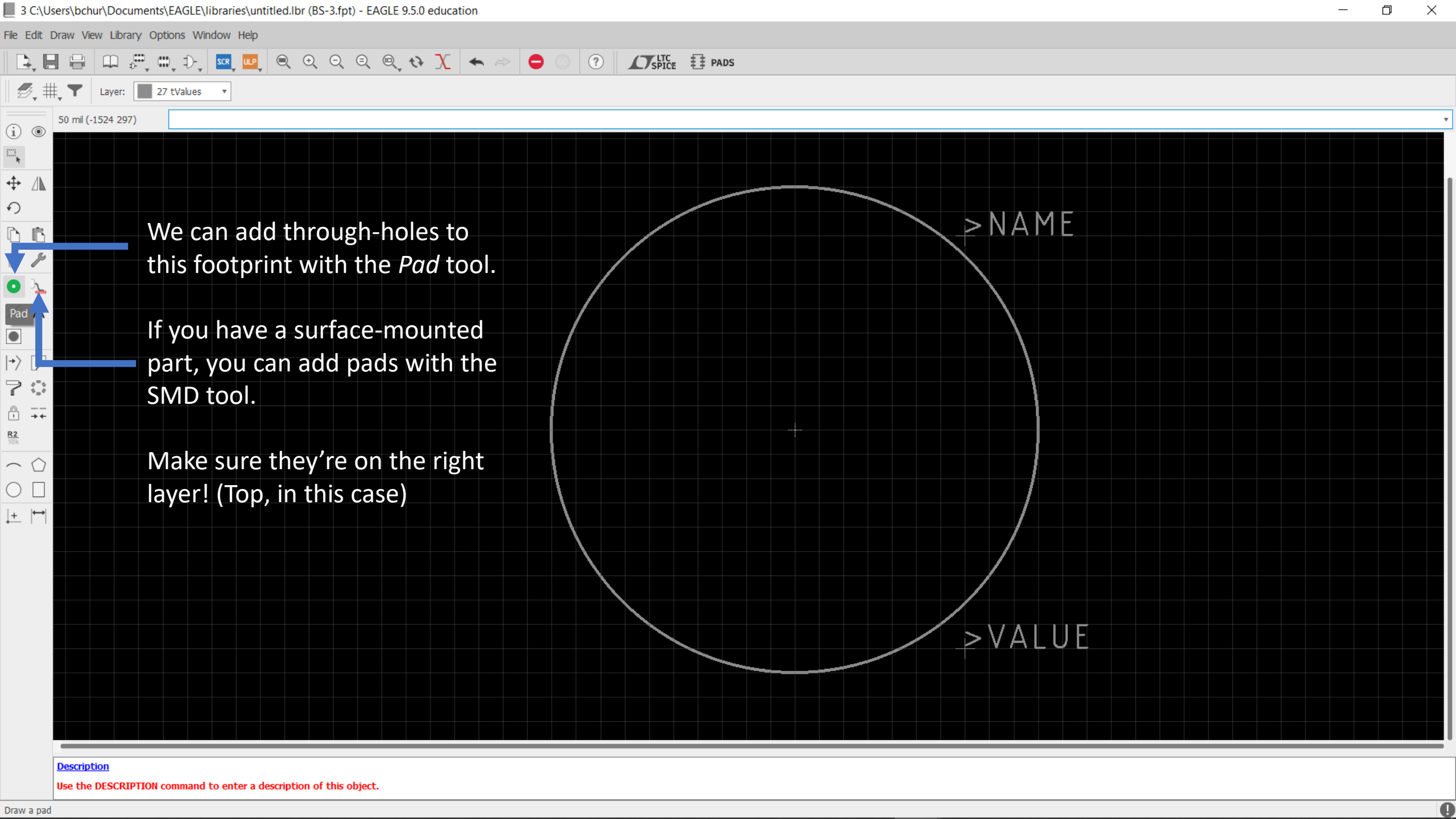
MATERIAL
BODY: NYLON 66 WITH 30% GLASS FILLED, UL FILE NO. E196894)
FLAMMABILITY RATING: UL94V-0
CONTACT: PHOSPHOR BRONZE

FINISH
CONTACT: NICKEL PLATED

SPECIFICATIONS
APPLICATION FOR 3V LITHIUM BATTERY
INSULATOR RESISTANCE: 5000 mΩMIN.
OPERATION TEMPERATURE: -40°C TO +200°C
DURABILITY: 50 CYCLES MIN
CONTACT RESISTANCE: 30 mΩ MAX
ROHS COMPLIANT

Tolerance (Except as noted)	MPD Memory protection Devices, Inc 200 Broad Hollow Road, Farmingdale, New York 11735		
decimal ±.5 (.020)		Scale 4=1	Drawn By B.S. Approved By T.B.
Fractional ± .8 (.030)	Title BR/CR 2032 COIN BATTERY HOLDER W/RETAINER ARM		
Angular ± 3°	Date 08/07/19	Drawing Number BS-3	


3 C:\Users\bchur\Documents\EAGLE\libraries\untitled.lbr (BS-3.fpt) - EAGLE 9.5.0 education
File Edit Draw View Library Options Window Help
Layer: 21 tPlace
50 mil (-711 253)
Click or press Ctrl+L key to activate command line mode
Instead, we're going to approximate this as a circle. (Radius (under Properties) is 500.)
You can go back and edit this at any time if you'd like to have this part.
Add the >NAME and >VALUE tags as well, on the tNames and tValues layers, respectively.
Description
Use the DESCRIPTION command to enter a description of this object.
Left-click & drag to define group (or left-click to start defining a group polygon)


3 C:\Users\bchur\Documents\EAGLE\libraries\untitled.lbr (BS-3.fpt) - EAGLE 9.5.0 education
File Edit Draw View Library Options Window Help
Layer: 27 tValues
50 mil (-1524 297)
We can add through-holes to this footprint with the *Pad* tool.
If you have a surface-mounted part, you can add pads with the SMD tool.
Make sure they're on the right layer! (Top, in this case)
>NAME
>VALUE
Pad
Description
Use the DESCRIPTION command to enter a description of this object.
Draw a pad

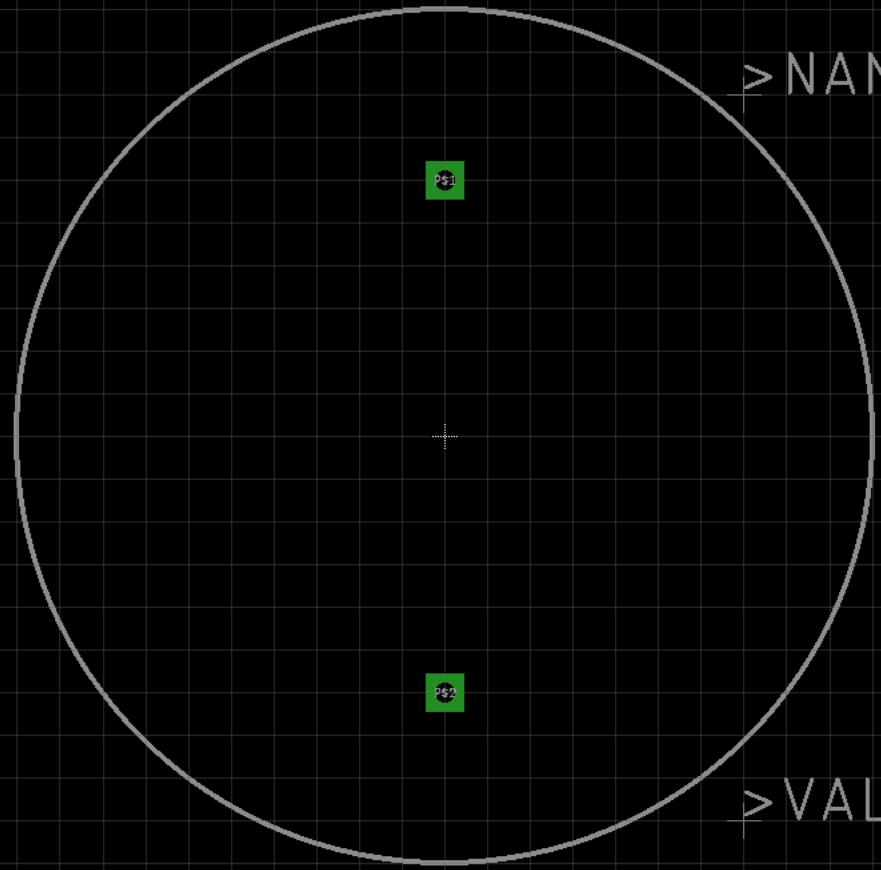
3 C:\Users\bchur\Documents\EAGLE\libraries\untitled.lbr (BS-3.fpt) - EAGLE 9.5.0 education

File Edit Draw View Library Options Window Help

Layer: 1 Top

50 mil (-1260 608)

Name the pads with the *name* tool. Probably whatever you named them in the symbol.

