INTRODUCTION TO CAPACITORS

Introduction

A capacitor is a two-terminal, electrical component. Along with resistors and inductors, they are one of the most fundamental **passive** components we use. You would have to look very hard to find a circuit which *didn't* have a capacitor in it.

What makes capacitors special is their ability to **store energy**; they're like a fully charged electric battery. *Caps*, as we usually refer to them, have all sorts of critical applications in circuits. Common applications include local energy storage, voltage spike suppression, and complex signal filtering.

Covered in this Tutorial

In this tutorial, we'll be examining all sorts of capacitor-related topics, including:

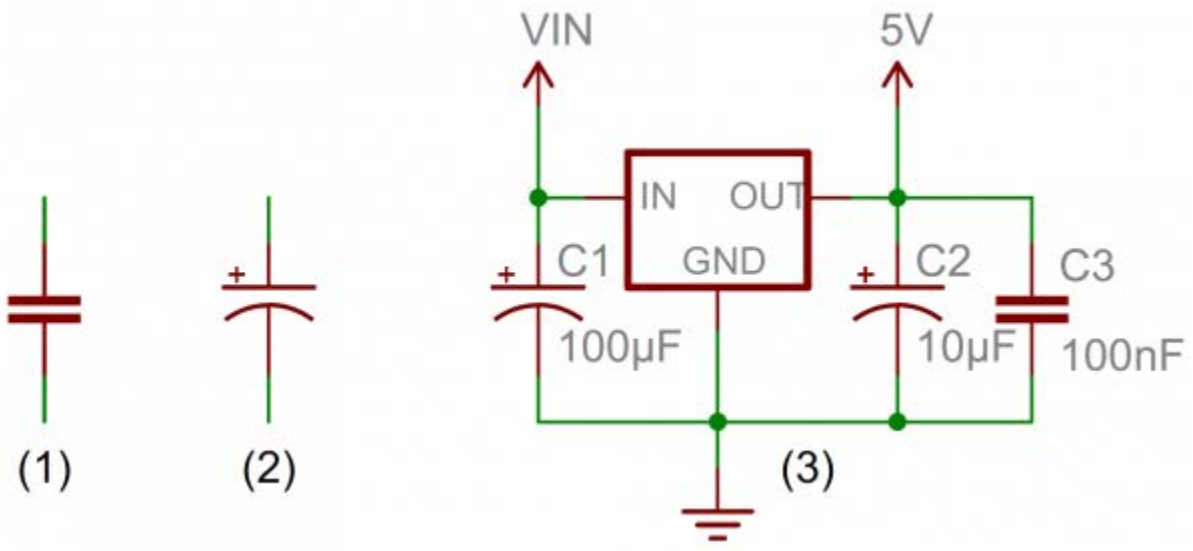
- How a capacitor is made
- How a capacitor works

- Units of capacitance
- Types of capacitors
- How to recognize capacitors
- How capacitance combines in series and parallel
- Common capacitor applications

Symbols and Units

Circuit Symbols

There are two common ways to draw a capacitor in a schematic. They always have two terminals, which go on to connect to the rest of the circuit. The capacitors symbol consists of two parallel lines, which are either flat or curved; both lines should be parallel to each other, close, but not touching (this is actually representative of how the capacitor is made). Hard to describe, easier to just show:



(1) and (2) are standard capacitor circuit symbols. (3) is an example of capacitors symbols in action in a voltage regulator circuit.

The symbol with the curved line (#2 in the photo above) indicates that the capacitor is polarized, meaning it's probably an electrolytic capacitor. More on that in the types of capacitors section of this tutorial.

Each capacitor should be accompanied by a name – C1, C2, etc.. – and a value. The value should indicate the capacitance of the capacitor; how many farads it has. Speaking of farads…

Capacitance Units

Not all capacitors are created equal. Each capacitor is built to have a specific amount of capacitance. The capacitance of a capacitor tells you **how much charge it can store**, more capacitance means more capacity to store charge. The standard unit of capacitance is called the **farad**, which is abbreviated *F*.

It turns out that a farad is a *lot* of capacitance, even 0.001F (1 milifarad – 1mF) is a big capacitor. Usually you'll see capacitors rated in the pico- (10^{-12}) to microfarad (10^{-6}) range.

Prefix Name	Abbreviation	Weight	Equivalent Farads
Picofarad	pF	10^{-12}	0.000000000001 F
Nanofarad	nF	10^{-9}	0.000000001 F
Microfarad	µF	10^{-6}	0.000001 F
Milifarad	mF	10^{-3}	0.001 F
Kilofarad	kF	10^{3}	1000 F

When you get into the farad to kilofarad range of capacitance, you start talking about special caps called *super* or*ultra*-capacitors.

Source : https://learn.sparkfun.com/tutorials/capacitors