

HMS-5000

Van der Pauw

Hall Effect Measurement System

Plots temperature dependant
Variables in the Range from
80K to 350K

Automated Motorized Magnet
Movement

PC not included. Runs on MS
Windows operating systems.

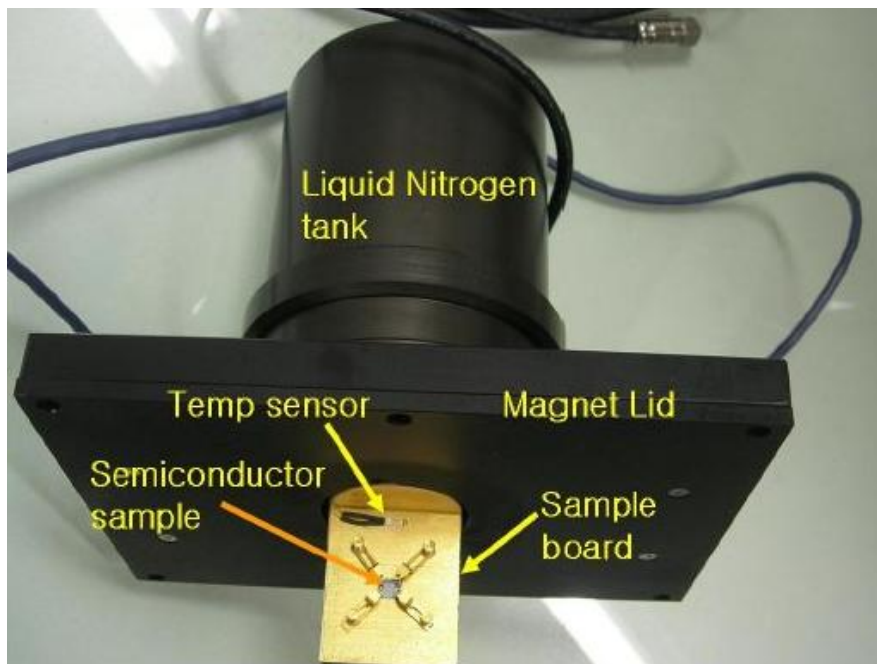


The HMS-5000 Hall Effect Measurement System plots concentration versus temperature, mobility versus temperature, resistivity versus temperature, conductivity versus temperature, and Hall coefficient versus temperature. The system provides the test results as tabular data as well as in graph form. The user defines the desired temperature steps within the range of 80K to 350K, fills the two LN2 reservoirs, and then the system automatically applies and switches the input current, measures the voltages, changes temperature, and moves the magnets all without user intervention. Once the test is finished, the temperature dependent graphs and tabular data are ready for viewing. The magnet movement is motor controlled and automated, variable temperature capability, and powerful analysis software. The system is automated so that without user intervention, it will ramp to each user defined temperature, stabilize, make the measurement (including moving the magnet automatically), and then plot a variety of temperature dependent electrical material properties.

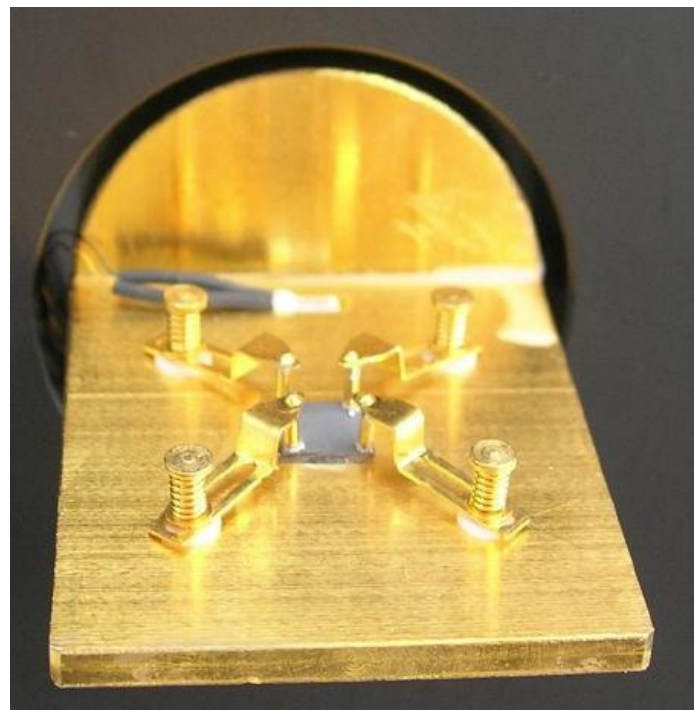
- Sample size: 5 mm x 5mm up to 15mm x 15mm
- Resistivity: 10^{-4} to 10^7 (Ohms-cm)
- Magnet : Permanent magnet, 30 mm diameter
- Magnet Flux Density: 0.55T nominal +/-1% of marked value
- Mobility: ($\text{cm}^2/\text{Volt-sec}$) $1 \sim 10^7$
- Concentration: (cm^{-3}): $10^7 \sim 10^{21}$
- Current Source: Range: 1nA-20mA Compliance: 12V
- Minimum Hall Voltage: $1\mu\text{V}$
- Temperature Range: 80K to 350K