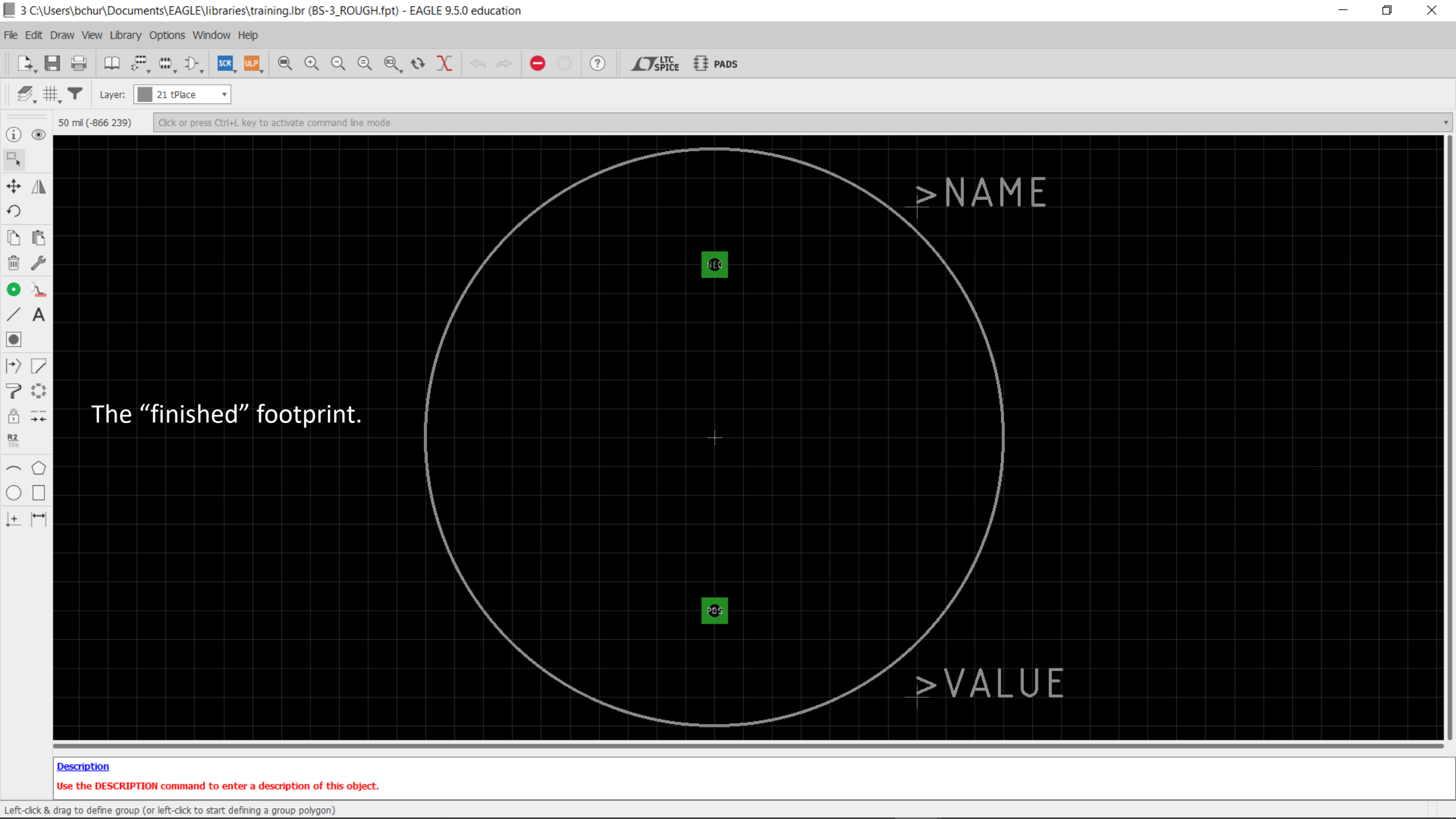


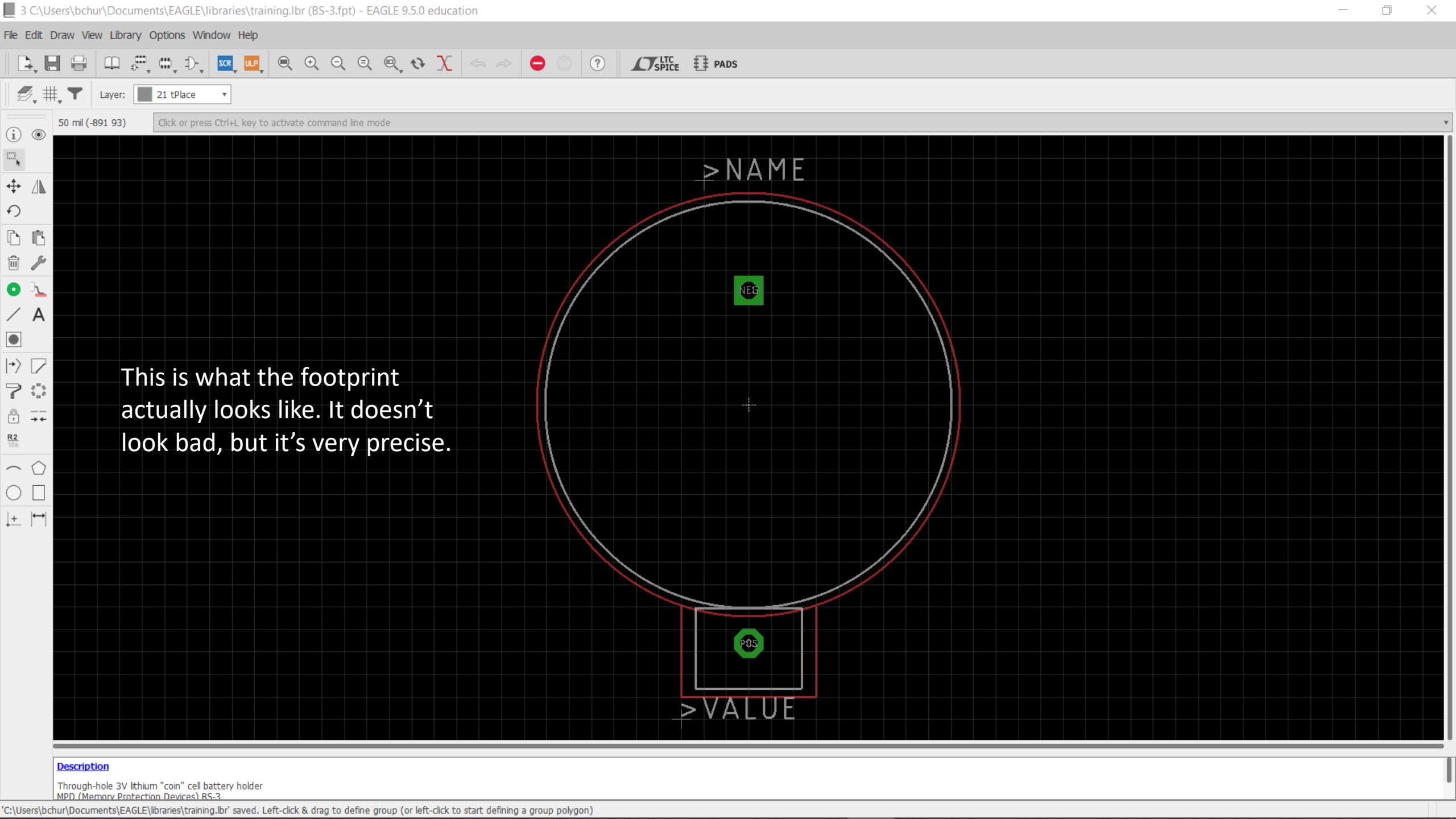
Name

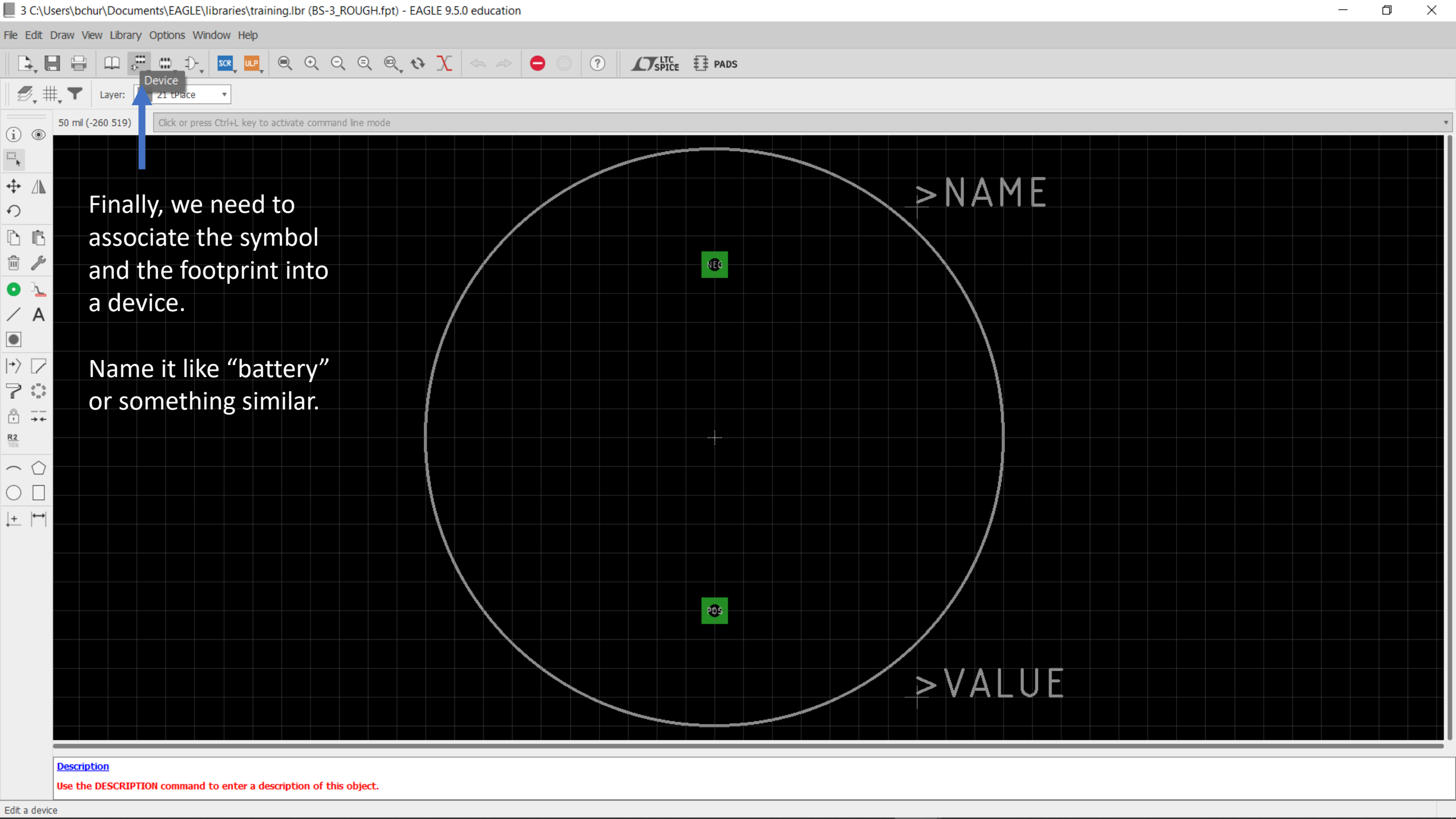
Description

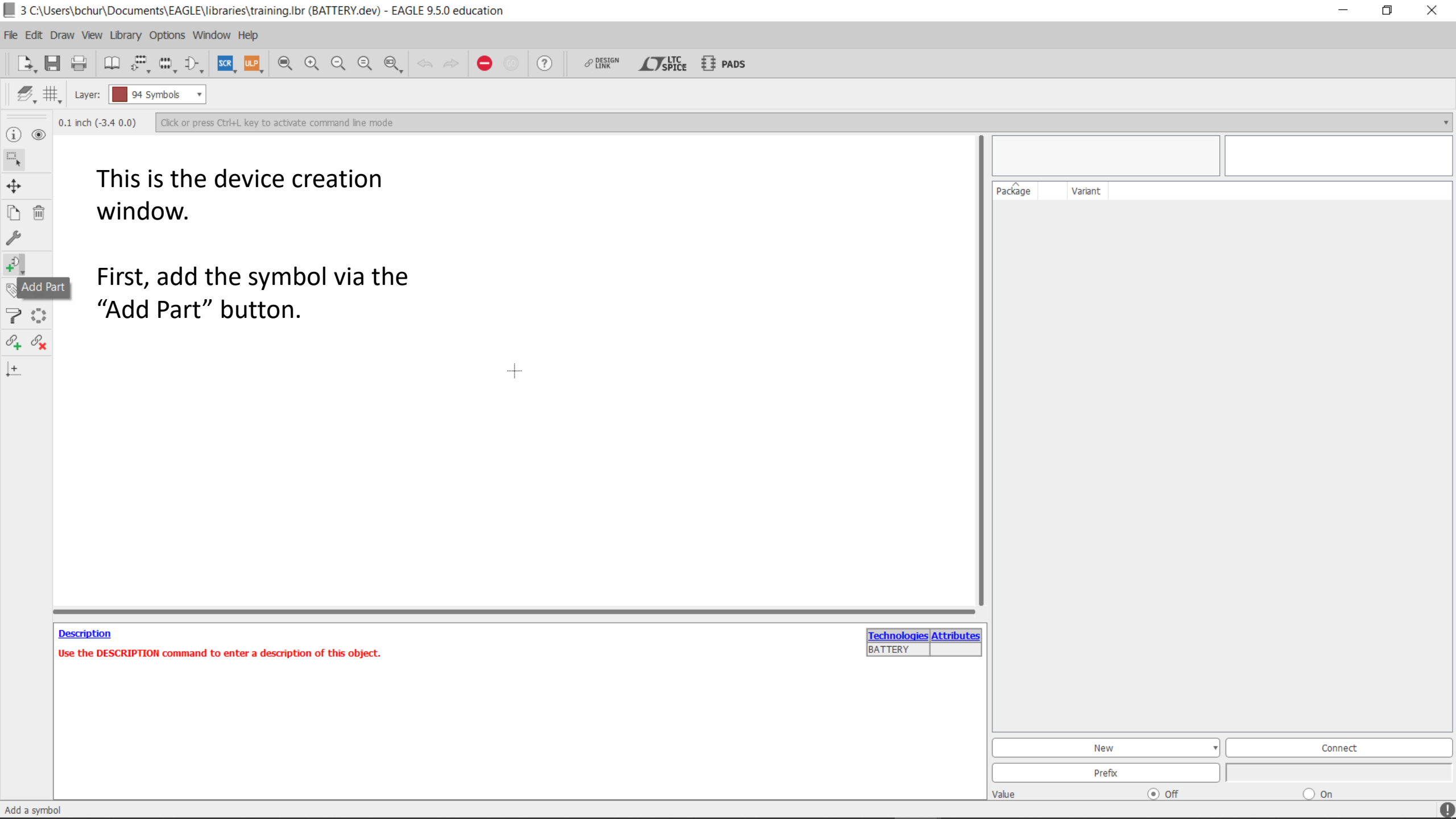
Use the DESCRIPTION command to enter a description of this object.

Define the name of an object


3 C:\Users\bchur\Documents\EAGLE\libraries\training.lbr (BS-3_ROUGH.fpt) - EAGLE 9.5.0 education
File Edit Draw View Library Options Window Help
Layer: 21 tPlace
50 mil (-866 239)
Click or press Ctrl+L key to activate command line mode
The “finished” footprint.
>NAME
NEG
POS
>VALUE
Description
Use the DESCRIPTION command to enter a description of this object.
Left-click & drag to define group (or left-click to start defining a group polygon)


3 C:\Users\bchur\Documents\EAGLE\libraries\training.lbr (BS-3.fpt) - EAGLE 9.5.0 education
File Edit Draw View Library Options Window Help
Layer: 21 tPlace
50 mil (-891 93)
Click or press Ctrl+L key to activate command line mode
>NAME
NEG
POS
>VALUE
This is what the footprint actually looks like. It doesn't look bad, but it's very precise.
Description
Through-hole 3V lithium "coin" cell battery holder
MPD (Memory Protection Devices) BS-3
'C:\Users\bchur\Documents\EAGLE\libraries\training.lbr' saved. Left-click & drag to define group (or left-click to start defining a group polygon)

