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Printed Circuit Board Design Workshop

Introduction to PCB & Schematic Capture

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Printed Circuit Board

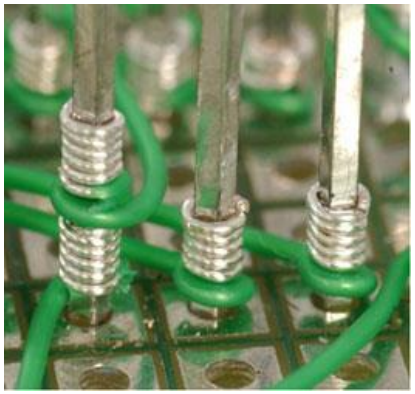
Invented since 20th century

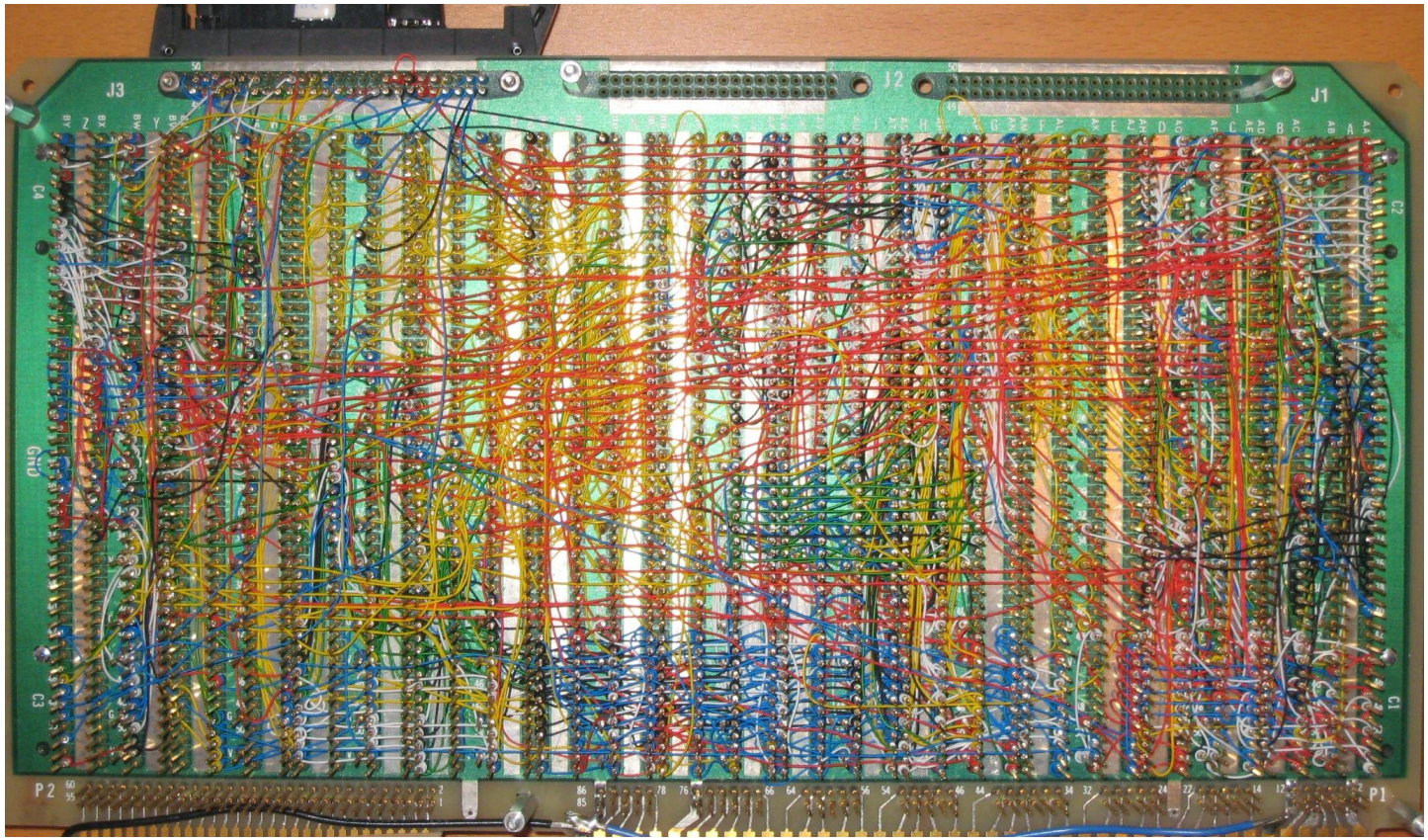
Also called as *Printed Wiring Board* (PWB)

Function

-Provide electrical connectivity
-Component population
-Act as heat sink
-Provide mechanical support