Software displaying *Bulk Concentration Versus Temperature* in range from 80K to 340K

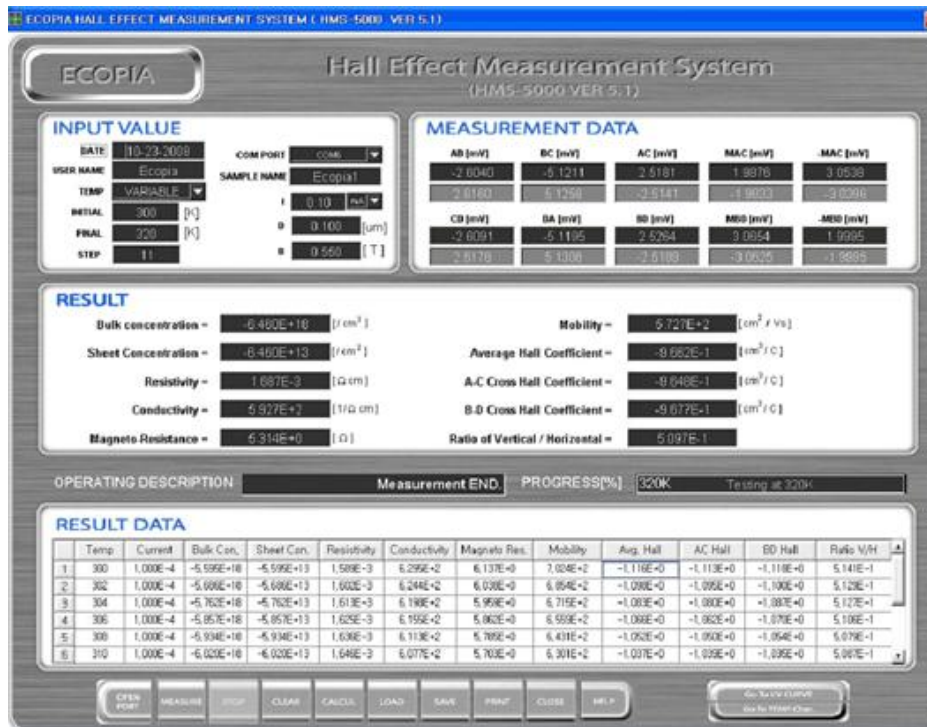


Sample Mounting Fixture with upper cooling reservoir

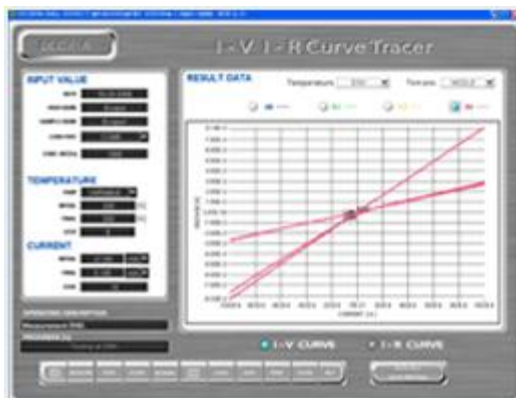


Sample Mounting Fixture

Samples should be square in shape and can be from 5mm x 5mm up to 20mm x 20mm in size.