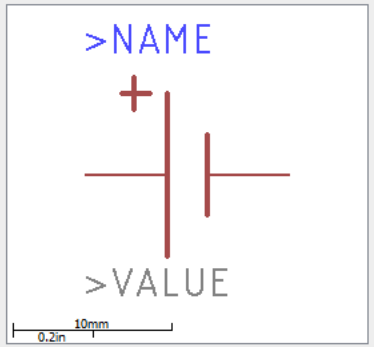

3 C:\Users\bchur\Documents\EAGLE\libraries\training.lbr (BS-3_ROUGH.fpt) - EAGLE 9.5.0 education
File Edit Draw View Library Options Window Help
Device
Layer:
21 tPlace
50 mil (-260 519)
Click or press Ctrl+L key to activate command line mode
Finally, we need to associate the symbol and the footprint into a device.
Name it like “battery” or something similar.
>NAME
NEG
POS
>VALUE
Description
Use the DESCRIPTION command to enter a description of this object.
Edit a device


3 C:\Users\bchur\Documents\EAGLE\libraries\training.lbr (BATTERY.dev) - EAGLE 9.5.0 education
File Edit Draw View Library Options Window Help
Layer: 94 Symbols
0.1 inch (-3.4 0.0)
Click or press Ctrl+L key to activate command line mode
This is the device creation window.
First, add the symbol via the "Add Part" button.
Add Part
Package
Variant
Description
Use the DESCRIPTION command to enter a description of this object.
Technologies
Attributes
BATTERY
New
Connect
Prefix
Value
Off
On
Add a symbol

3 C:\Users\bchur\Documents\EAGLE\libraries\training.lbr (BATTERY.dev) - EAGLE 9.5.0 education

Add

Symbol
BATT



OK
Cancel

Select the symbol and place it on the origin.