Introduction
History - Wire Wrap

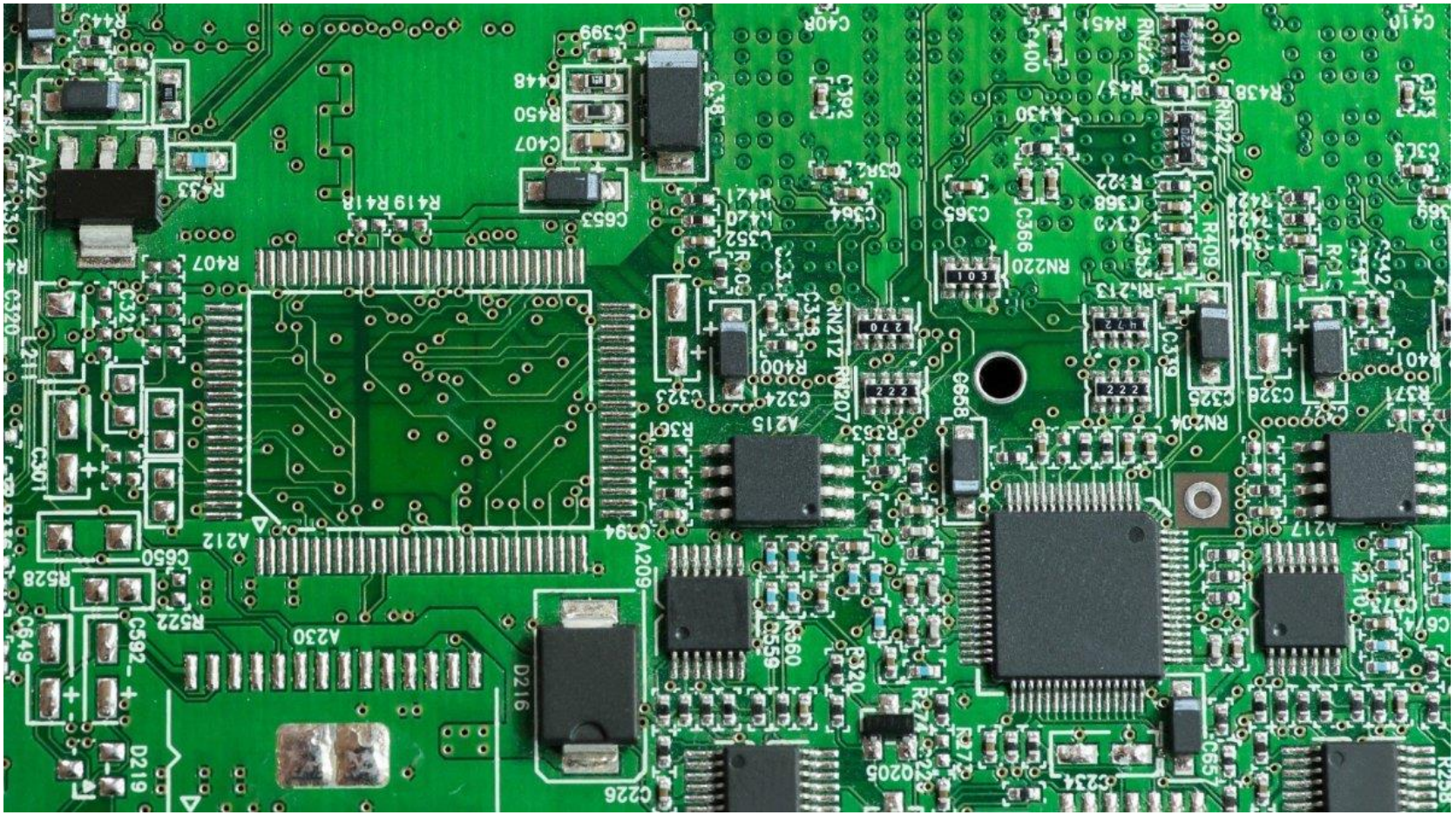




Wire wrap sockets are expensive.
Not suitable for discrete components.
Large, bulky and heavy.
Relatively fragile

Schematic Editing

History - Modern PCB

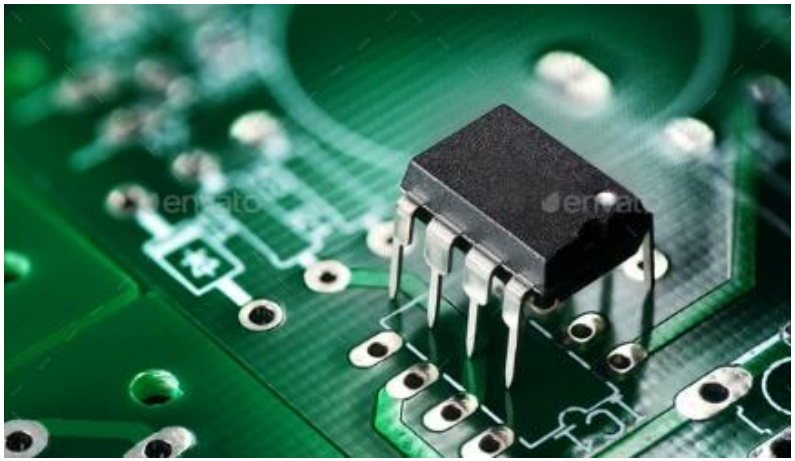


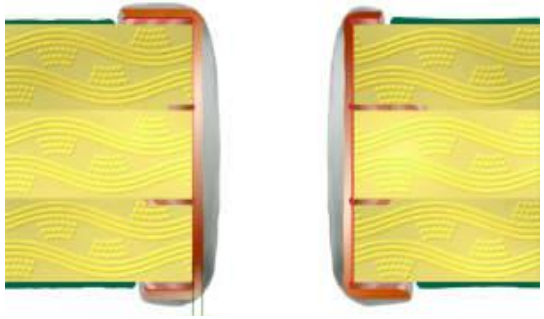
A printed circuit board can have multiple copper layers.
A two-layer board has copper on both sides; multi layer boards sandwich additional copper layers between layers of insulating material.
Conductors on different layers are connected with vias

