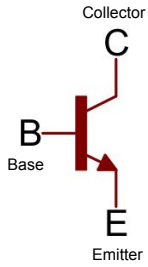


# 2N3904

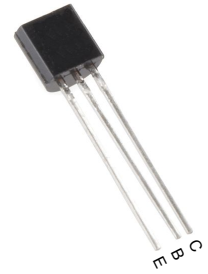
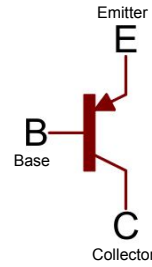
NPN



Bipolar Junction Transistor (BJT)

# 2N3906

PNP



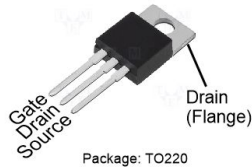
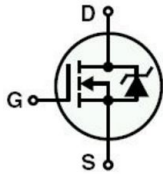
Bipolar Junction Transistor (BJT)

# HUF75321

N-Channel

Source connects to negative rail

Metal Oxide Semiconductor Field Effect Transistor (MOSFET)



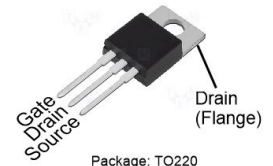
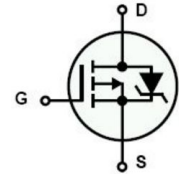
Package: TO220

# IRF5305

P-Channel

Source connects to positive rail

Metal Oxide Semiconductor Field Effect Transistor (MOSFET)



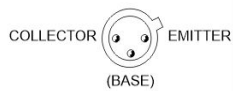
Package: TO220

# OP805

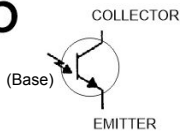
(discontinued)

NPN Phototransistor Infrared  $\lambda_{PS} = 890 \text{ nm}$

View from pin side:



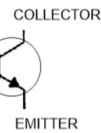
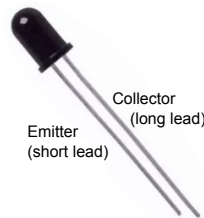
Base lead, while present, is not being used.



# QSD124

(replaces OP805)

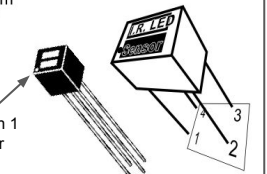
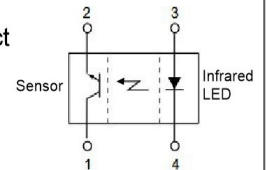
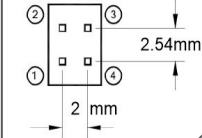
NPN Phototransistor Infrared  $\lambda_{PS} = 880 \text{ nm}$



# QRD1114

Reflective Object Sensor

View from pin side:

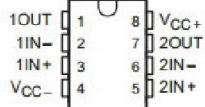


dot = pin 1 indicator

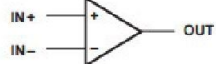
# TL082

OP-AMP Operational Amplifier (Dual)

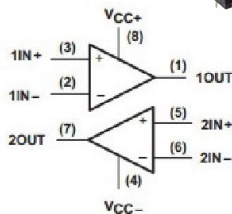
TL082, TL082A, TL082B D, JG, P, OR PW PACKAGE (TOP VIEW)



TL082 (EACH AMPLIFIER)  
TL084 (EACH AMPLIFIER)



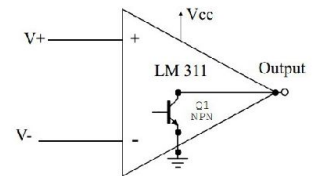
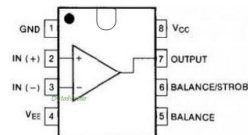
TL 082 = 2 amplifiers in 8-pin package  
TL 084 = 4 amplifiers in 14-pin package



# LM311

Voltage Comparator

LM 311 (Top View)



**Bring this kit every Tuesday for class. After class, we'll open LIFE 2402 so you can store it on your workbench. Alternatively, you can take it home, but don't forget to bring it for the next class.**

**Always insulate the battery with blue masking tape before storing it inside the box, to avoid shorting it.**

**After lectures end (week 6), replenish any missing or broken items. Throw away all broken bits, then remove the battery, and return the kit. We will set up a return area for this. Keep the multimeter at your workbench until the end of the course.**

## ENPH 253 Lecture Electronics Kit

item	qty	Description	Details	\$/unit
1	2	Battery	9V block battery	0.74
2	2	Battery Clip	9V battery clips with wires	1.75
3	2	Breadboard	Tiny Breadboard 170 holes	2.50
4	1	Capacitor	470 uF (electrolytic)	0.50
5	1	Capacitor	470 nF (474)	0.20
6	1	Capacitor	33 nF (333)	0.10
7	1	Capacitor	3.3 nF (332)	0.10
8	1	Capacitor	330 pF (331)	0.10
9	1	DC motor	DC Motor (1.5-9V range)	4.95
10	2	Diode	1N4007	0.16
11	2	IC	LM311 - Comparator (single)	0.53
12	3	IC	TL082 - Op Amp (dual)	0.27
13	1	Infrared	OP805 - IR phototransistor	0.30
14	2	Infrared	QRD1114 - proximity sensor	1.03
15	1	Lamp	Incandescent, 12v, size T-3 1/4	0.30
16	2	LED	LED red, 3mm	0.14
17	2	LED	LED green, 3mm	0.14
18	1	Multimeter	DVM810 (Jameco)	7.00
19	4	Resistor	100 ohm (brn - blk - brn)	0.01
20	4	Resistor	1k ohm (brn - blk - red)	0.01
21	4	Resistor	3.3k ohm (org - org - red)	0.01
22	4	Resistor	10k ohm (brn - blk - org)	0.01
23	4	Resistor	33k ohm (org - org - org)	0.01
24	4	Resistor	100k ohm (brn - blk - yel)	0.01
25	1	Potentiometer	Thumbwheel pot, 100k	1.06
26	4	switch	pushbutton tactile	0.28
27	2	Transistor	3904 NPN (BJT)	0.20
28	2	Transistor	3906 PNP (BJT)	0.20
29	2	Transistor	HUF75321 (N-Chan MOSFET)	1.10
30	2	Transistor	IRF5305 (P-Chan MOSFET)	1.10
31	set of	Jumper Wires	assorted (10 to 20 pieces)	0.25