The origin will be the origin of the part, so definitely choose as close to the center as possible!

Package
Variant

New
Connect
Prefix
Value
Off
On

Description

Use the DESCRIPTION command to enter a description of this object.

Technologies	Attributes
BATTERY	

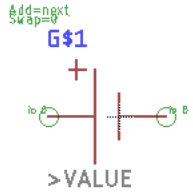
3 C:\Users\bchur\Documents\EAGLE\libraries\training.lbr (BATTERY.dev) - EAGLE 9.5.0 education

File Edit Draw View Library Options Window Help

Layer: 94 Symbols

0.1 inch (3.3 -1.5)

Click or press Ctrl+L key to activate command line mode



Package Variant

Next, we need to add the package. It's a "local package" because we designed it by hand.

Choose the one you drew.

Description

Use the DESCRIPTION command to enter a description of this object.

Technologies	Attributes
BATTERY	

New

Add local package

Add from web

Create with package generator

Connect

Off On

Left-click & drag to define group (or left-click to start defining a group polygon)

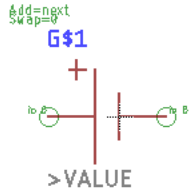
3 C:\Users\bchur\Documents\EAGLE\libraries\training.lbr (BATTERY.dev) - EAGLE 9.5.0 education

File Edit Draw View Library Options Window Help

Layer: 94 Symbols

0.1 inch (-2.1 0.3)

Click or press Ctrl+L key to activate command line mode



Description

Use the DESCRIPTION command to enter a description of this object.

Technologies	Attributes
BATTERY	

Package	Variant
BS-3_ROUGH	

The package is added here.

Many different packages can be added for the same symbol (e.g. one LED symbol with many different packages).

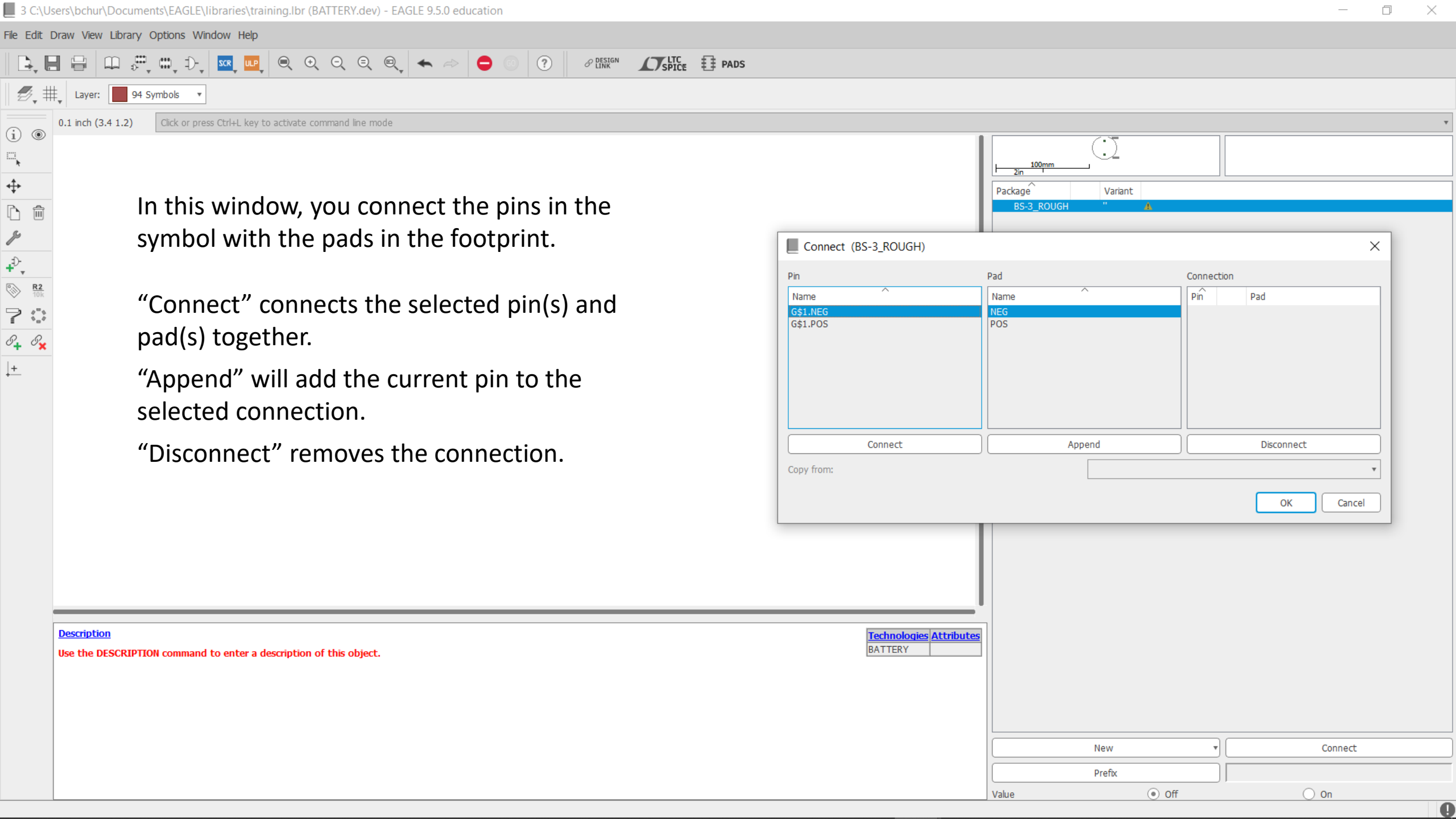
Double click on the package to wire it.

New | Connect

Prefix

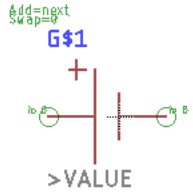
Value Off On

Left-click & drag to define group (or left-click to start defining a group polygon)

