

# ELEMENTS OF ELECTRONIC CIRCUITS

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This document is intended to provide you a detail of my experience by listing the electronic components and devices which I have used in my career. Since Alessandro Volta invented the voltaic pile, possibly the first chemical battery in 1800, the industry has been advancing with tremendous growth. Today we have wide variety of electrical and electronic components, devices and their derivatives. It would be difficult to cover each every device/derivative in one document as each topic has been studied in too much detail in last century.

## Electronic components:

- **Resistors**
  - Carbon film
  - Carbon composition
  - Metal oxide film
  - Metal film
  - Wire wound
- **Capacitors**
  - Electrolytic (Polarized)
    - Aluminum
    - Tantalum
  - Ceramic
  - Multi-layer ceramic
  - Mica
  - Mylar
  - Polycarbonate
  - Glass
- **Inductors**
  - Air core
  - Iron core
  - Ferrite bead
- **Batteries**
  - Alkaline
  - Lithium-ion
  - Lead-Acid
  - Nickel cadmium
  - Zinc chloride
- **Electronic transducers**
  - Photo resistors
  - Photo diodes
  - Thermistors
  - Piezoelectric ceramic / crystals
  - Magnets / electromagnets
  - Hall effect

## Magnetics:

- Transformers
  - Tapped
  - Multiple windings
  - Auto transformer
  - Power transformer
  - Pulse transformer
  - Audio / signal transformer
- Choke
  - Air core
  - Powder core
  - Iron core
  - Common mode
  - Differential mode
- Relay
  - Hold coil only
  - Close-Trip coils

## Electronics devices:

- Diodes
  - Rectifiers
  - Zener
  - Schottky
  - Photo diode
  - Light emitting diode
  - Varicap
  - Transient voltage suppressor (TVS)
  - Zero reverse recovery
- Transistors
  - Bipolar junction
    - NPN
    - PNP
    - Photo
    - SCR
    - Triacs
  - Field Effect (FET)
    - Junction FET
      - Depletion
        - N-channel
        - P-channel
      - Enhanced
        - N-channel
        - P-channel
    - Metal oxide FET (MOSFET)
      - Enhanced
        - P-channel
        - N-channel
  - Hybrid

- IGBT
  - Thyristors
    - GTO
    - MCT
- Amplifier
  - Single Ended & Differential
  - Gain
  - Trans conductance
  - Impedance converter
- Comparators
  - Hysteresis / Window

#### Electrical Machines:

- DC
  - Motors
    - Brushed
      - Separately excited
      - Series excited
      - Parallel excited
    - Brushless
      - Unidirectional
      - Bidirectional
    - Switch reluctance
    - Stepper
- AC
  - Motors
    - Induction & synchronous
  - Generators
    - synchronous

#### Digital system:

- Elements
  - Gates
    - AND / NAND
    - OR / NOR / XOR
- Controllers
  - Microcontrollers
    - RISC / CISC
    - 4-bit to 32-bit
- Memory
  - Volatile
    - SRAM / PSRAM
    - DRAM
    - DDR2/3
  - Non-volatile
    - ROM
    - NOR
    - NAND
    - EEPROM