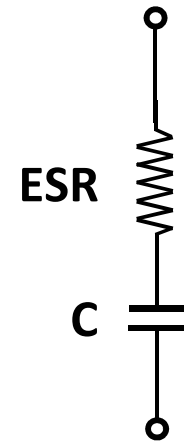


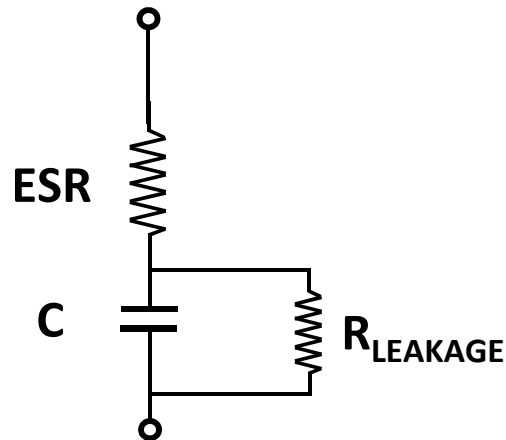
# Capacitor ESR

- ESR = Equivalent Series Resistance
- ESR in capacitors:
  - RF applications
    - “Q” or “Loss Tangent” quantifies loss
      - Measure with RF equipment (ie., “Q Meter”)
  - Low frequency applications
    - Electrolytic capacitors usually used to
      - Couple/decouple low frequency signals
      - **Reduce power supply ripple**
    - “ESR” quantifies loss
      - Measure with ESR Meter
      - Can’t measure capacitor ESR with a conventional OHM Meter
- Electrolytic capacitor lifetime: 1000 hrs to > 40 yrs
  - Driven mostly by:
    - Heat
    - Ripple current



# Measuring Capacitor ESR

- ESR Meter = Low Ohms Meter
  - **0.01** to 40 ohms with **1% accuracy** and **0.01 ohm resolution**
- Can be used to test:
  - Capacitors **IN CIRCUIT**
    - No risk to damage of other components
  - Location of a short circuit
  - Bad solder joints and switch contacts
  - Batteries
- Capacitance and ESR are **NOT** closely correlated
  - Capacitance can be good and ESR can be bad (and vice versa)
- ESR is not the same as LEAKAGE resistance



# How An ESR Meter Works

Anatek meter generates bursts of 8 usec pulses at a 2 KHz rate with a max level of 500 mv P-P

highly conductive liquid called the "electrolyte", which effectively connects the negative plate to the oxide layer and gives the capacitor its name. In very old electrolytics, the electrolyte was water-

tance itself.

In operation, electrolytic capacitors can function perfectly for decades. However, there are some conditions which will cause the electrolyte's resistance (ESR) to increase. This can eventually reach a point where it causes problems for the circuit.

Normally, a flexible rubber seal keeps the electrolyte contained inside the aluminium case of the capacitor. If the seal fails (as it regularly does in surface-mount electrolytics), the electrolyte will

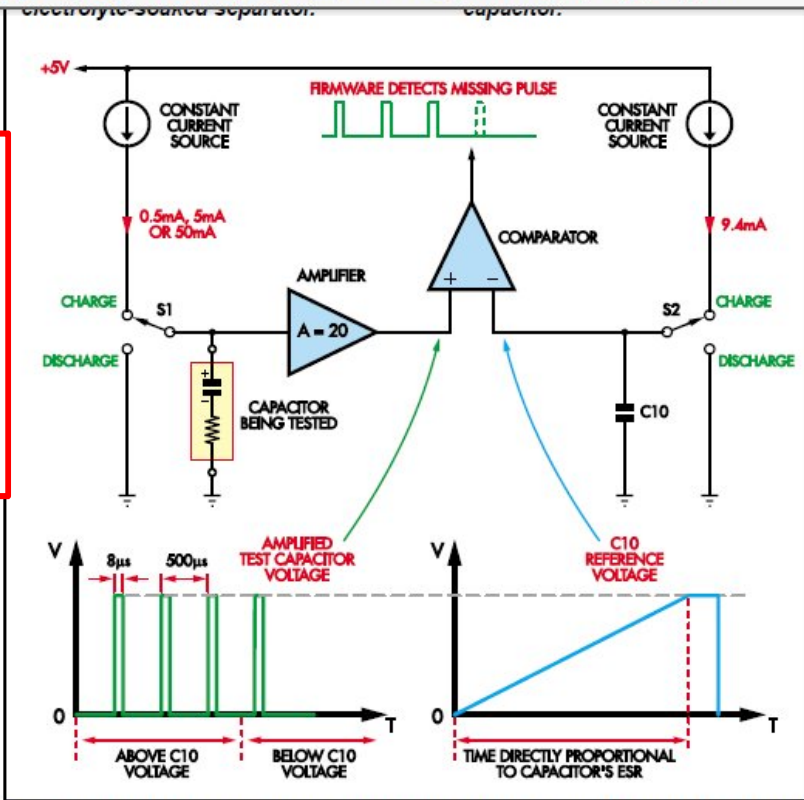
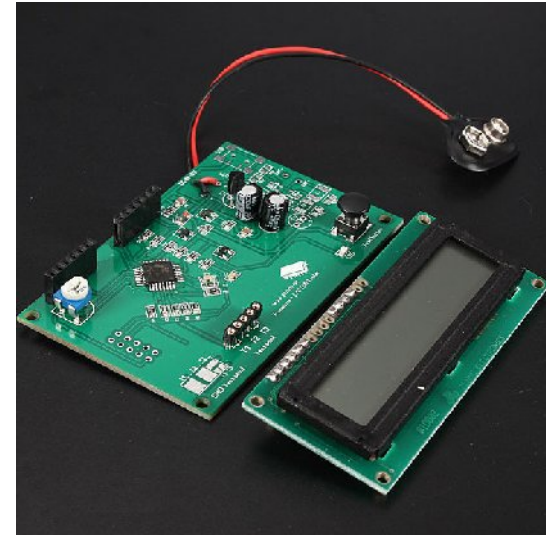


Fig.3: this block diagram shows the basic scheme for the ESR meter. S1 is an electronic switch and it allows the test capacitor to be alternately charged for 8µs from a constant current source and then discharged for 492µs. The result-

# Capacitor ESR Meters

- eBay
  - Transistor, Capacitor, **ESR**, Inductance, Resistor, LCR, NPN, PNP, Mosfet, LED, Meter
  - **\$21.99**
  - Seller: cenn2010



- Blue ESR METER
  - [Buy direct](http://www.anatekcorp.com/)
  - <http://www.anatekcorp.com/>
  - **\$79 (kit)**

