

302 Resistivity Probe Stand

The 302 resistivity probe stand is designed for measuring sheet resistivity on samples with flat surface. Making good measurements requires the four point probe to put even pressure on each point and assure the probes move straight up and down. The four point probe contains four thin collinearly placed tungsten wire probes which are made to contact the sample under test. Current I is made to flow between the outer probes, and voltage V is measured between the two inner probes, ideally without drawing any current.

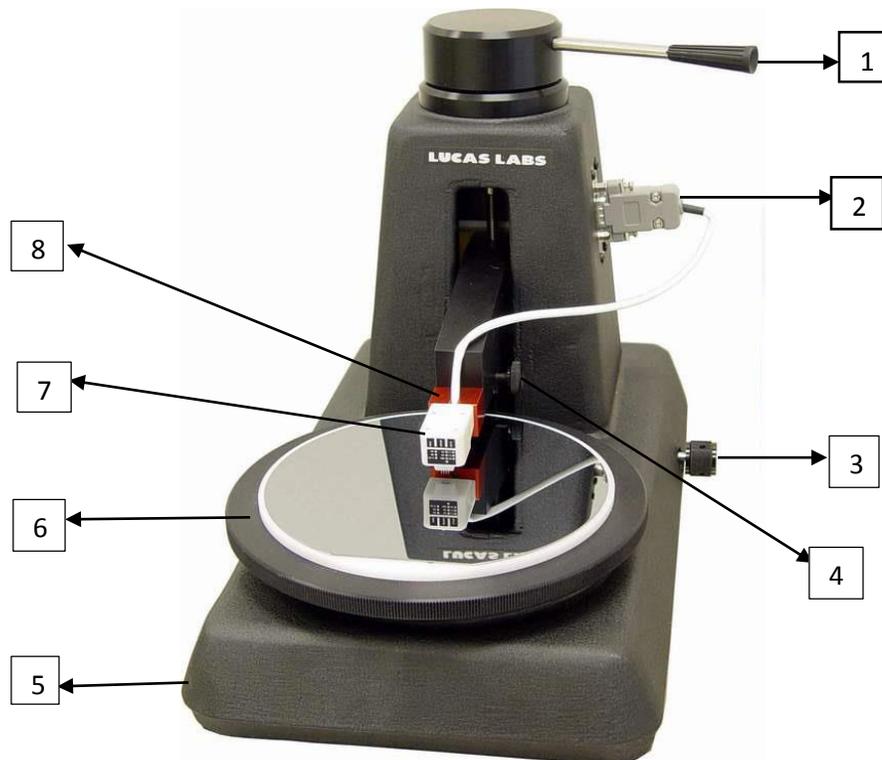


Figure 1. Resistivity probe stand

The components of the resistivity stand are:

1. Contact Lever
2. Probe Head Electrical Connection
3. Z adjustment Knob
4. Mounting Block Lock
5. Base Stand
6. Mounting chuck
7. Probe Head
8. Probe Head Mounting Block

With the probe head mounted and the meters electrically connected (current source connected to pins 1 and 4, voltmeter connected to pins 2 and 3), the system is ready for measuring sheet resistance of a sample. The following formula is used:

$$R_s = 4.5324 V/I$$

R_s – Ohms

V – Voltage (V)

I – Current (Amps)

The theory makes the following 6 assumptions: [1]

1. The spacing between probe tips is the same between each probe tip.
2. The contact pressure on all four probe tips is uniform
3. The edge of the sample is at least 10 times the spacing from the nearest probe tip.
4. The thickness of the sample is less than 0.4 times the spacing between probe tips.
5. The current is forced until a voltage reading between 1 and 100 mV is achieved.
6. Temperature is 23 °C

To make a measurement:

1. Turn on the electric current source and set the current value. The current should not exceed 800 μ A. A larger current may disrupt the metal film and/or damage the probe!
2. Lower the probe head into contact with the sample.
3. Read the voltage. If voltage reading is unstable, try increasing the current setting. Continue until voltage reading is stable.
4. Apply the equation above to calculate R_s .

Note: to avoid overheating the probe tips, try to take the readings as quick as possible.

Reference

[1] L.B. Valdes, "Resistivity Measurements on Germanium for Transistors".