Through Hole Technology

Board are drilled, then plated

Provide connectivity between layers

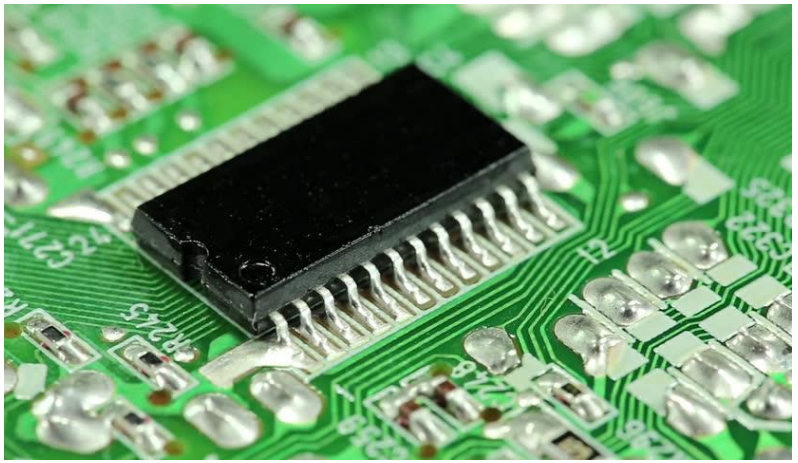


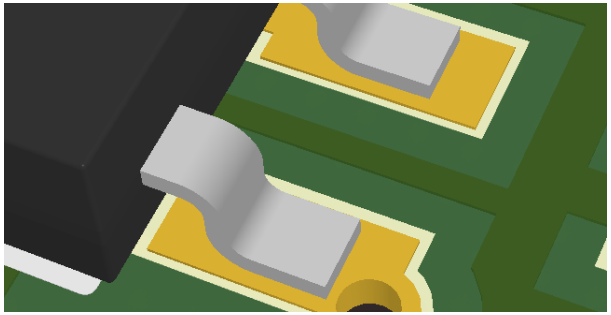


Surface Mount Technology

Land pattern are etched

Component may or may not have leads





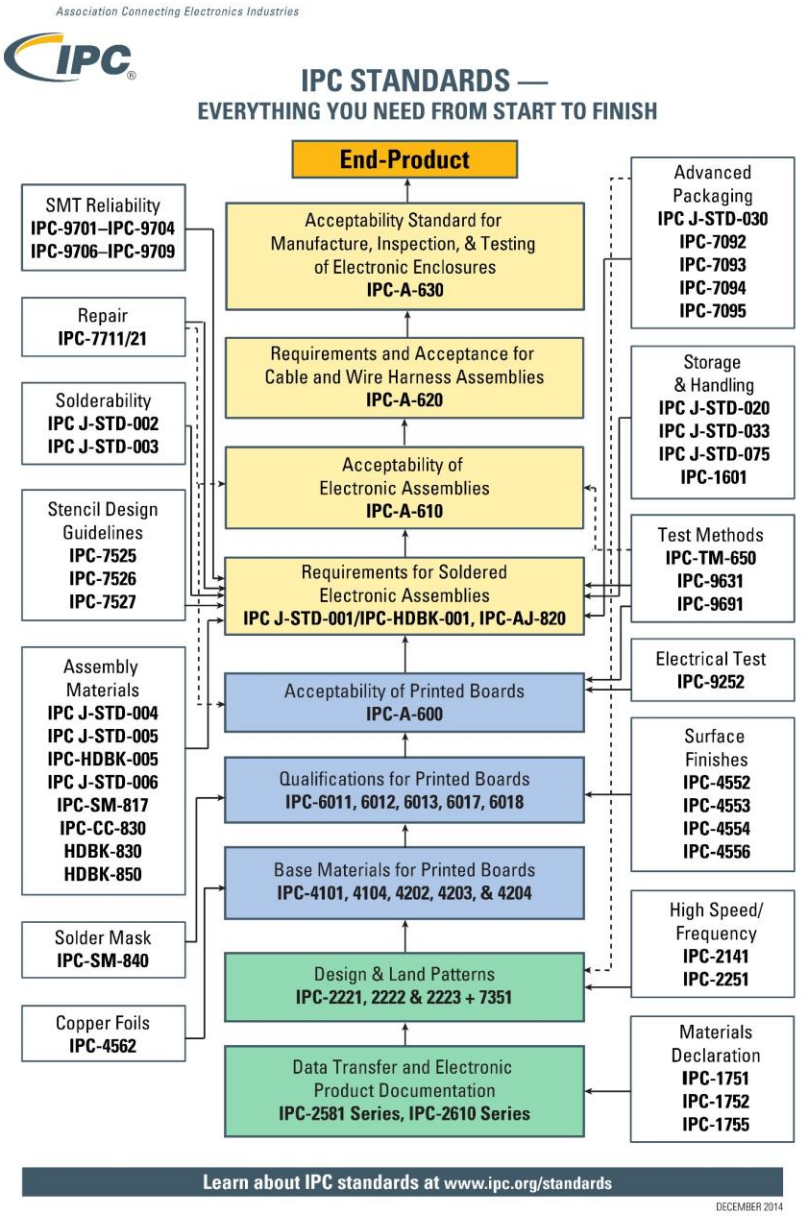
IPC Standard

Institute for Interconnecting and Packaging Electronic Circuit

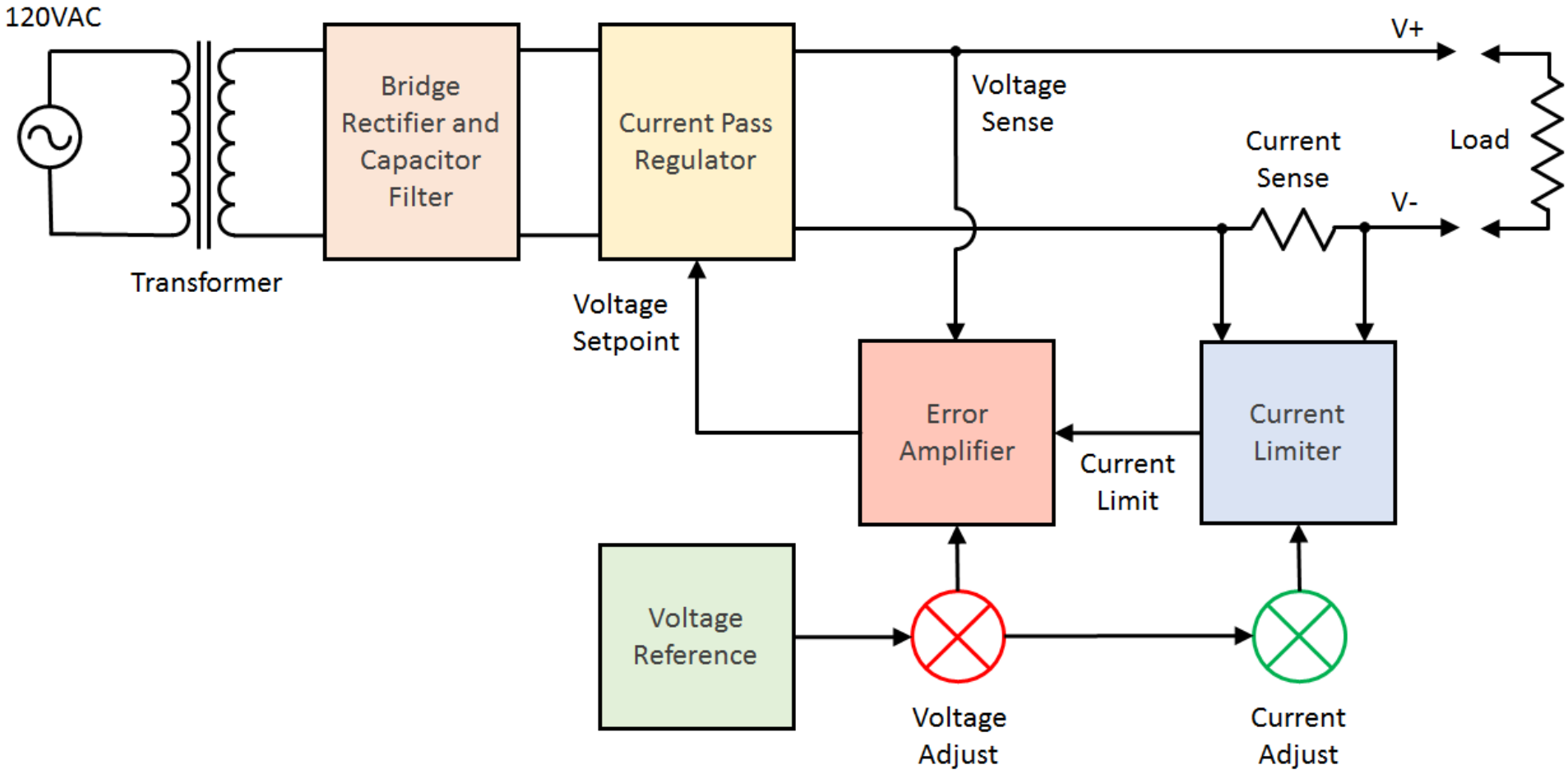
Founded in 1957

Develop standards used by electronics manufacturing industry and is used worldwide
By original equipment manufacturer OEM

