



## **SMT** Soldering Basics

## Hello!

Surface mount soldering seems intimidating at first glance, but is easy with practice and understanding some basic techinques. In this class you'll learn a few of these techniques – enough to be able to solder and troubleshoot most basic kits.

The kits for the class contain a variety of different chip component sizes: 1206, 0805, 0603, and 0402 along with SOT-23 transistors and SOIC packaged IC chips. Don't fret if these mean nothing to you right now, they'll make sense soon.

Inside the kit box you will find what you need to handle SMT components and install them except for solder and a soldering iron. You will use the class provided soldering iron and solder. The box includes:

- 1 Electronic Microscope w/4.3" IPS display and 32GB MicroSD memory card
- 1 Tile base for microscope
- 1 Set of anti-static tweezers
- 2 Jeweler's loupes
- 1 Desoldering Braid
- 1 Tube of flux
- 2 Blunt tipped dispensing needles for flux
- 1 Squeeze plunger for flux tube
- 1 Pack of Soldering Aids
- 1 500-pack Q-Tips
- 1 16oz bottle of 91% Isopropyl Alcohol

Plus: 1 Square PCB kit with components and 1 star PCB kit with components

After assembling the kits, use the instructor's power supply to test.

Most components are easy to install. Chip type resistors and MLCC capacitors have no polarity. SOT-23 transistors install only one way on the 3 pads, and IC chips will have standard dots or indents on one end like their larger DIP type counterparts to indicate how they will be installed.

Resistors will be marked with their values and MLCC capacitors will have no markings at all. Be careful to install one value set at a time to avoid soldering the wrong part to the pads on the PCB.

Resistors will be marked similar to the following:

"101" where the first 2 digits "10" is the value and the the third is the number of zeros to add to the value. 101 = 10 + 1 more zero = 100 ohms. 102 = 10 + 2 more zeros = 1000 ohms.

47R = 47 ohms. The R is for decimal and signifies the value is <100

4R7 = 4.7 ohms. In this case the R is the decimal and the digit to the right of it the tenths digit.

LEDs are easy to install backwards so check their markings vs. the markings on the PCB silkscreen to ensure they get properly installed:



Square PCB:





Name	Parameter	Quantity	
1206 Resistor	Random	12	
0805 Capacitor	Random	12	
0805 Resistor	Random	12	
0603 Resistor	Random	14	
0603 Capacitor	Random	14	
0402 Capacitor	Random	14	
0805 Resistor	1K ohm	15	
LED		11	
LED		4	
Triode	J3Y	4	
Diode	4148	4	
0805 Resistor	10K ohm	5	
0805 Resistor	2M ohm	1	
0805 Capacitor	0.1uF	2	
IC	NE555	1	
IC	CD4017	1	

Practice components: Easy: R1 – R12: Random 1206 resistors

Medium: C1 – C12: Random 0805 capacitors R13 – R24: Random 0805 resistors

Hard: C13 – C26: Random 0603 capacitors R34 – R47: Random 0603 capacitors

Very hard: Other: 14 0402 components

Flashing LED Circuit: R48 – R68: 620 Ohm 0805 resistor (marked 621) D12 – D15: 4148 Diode Q1 – Q4: MMBT8050 / S8050 Transistor (Marked J3Y) U1: CD4017 (16 pin SOIC) U2: NE555 (8 pin SOIC) D1 – D11: Blue LED D16 – D19: Green LED C27 – C28 .1uf 0805 capacitor

6. Schematic diagram:





Star Kit:

## **High Quality PCB Board**



FRONT

BACK



Component Listing					
NO.	Component Name	PCB Marker	Parameter	Quantity	
1	SMD 0805 Resistor	R5	22ohm	1	
2	SMD 0805 Resistor	R6	33Kohm	1	
3	SMD 0805 Resistor	R1,R2,R4	47Kohm	3	
4	SMD 0805 Resistor	R3	100Kohm	1	
5	SMD 0805 Capacitor	C1	47uF	1	
6	LM358	UI	SOP-8	1	
7	S8050 Transistor	Q1	SOT-23	1	
8	SMD 0805 LED	LED1-LED20	Red or Green or Blue	20	
9	Red Cable		20cm	1	
10	Black Cable		20cm	1	
11	PCB	PB00060	47*45*1.5mm	1	

NOTE: Users can complete the installation according to the PCB silk screen and coponent list.