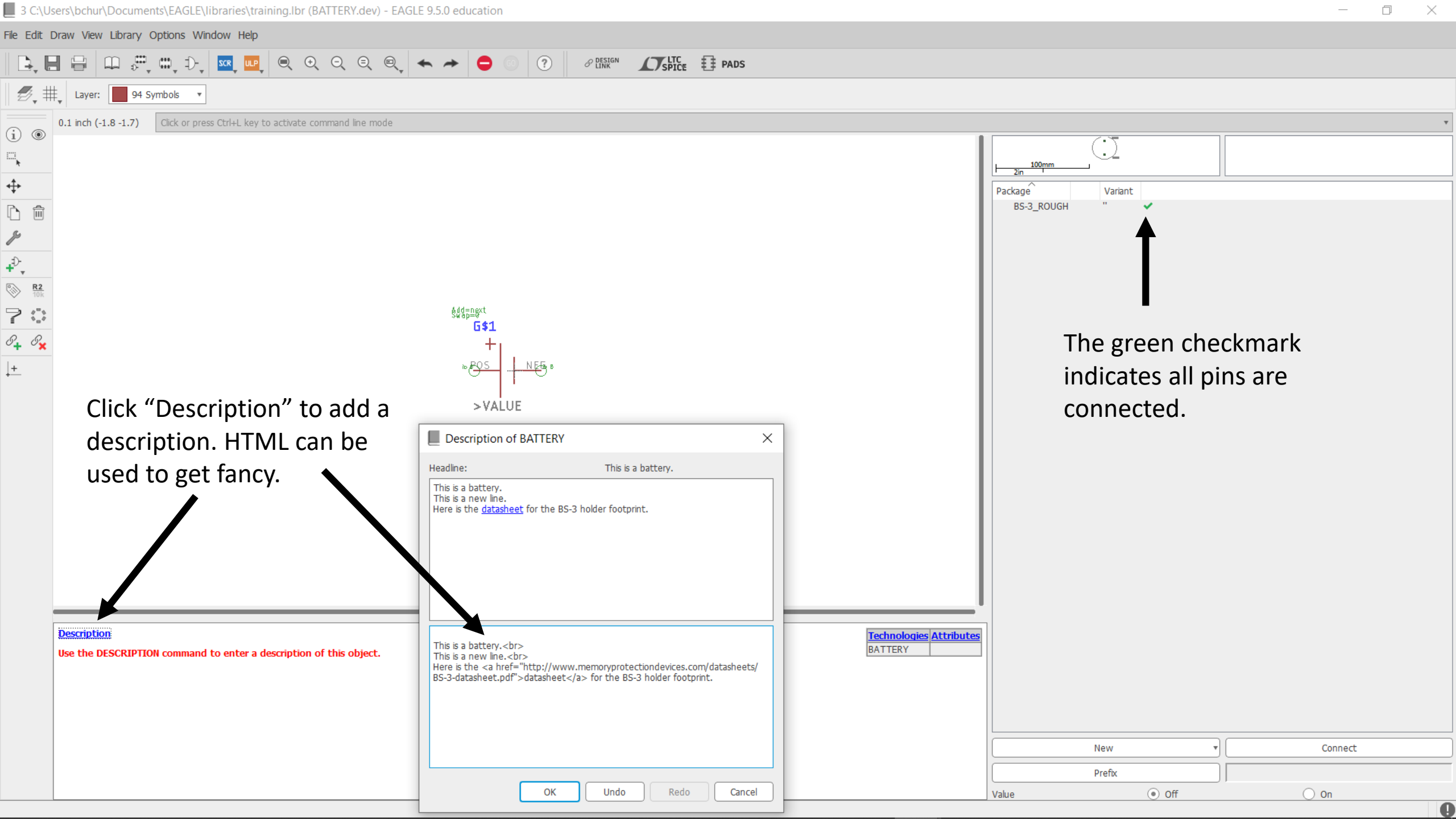

3 C:\Users\bchur\Documents\EAGLE\libraries\training.lbr (BATTERY.dev) - EAGLE 9.5.0 education
File Edit Draw View Library Options Window Help
Layer: 94 Symbols
0.1 inch (3.4 1.2)
Click or press Ctrl+L key to activate command line mode
In this window, you connect the pins in the symbol with the pads in the footprint.
“Connect” connects the selected pin(s) and pad(s) together.
“Append” will add the current pin to the selected connection.
“Disconnect” removes the connection.
Connect (BS-3_ROUGH)
Pin
Name
G$1.NEG
G$1.POS
Pad
Name
NEG
POS
Connection
Pin
Pad
Connect
Append
Disconnect
Copy from:
OK
Cancel
Package
Variant
BS-3_ROUGH
Description
Use the DESCRIPTION command to enter a description of this object.
Technologies
Attributes
BATTERY
New
Connect
Prefix
Value
Off
On

All the pins should be connected to a pad.

Not all pads need to be connected to a pin!



Click OK when done.


3 C:\Users\bchur\Documents\EAGLE\libraries\training.lbr (BATTERY.dev) - EAGLE 9.5.0 education
File Edit Draw View Library Options Window Help
Layer: 94 Symbols
0.1 inch (-1.8 -1.7)
Click or press Ctrl+L key to activate command line mode
Add=next
Swap=0
G$1
POS
NEG
>VALUE
Package
Variant
BS-3_ROUGH
The green checkmark indicates all pins are connected.
Click “Description” to add a description. HTML can be used to get fancy.
Description of BATTERY
Headline:
This is a battery.
This is a battery.
This is a new line.
Here is the datasheet for the BS-3 holder footprint.
This is a battery.
This is a new line.
Here is the datasheet for the BS-3 holder footprint.
OK
Undo
Redo
Cancel
Description
Use the DESCRIPTION command to enter a description of this object.
Technologies
Attributes
BATTERY
New
Connect
Prefix
Value
Off
On

Don’t forget to save!

But wait!

There’s more!

This would be quite ridiculous for standard packages

And what if there’s already a symbol/footprint we want to use?

3 C:\Users\bchur\Documents\EAGLE\libraries\training.lbr (BATTERY.dev) - EAGLE 9.5.0 education

File Edit Draw View Library Options Window Help

Table of contents

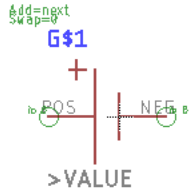
Layer:

0.1 inch (-2 1.7)

Click or press Ctrl+L key to activate command line mode

Let’s go back to the main library page.
Click “Table of contents”.

(But first, probably save if you haven’t.)



100mm
2in

Package	Variant
BS-3_ROUGH	''

New

Connect

Prefix

Value Off On

Description

This is a battery.
This is a new line.
Here is the datasheet for the BS-3 holder footprint.

Technologies	Attributes
BATTERY	

Show table of contents

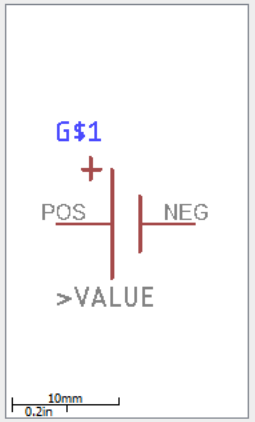
3 C:\Users\bchur\Documents\EAGLE\libraries\training.lbr - EAGLE 9.5.0 education

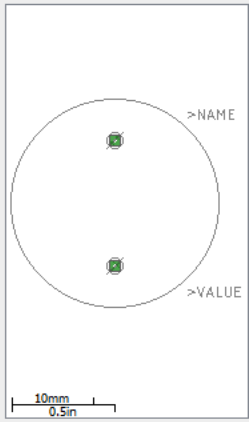
File Edit Draw View Library Options Window Help

Layer: 94 Symbols

0.1 inch (-2.4 1.7) Click or press Ctrl+L key to activate command line mode

Device	Footprint	3D Package	Symbol
BATTERY	BS-3		BATT
	BS-3_ROUGH		





This is a battery.
This is a new line.
Here is the datasheet for the BS-3 holder footprint.

Package	Variant
BS-3_ROUGH	

Let's say you want to use a symbol from another library in this library.

Easy! Go back to the main Control Panel screen.

Add Device... | Add Footprint... | Import 3D Package | Add Symbol...

'C:\Users\bchur\Documents\EAGLE\libraries\training.lbr' saved. Left-click & drag to define group (or left-click to start defining a group polygon)

Control Panel - C:\Users\bchur\Dropbox (GaTech)\Eagle\Projects\batt_swtiched-LED - EAGLE 9.5.0 education

File View Options Window Help

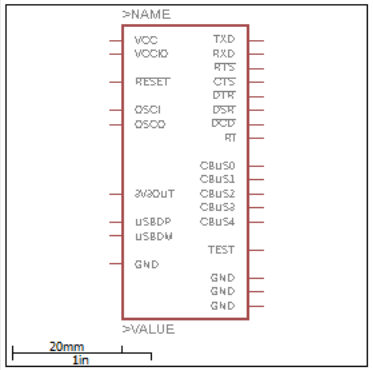
Name	Description
discrete.lbr	Discrete devices (Antenna, Arrrester, Thermistor)
display-hp.lbr	Hewlett Packard LED Displays
display-kingbright.lbr	KINGBRIGHT Numeric Displays
display-lcd.lbr	Hitachi, Data Modul, Tuxgraphics - LCD Displays
docu-dummy.lbr	Dummy symbols
dom-key.lbr	Beispiel eines DOM-Key (Carbon-Key)
eagle-ltspice.lbr	Default symbols for import LTspice schematics
ecl.lbr	ECL Logic Devices
em-microelectronic.lbr	EM MICROELECTRONIC - MARIN SA
etx-board.lbr	Kontron / JUMPtec ETX Board
exar.lbr	Exar Devices
fairchild-semic.lbr	FAIRCHILD SEMICONDUCTOR Integrated Circuits
farnell.lbr	Elements from Distributor FARNELL
fiber-optic-hp.lbr	Hewlett-Packard Fiber Optic Components
fiber-optic-siemens.lbr	Siemens Fiber Optic Components
fifo.lbr	First In First Out Memories
flexipanel.lbr	PIXIE (TM) Controller
fox-electronics.lbr	FOX Electronics Crystals; Oscillators
frames.lbr	Frames for Sheet and Layout
freescale.lbr	Freescale
ftdichip.lbr	FTDI (TM) CHIP Future Technology Devices International Ltd.
DLP-USB232M-G	DLP-USB232M-G USB - SERIAL UART Interface Module
FT230X	USB to BASIC UART IC
FT232B	USB to serial UART interface
FT232R	Source: http://www.ftdichip.com/Documents/DataSheets/DS_FT2.
3D Packages	
Footprints	
Symbols	
DLP-USB232M	
FT230X	
FT232BQ	
FT232R	
fujitsu.lbr	nductor Limited
fuse.lbr	e Holders
gennum.lbr	GENNUM
halo-electronics.lbr	HALO ELECTRONIC, INC.
heatsink.lbr	Heatsinks
holes.lbr	Mounting Holes and Pads
holtek.lbr	HOLTEK Semiconductor
ic-package.lbr	IC Packages an Sockets
inductor-coilcraft.lbr	Coilcraft SMD Inductors
inductor-neosid.lbr	Neosid Chokes and Transformers
inductor-nkl.lbr	Inductors by NKL®
inductors.lbr	Inductors and Filters
infineon-tricore.lbr	Infineon Microcontroller TriCore TM 32-bit MCU-DSP Architecture
infineon.lbr	Infineon Technologies
intersil-techwell.lbr	intersil / Techwell
intersil.lbr	Intersil
IQD-Frequency-Products.lbr	Crystals and Oscillators
ir.lbr	IR International Rectifier
isd.lbr	ISD Voice Recorder/Playback Devices
johanson-technology.lbr	Johanson Technology, Inc. Filters
jump-0r-smd.lbr	Soldering jumper and bridges

Open in Library
Copy to Library

Home Preview

Ben Hurwitz

FT232R (Version 1) ftdichip.lbr



Locate the ftdichip.lbr library.