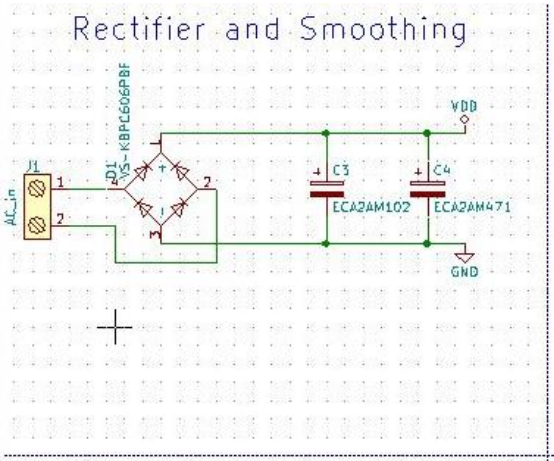
Standards are created by comittees of industry volunteers

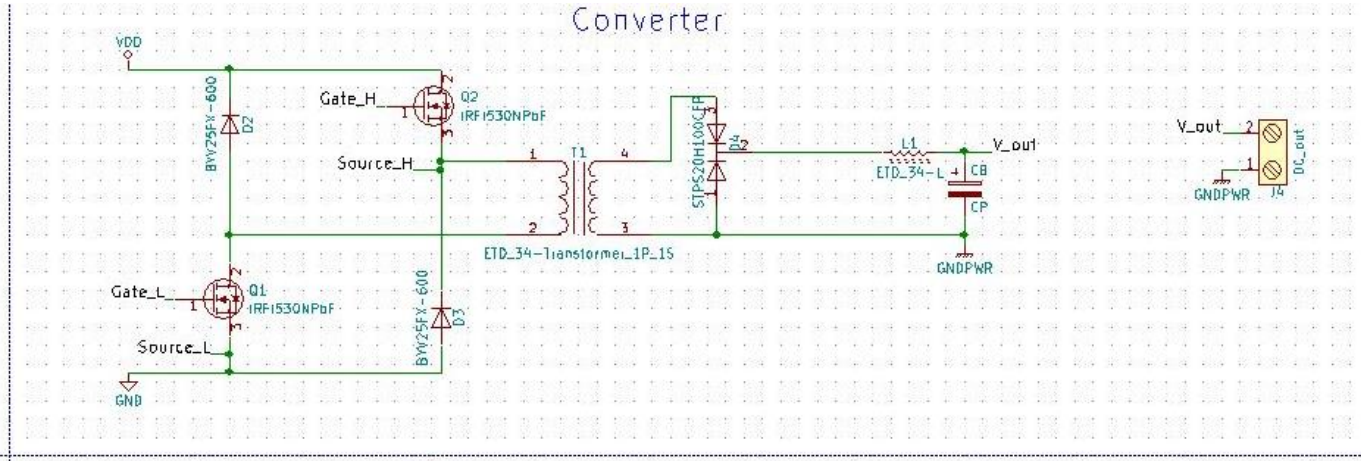


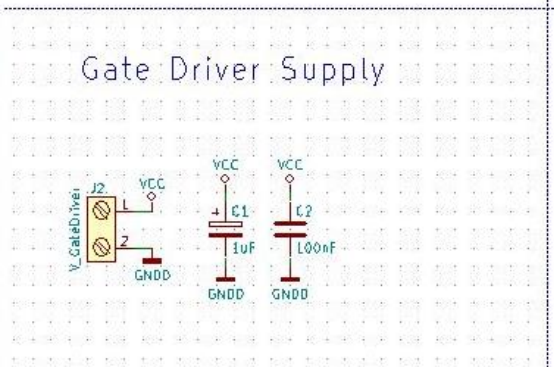
Block Diagram

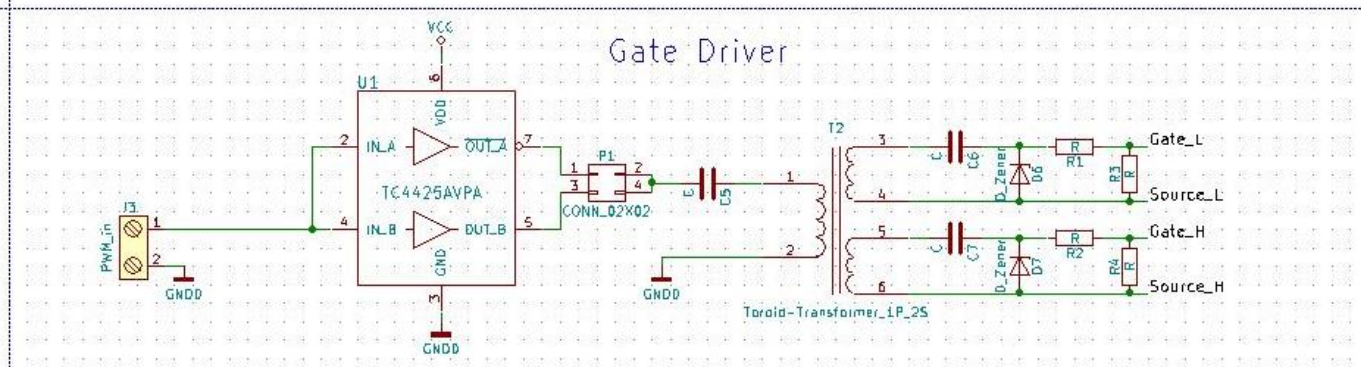


Schematic Diagram



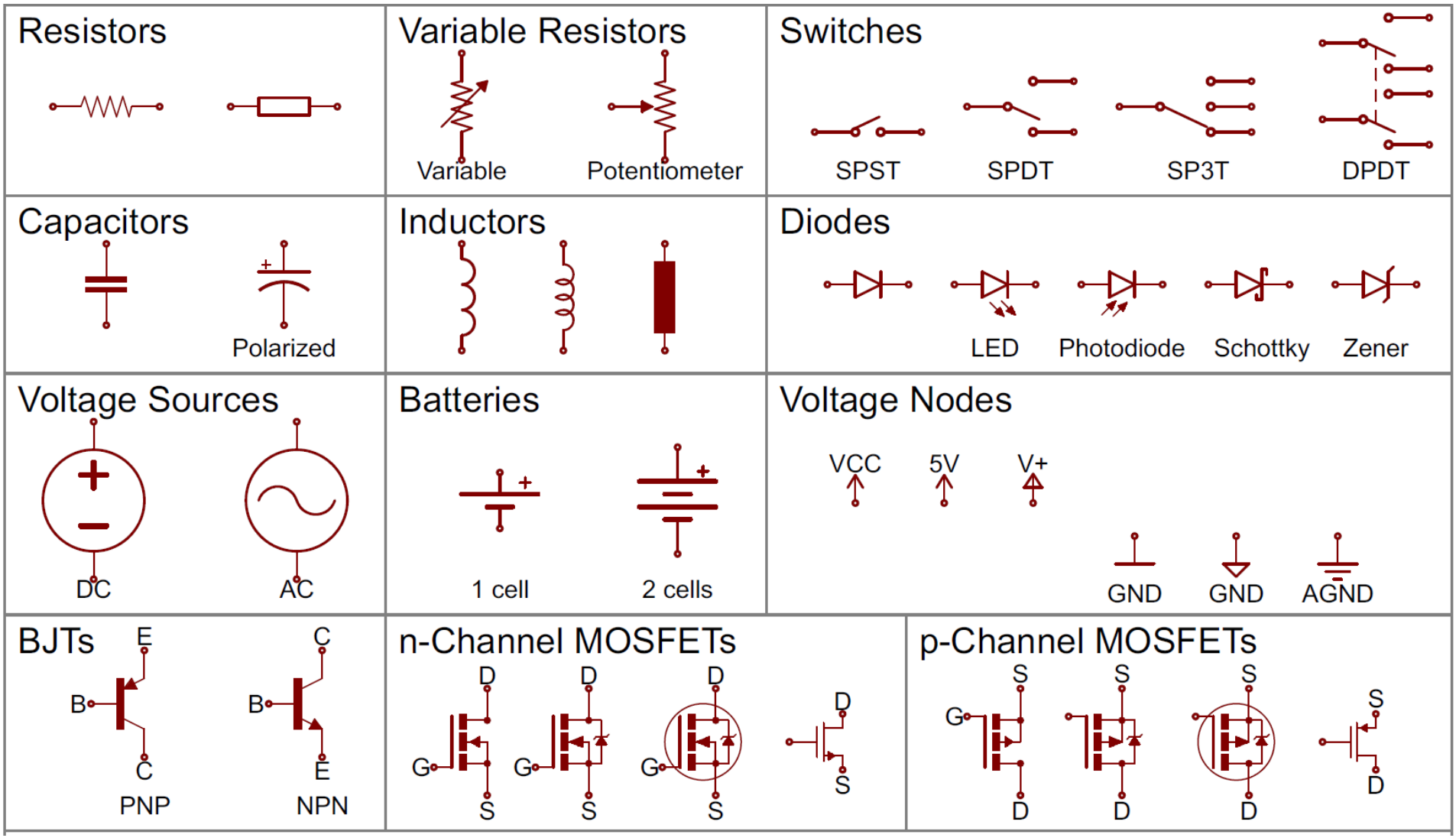




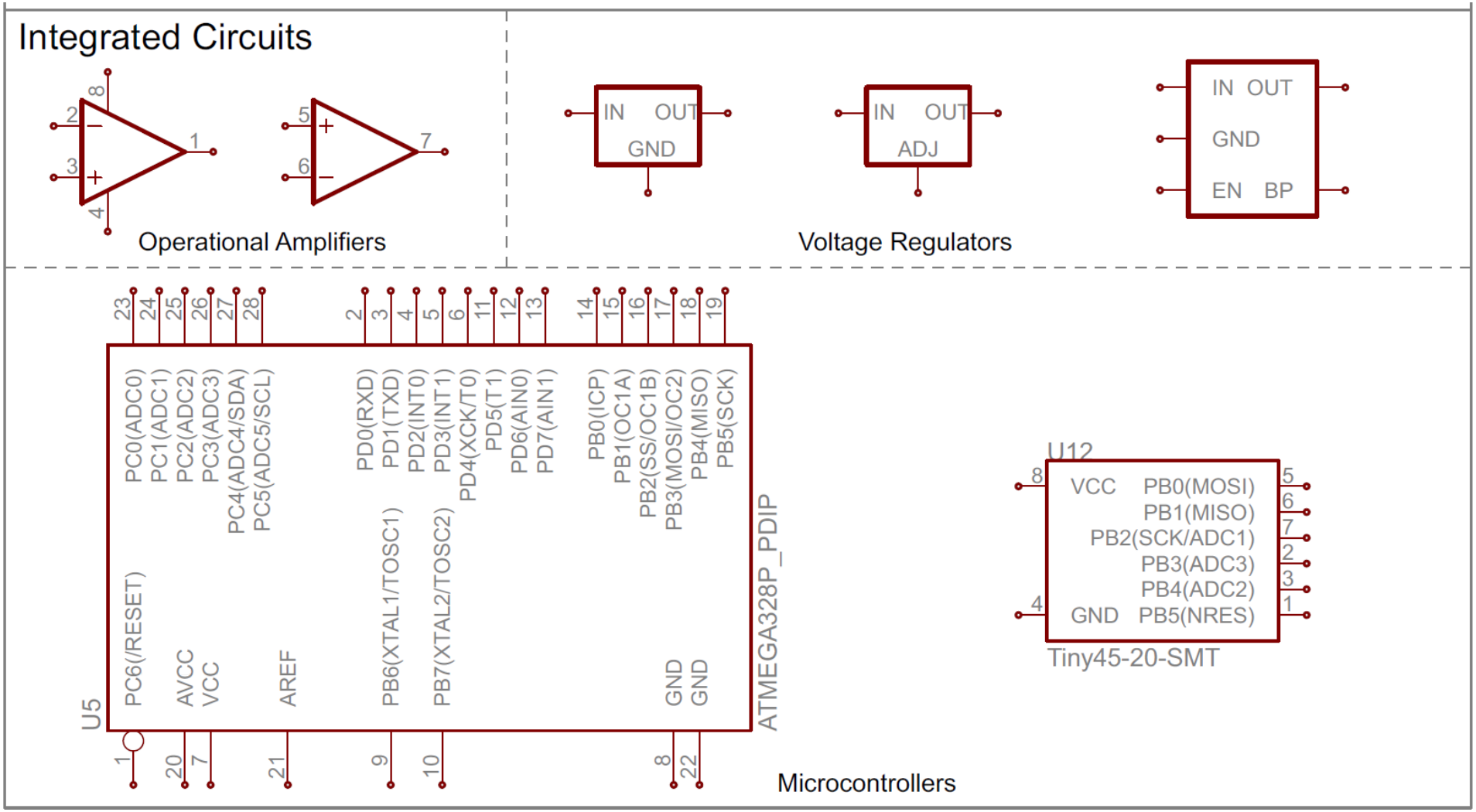


Schematic Editing

Schematic Symbols

