Four Point Probe Technique - Linear Method.

→ One of the most common approaches for measuring Sheet or Surface Conductivity is the four-point probe method.

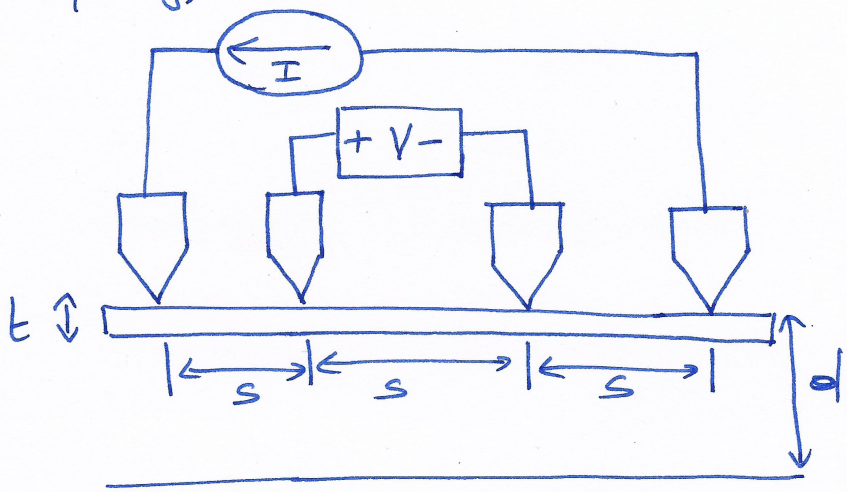
Principle

→ The Current is driven between a pair of probes or Connections and the voltage is measured across the other two.

→ The four-point probe method is most often realised by Contacting a flat film surface with four equally spaced in-line probes.

Experiment.

→ The four-point probe method, has four equally spaced in-line probes with probe tip diameters Small Compared to the probe Spacing, "S".



In-line four-point probe measurement of a Conductive film of thickness t, uses a known Current Source, high-impedance Voltmeter, Spring loaded Sharp probes.

→ An Ohmic Contact is assumed between the probe tip and the Sample.

→ Current is most Commonly passed between the outer two probes and the voltage difference is measured between the two inner probes.

→ Resistivity in a four-point probe measurement is given by

$$\rho = \frac{2\pi s F V}{I}$$

where, F → is a Correction factor.

→ for placement of probes near the center of a medium of area large relative to the probe spacing, and of a semi-infinite thickness, the Correction factor F is unity.

→ The Correction factor F is dependent on the thickness of Conducting layer, Sample thickness, lateral dimensions of the Sample (Square, round, etc) and the Conducting or Semi-Conducting nature of Samples.

→ Locating the probes closer than four probe spacings from the wafer edge can also result in measurement error.

→ Separation of the current source from the high-impedance voltage meter avoids errors associated with contact resistance

→ At times of Semiconductor measurements, Sufficient Separation between the current and voltage probes is required so that minority carriers injected near the current probes recombine before their presence can be felt the voltage probes.