Under “Symbols”, find “FT232R”.

Right click, and select “Copy to library”.

This copies the current selection to the currently open library, which in this case is the one we just made!

(Yes, we could have done this with the battery symbol.)

(In reality, you want separate libraries for different types of components, rather than a single library for everything.)

FT232R@ftdichip.lbr

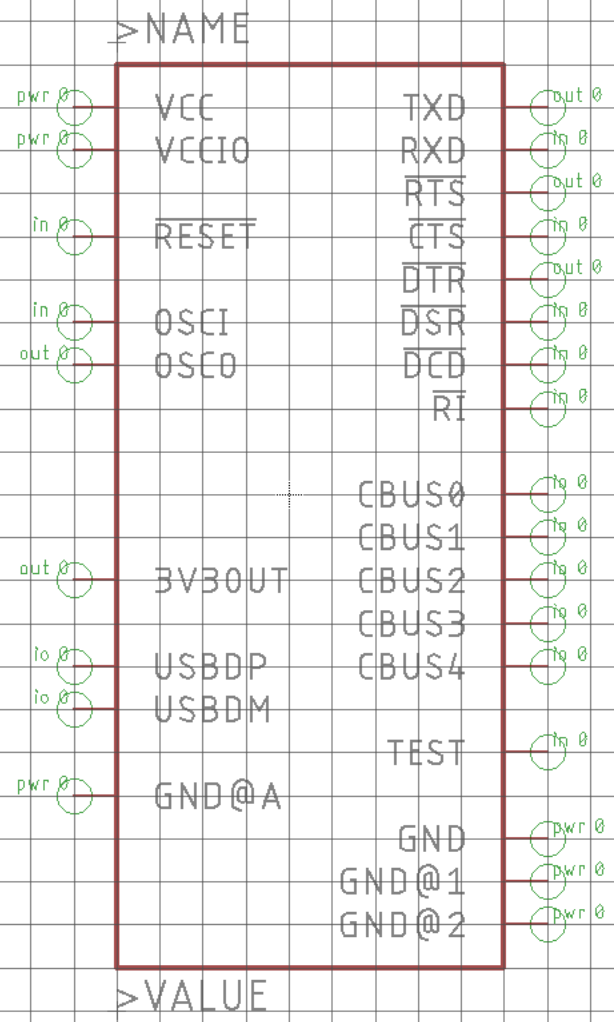
3 C:\Users\bchur\Documents\EAGLE\libraries\training.lbr (FT232R.sym) - EAGLE 9.5.0 education

File Edit Draw View Library Options Window Help

Layer: 94 Symbols

0.1 inch (0.8 1.2)

Click or press Ctrl+L key to activate command line mode



It will open the symbol in the symbol editor if you want to edit it.

Save whenever you are done editing and return to your Table of Contents (i.e. your library).

Description

Use the DESCRIPTION command to enter a description of this object.

Left-click & drag to define group (or left-click to start defining a group polygon)

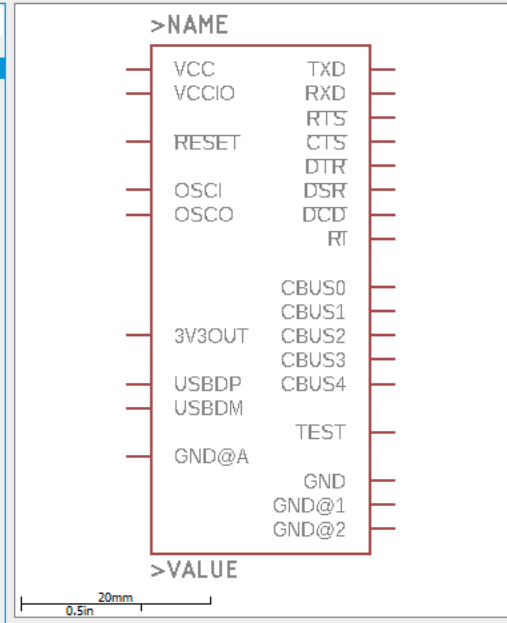
3 C:\Users\bchur\Documents\EAGLE\libraries\training.lbr - EAGLE 9.5.0 education

File Edit Draw View Library Options Window Help

Layer: 94 Symbols

0.1 inch (1.0 1.2) Click or press Ctrl+L key to activate command line mode

Device	Footprint	3D Package	Symbol
BATTERY	BS-3		BATT
	BS-3_ROUGH		FT232R



And there is it!

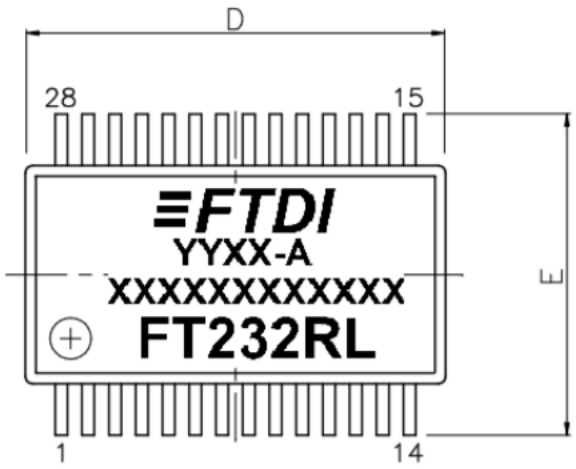
Now, we want to add a footprint for this symbol to get a device. The various footprint options are on the datasheet. There are two packages for this: an SSOP and a QFN. Let's use the SSOP.

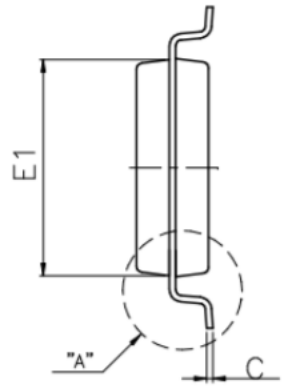
Add Device... Add Footprint... Import 3D Package Add Symbol...

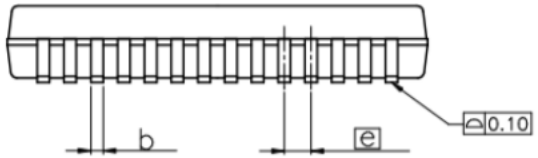
Left-click & drag to define group (or left-click to start defining a group polygon)

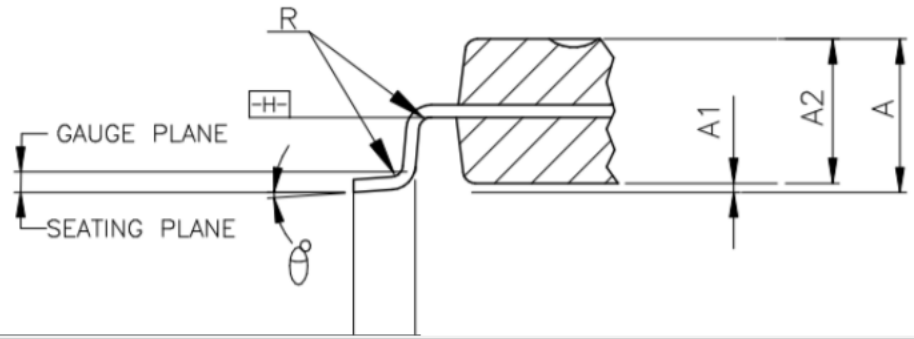
9.1 SSOP-28 Package Dimensions

Yikes!
Thankfully, we don't have to do this by hand because it's a standard package.