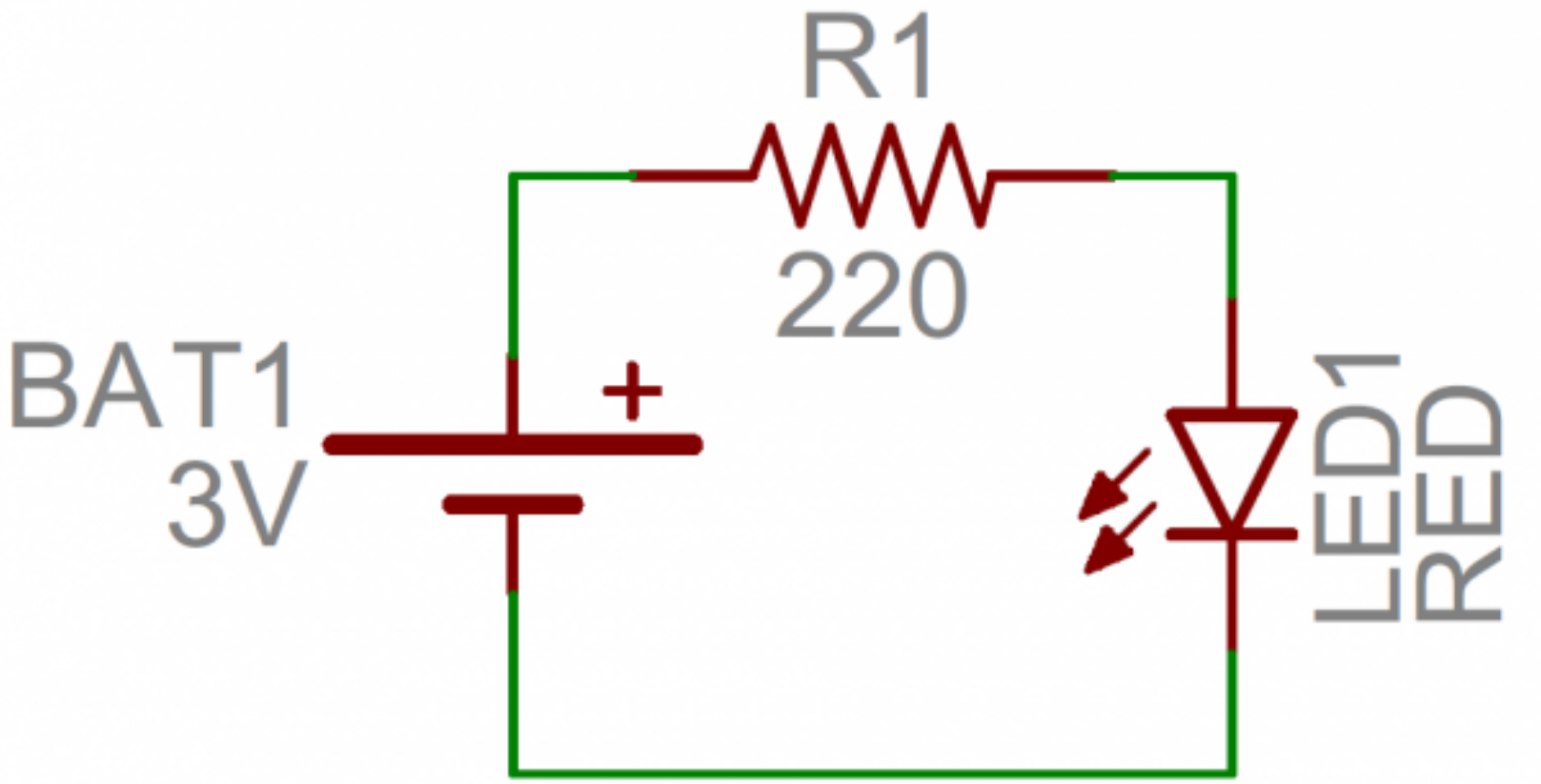


Schematic Editing
Schematic Symbols

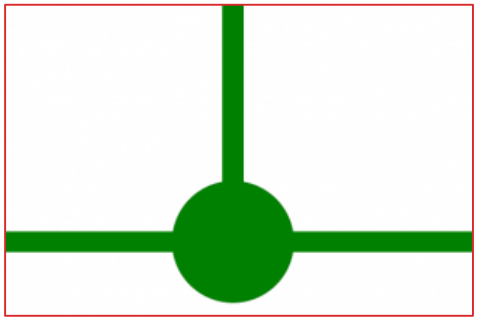


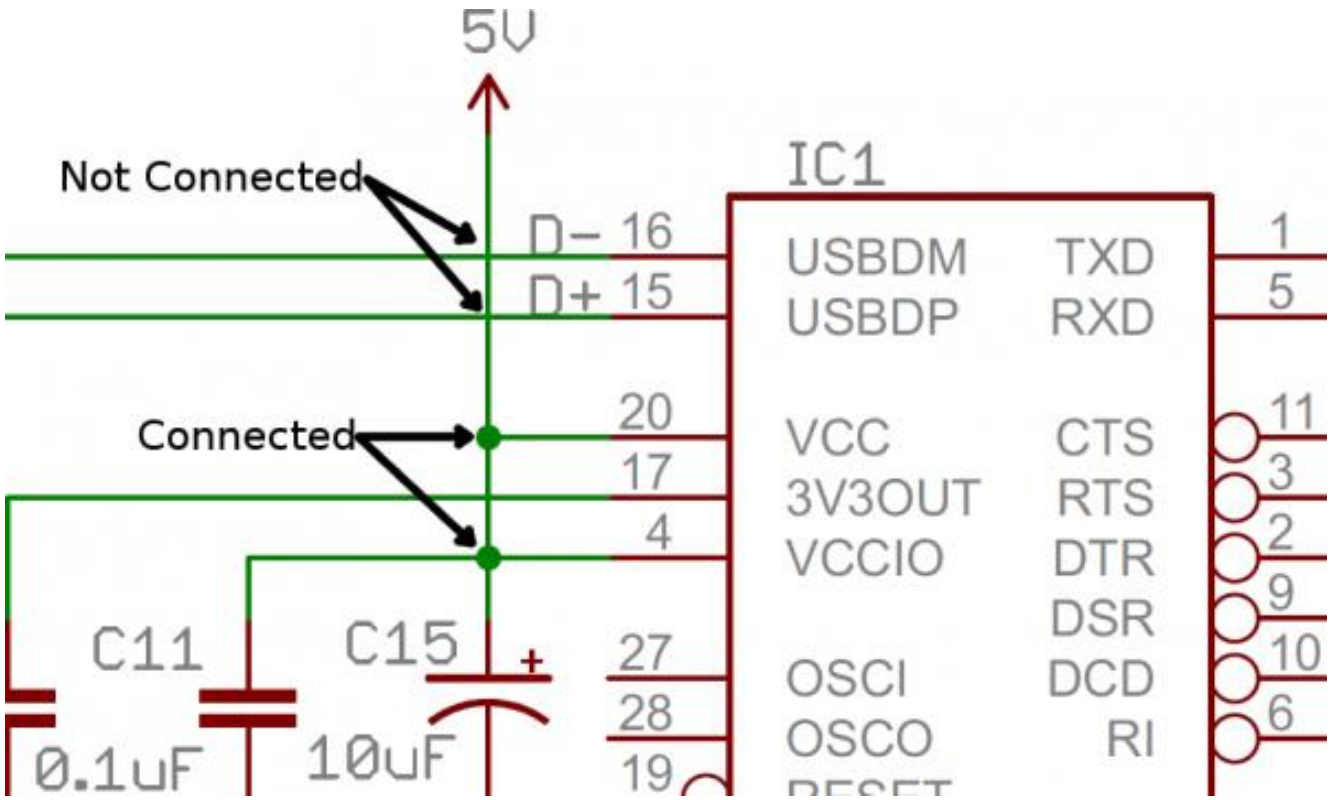
Schematic Editing

Net/Wire



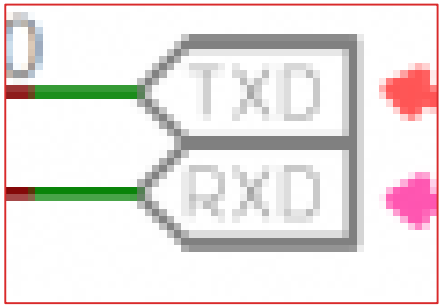
Schematic Editing
Nodes

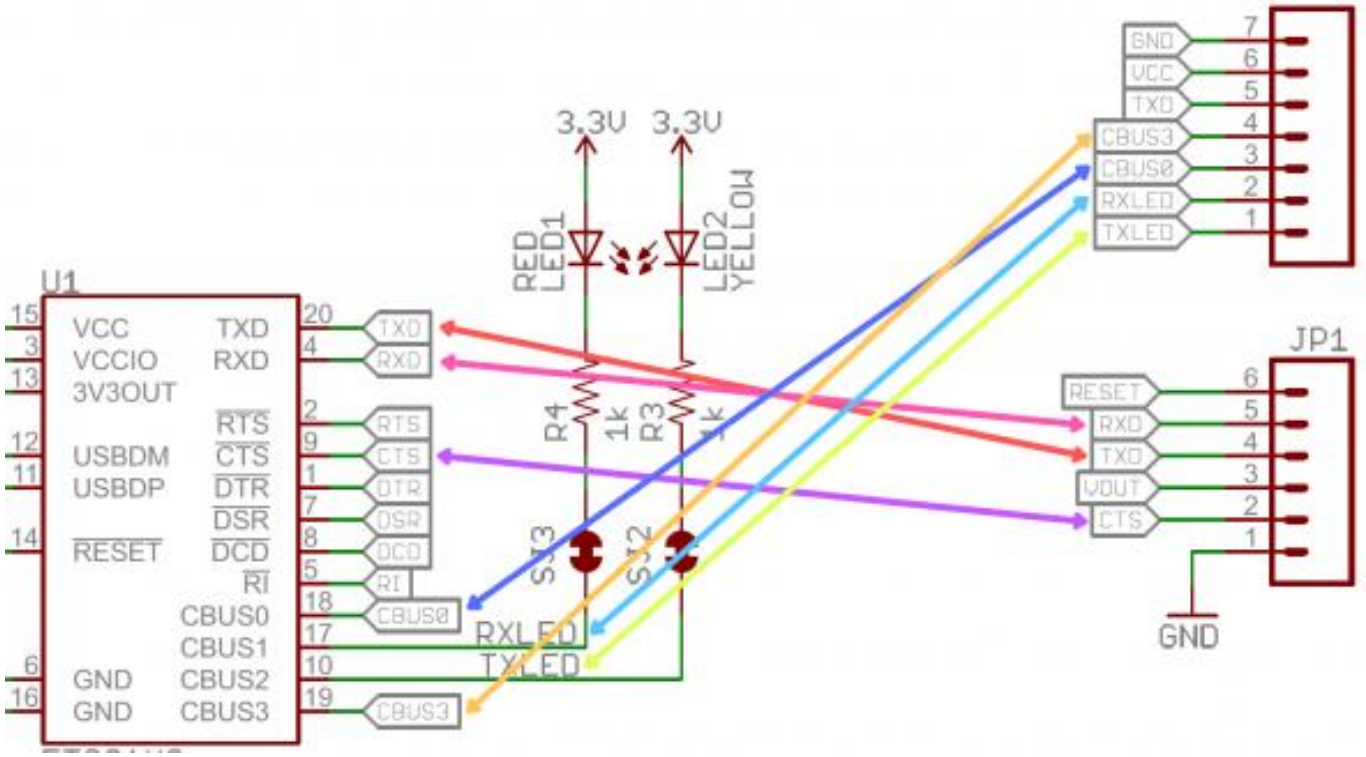




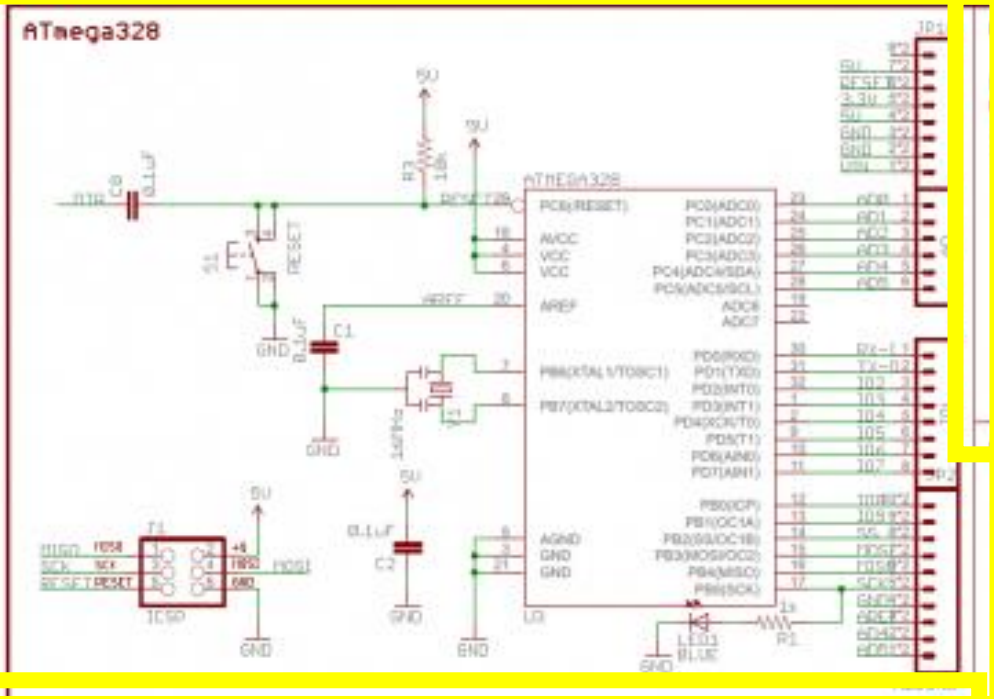
Schematic Editing

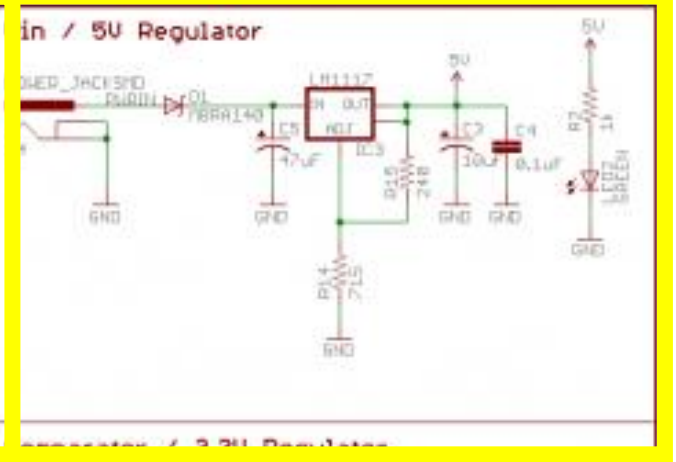