SYMBOLS	MIN.	NOM.	MAX.
A	–	–	2.0
A1	0.05	–	–
2 A2	1.65	1.75	1.85
b	0.22	–	0.38
c	0.09	–	0.25
2 D	10.05	10.20	10.50
3 E	7.65	7.80	7.90
E1	5.00	5.30	5.60
e	0.65 BSC		
L	0.55	0.75	0.95
R	0.09	–	–
θ°	0°	4°	8°

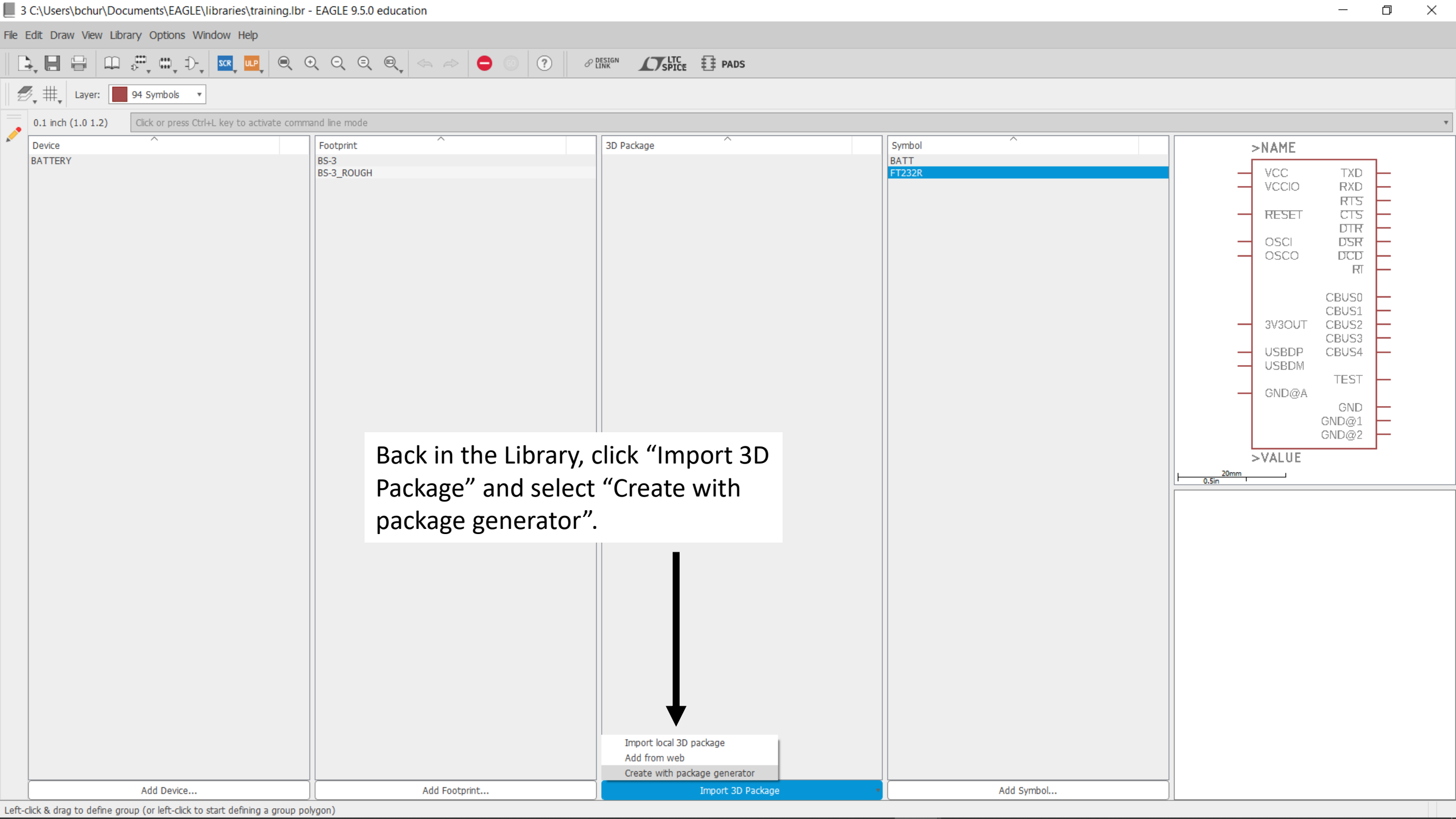
UNIT : MM

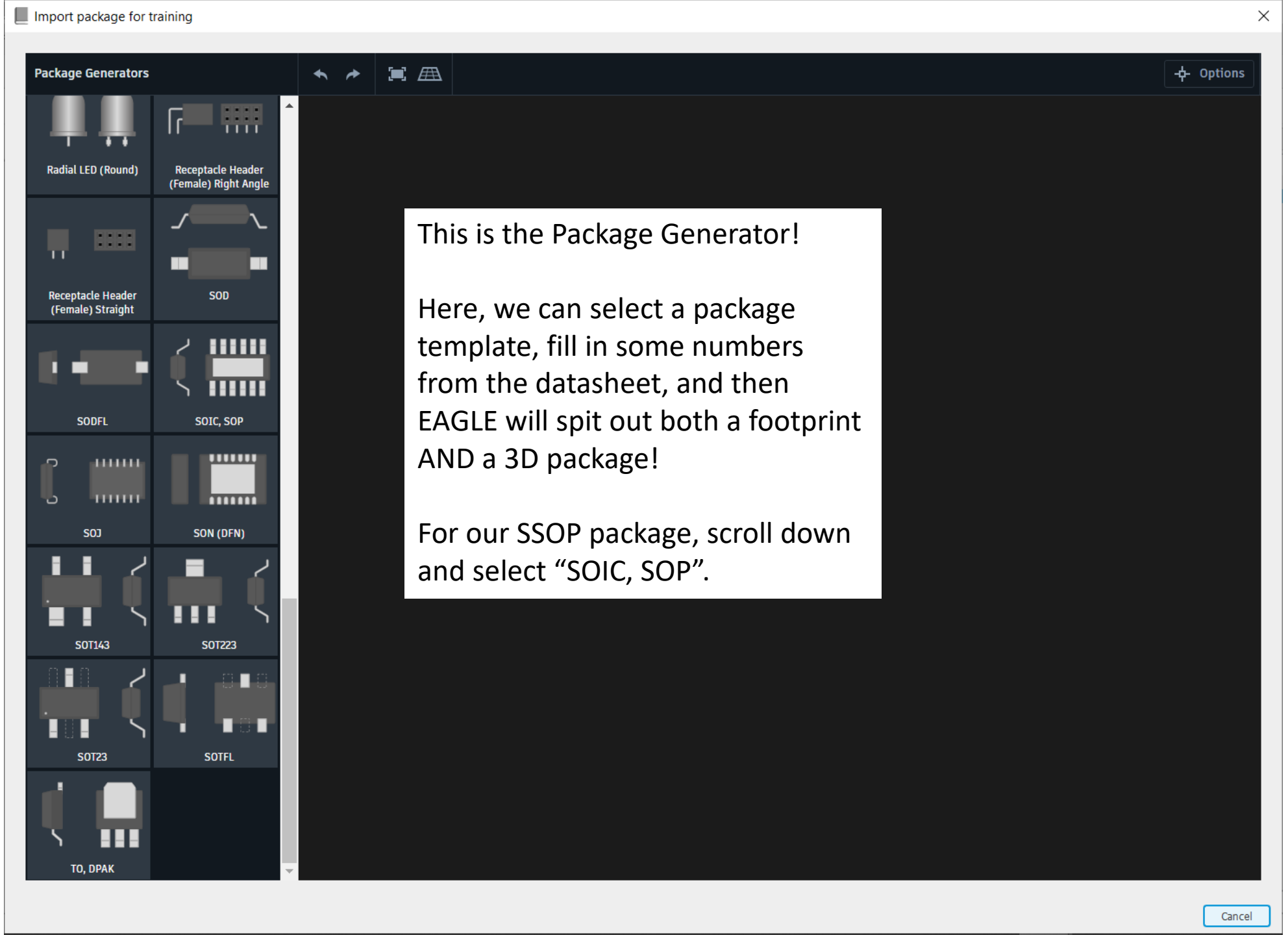
NOTES :

1.JEDEC OUTLINE : MO-150 AH

2."D" AND "E1" DIMENSIONS DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS, BUT DOES INCLUDE MOLD MISMATCH AND ARE MEASURED AT DATUM PLANE -H-,MOLD PARTING LINE. MOLD FLASH OR PROTRUSION SHALL NOT EXCEED 0.20 mm PER SIDE.

3.DIMENSION b DOES NOT INCLUDE DAMBAR PROTRUSION/INTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.13mm TOTAL IN EXCESS OF b DIMENSION AT MAXIMUM MATERIAL CONDITION. DAMBAR INTRUSION SHALL NOT REDUCE DIMENSION b BY MORE THAN 0.07mm AT LEAST MATERIAL CONDITION.

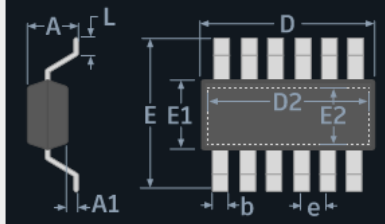

3 C:\Users\bchur\Documents\EAGLE\libraries\training.lbr - EAGLE 9.5.0 education
File Edit Draw View Library Options Window Help
Layer: 94 Symbols
0.1 inch (1.0 1.2)
Click or press Ctrl+L key to activate command line mode
Device
BATTERY
Footprint
BS-3
BS-3_ROUGH
3D Package
Symbol
BATT
FT232R
>NAME
VCC
VCCIO
RESET
OSCI
OSCO
3V3OUT
USBDP
USBDM
GND@A
TXD
RXD
RTS
CTS
DTR
DSR
DCD
RI
CBUS0
CBUS1
CBUS2
CBUS3
CBUS4
TEST
GND
GND@1
GND@2
>VALUE
20mm
0.5in
Back in the Library, click “Import 3D Package” and select “Create with package generator”.
Import local 3D package
Add from web
Create with package generator
Add Device...
Add Footprint...
Import 3D Package
Add Symbol...
Left-click & drag to define group (or left-click to start defining a group polygon)


Import package for training
Package Generators
Options
Radial LED (Round)
Receptacle Header (Female) Right Angle
Receptacle Header (Female) Straight
SOD
SODFL
SOIC, SOP
SOJ
SON (DFN)
SOT143
SOT223
SOT23
SOTFL
TO, DPAK
This is the Package Generator!
Here, we can select a package template, fill in some numbers from the datasheet, and then EAGLE will spit out both a footprint AND a 3D package!
For our SSOP package, scroll down and select “SOIC, SOP”.
Cancel

Import package for training

SOIC, SOP Generator

Options



# Pins	28	
Pad Shape	Rectangle	
Density Level	Nominal (N)	
e	0.65 mm	
E	7.65 mm	7.9 mm
L	0.55 mm	0.95 mm
b	0.22 mm	0.38 mm
D	10.05 mm	10.5 mm
E1	5 mm	5.6 mm
A	0 mm	2 mm
A1	0.05 mm	0.05 mm
Thermal Pad		
Map Silkscreen to Body	Maximum	
Fabrication Tolerance	0.05 mm	
Placement Tolerance	0.03 mm	

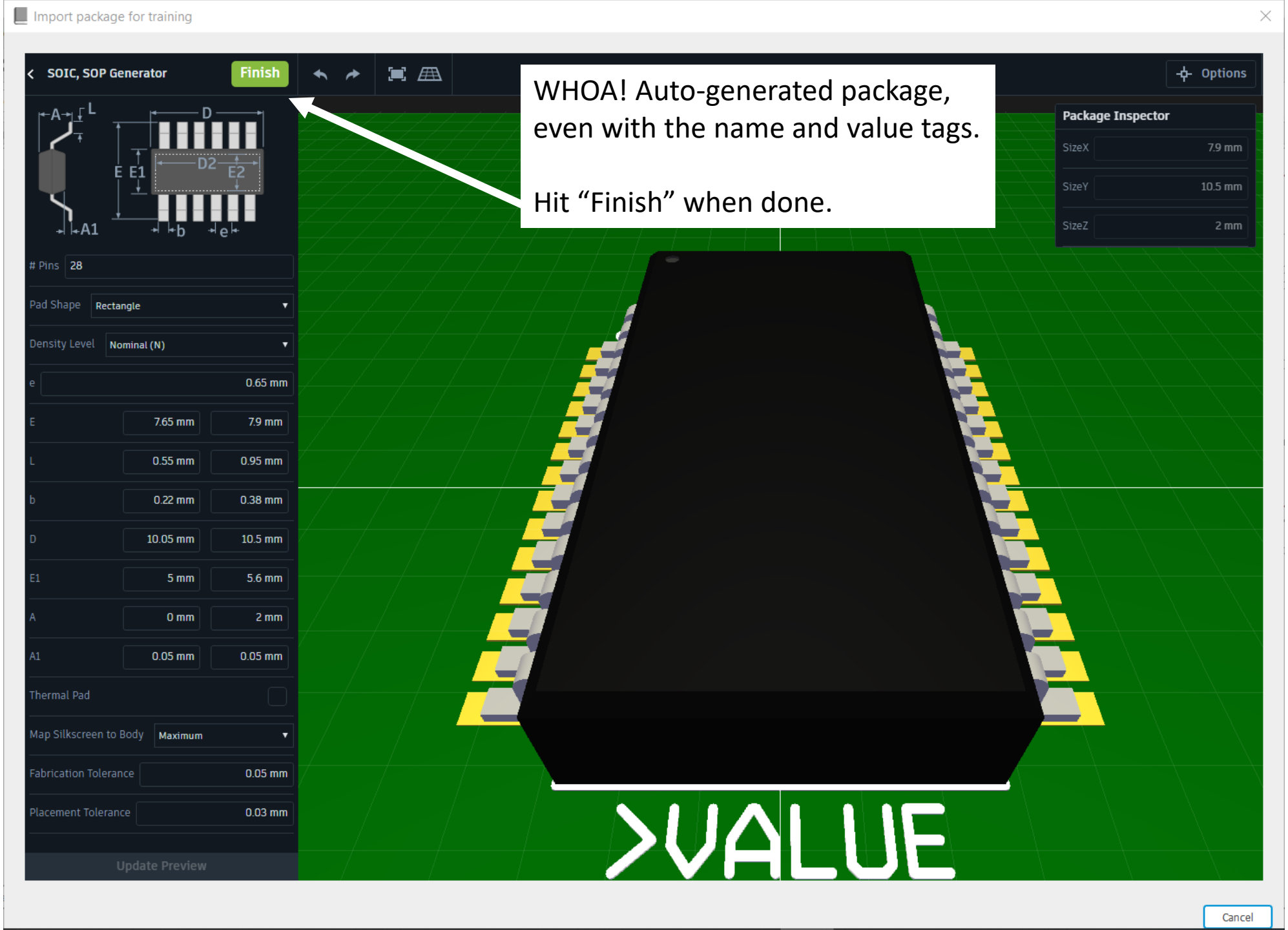
Update Preview

Here, I've filled out all the numbers from the datasheet directly.

Be aware: make sure your dimensions match the image above!

Once you're done, just hit "Update Preview".

Cancel


Import package for training
SOIC, SOP Generator
Finish
Options
WHOA! Auto-generated package, even with the name and value tags.
Hit “Finish” when done.
Package Inspector
SizeX 7.9 mm
SizeY 10.5 mm
SizeZ 2 mm
Pins 28
Pad Shape Rectangle
Density Level Nominal (N)
e 0.65 mm
E 7.65 mm 7.9 mm
L 0.55 mm 0.95 mm
b 0.22 mm 0.38 mm
D 10.05 mm 10.5 mm
E1 5 mm 5.6 mm
A 0 mm 2 mm
A1 0.05 mm 0.05 mm
Thermal Pad
Map Silkscreen to Body Maximum
Fabrication Tolerance 0.05 mm
Placement Tolerance 0.03 mm
Update Preview
>VALUE
Cancel

3 C:\Users\bchur\Documents\EAGLE\libraries\training.lbr - EAGLE 9.5.0 education

File Edit Draw View Library Options Window Help

Layer: 94 Symbols

0.1 inch (1.0 1.2) Click or press Ctrl+L key to activate command line mode

Device	Footprint	3D Package	Symbol
BATTERY	BS-3	SOP65P777X200-28N	BATT
	BS-3_ROUGH		FT232R
	SOP65P777X200-28N		

With the footprint and 3D package created, we can now go and create the FTDI232R device just as we did with the Battery device.

28-SOP, 0.65 mm pitch, 7.78 mm span, 10.28 X 5.30 X 2.00 mm body

28-pin SOP package with 0.65 mm pitch, 7.78 mm span with body size 10.28 X 5.30 X 2.00 mm

Add Device... Add Footprint... Import 3D Package Add Symbol...

Left-click & drag to define group (or left-click to start defining a group polygon)

Whew!

That’s a lot.

What’s next?

There is so much more to EAGLE than just these basics

The internet is a wonderful tool for this.

(Adafruit and SparkFun have good tutorials)

And there are tons of board design resources as well

The internet is a wonderful tool for this, too.

This is old (2004) but still a good reference for some general rules.

http://www.alternatezone.com/electronics/files/PCBDesignTutorialRevA.pdf

Maybe you want to fab your design with us!

Follow this link to find out how!

Or send it out

(We’re not offended)

Either way, the circuits world is your oyster.

Be free!

And remember…

90% of your effort should be in placement!

Questions?