Net Label

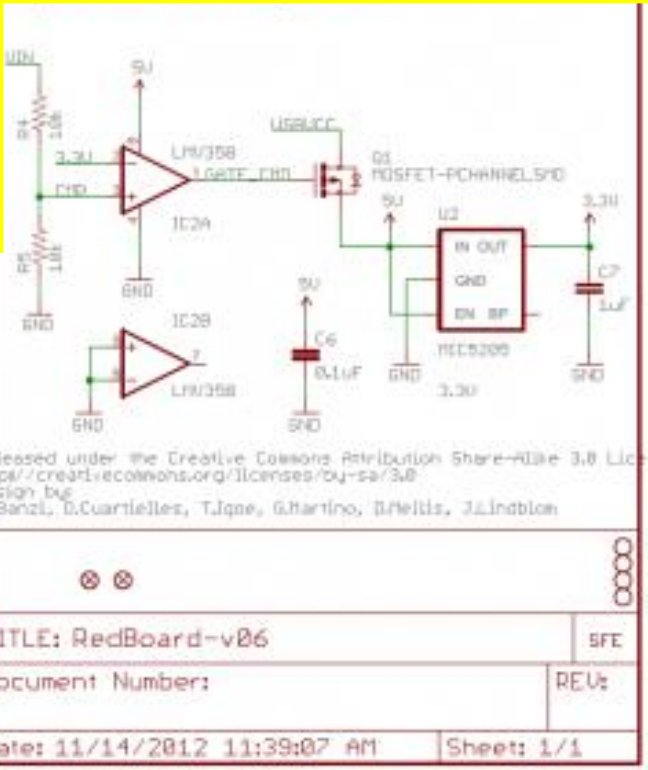


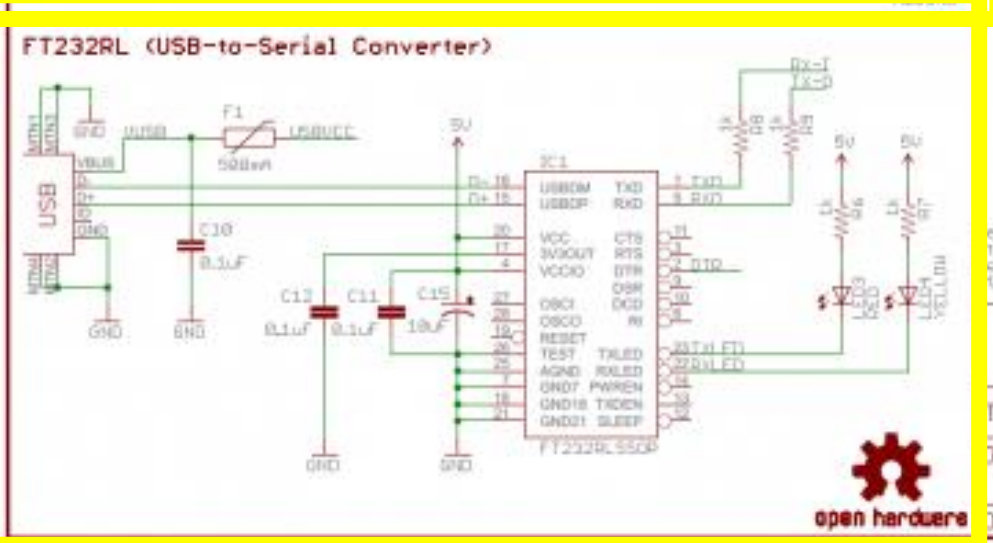


Schematic Editing
Block









Schematic Editing

Reference Designator

A	separable assembly
AR	amplifier
AT	attenuator; isolator
B	blower, motor
BT	battery
C	capacitor
CB	circuit breaker
CP	connector adapter, coupling
CN	capacitor network
D or CR	diode
D or VR	breakdown diode
DC	directional coupler
DL	delay line
DS	display, lamp
E	terminal
F	fuse
FD*	fiducial
FL	filter
G	generator, oscillator
GN	general network
H	hardware
HY	circulator, directional coupler
J	connector, jack, female
K	contactor, relay
L	coil, inductor, bead, ferrite bead
LS	loudspeaker, buzzer
M	meter
MG	motor-generator
MH*	mounting hole
MK	microphone
MP	mechanical part
P	connector, plug, male
PS	power supply
Q	transistor
R	resistor
RN	resistor network
RT	thermistor
S	switch
T	transformer
TB	terminal board, terminal strip
TC	thermocouple
TP**	test point, In-circuit test points
TZ	transzorb
U	inseparable assembly, IC pkg
V	electron tube
VR	voltage regulator
W	wire, cable, cable assembly
X	fuse holder, lamp holder, socket
Y	crystal, magnetostriction oscillator
Z	miscellaneous

Schematic Editing

Schematic Symbols