HMS-5000's Main Test Page



I-V, I-R graph per temp variation



Carrier concentration vs temp variation



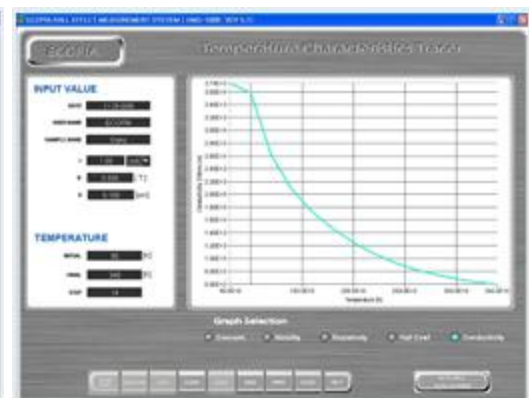
Carrier mobility vs temp variation



Resistivity vs temp variation

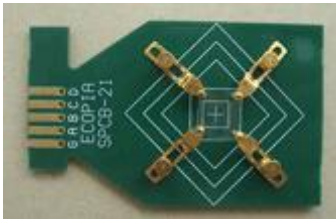


Hall Coefficient vs temp variation

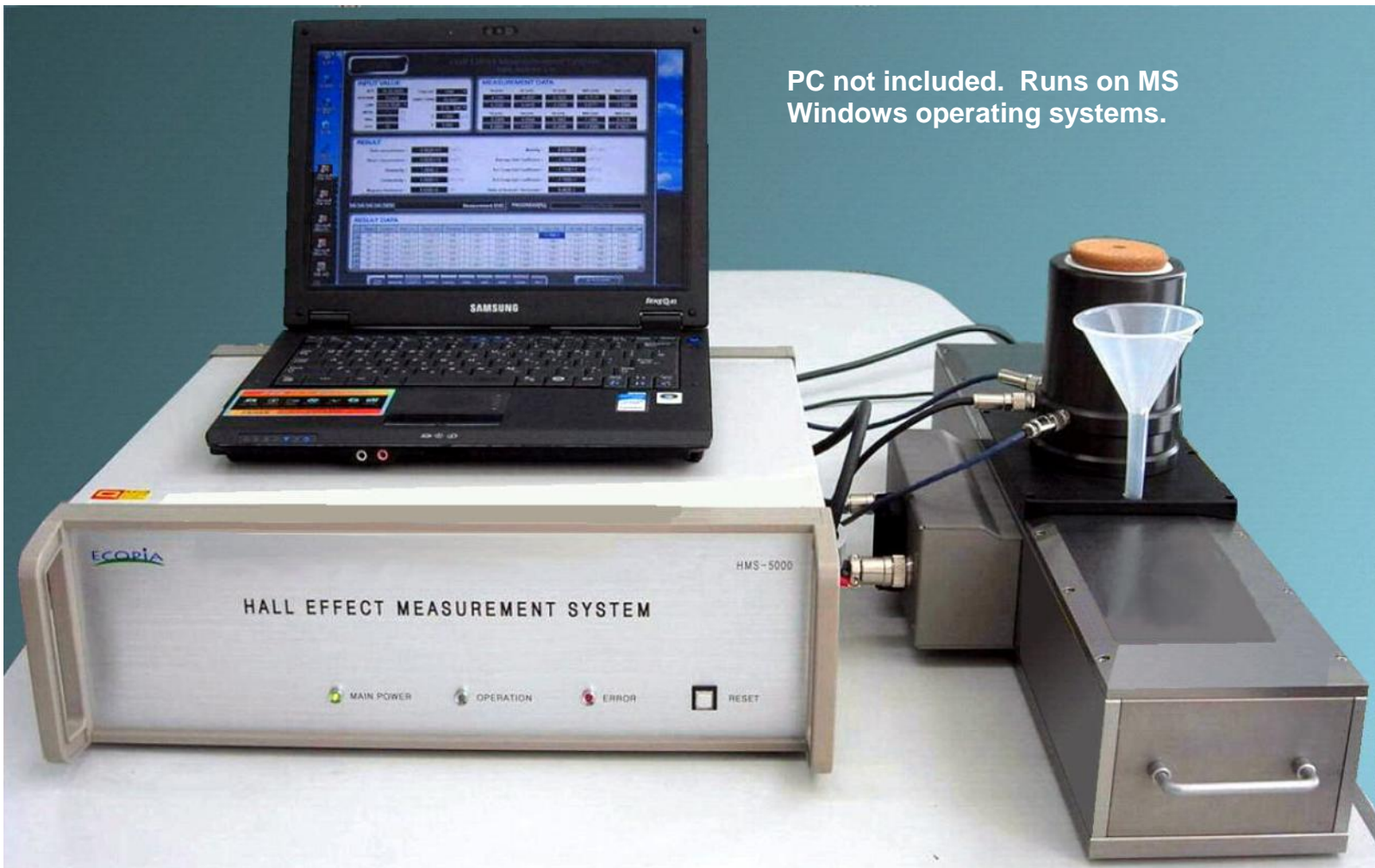


Conductivity vs temp variation

An optional room-temperature-only sample kit lid with sample board is available as an option for the HMS-5000



SPCB-21 for use with HMS-50000 when equipped with the optional room-temperature-only sample kit.



PC not included. Runs on MS Windows operating systems.

Applying 95/5% Indium/Tin to Sample Corners in Preparation for Mounting onto Spring Clip Sample Mount



If you have a larger piece of InSn, place a small amount on an insulating material (we have used a spare piece of a silicon substrate) and melt it using a soldering iron.



Set the soldering iron to 350°C to 400°C for best results.



Using a razor blade knife, cut tiny fragments of the cooled InSn so that it can be applied to the corners of the sample.

As opposed to standard solder, InSn maintains good ohmic contact even when submerged in LN₂, and it does not contain solder resin which might inhibit ohmic contact.

InSn can usually be used as the electrical conductivity material for corner contacts, however, for some samples silver paste or carbon paste are recommended to improve ohmic contact.

Soldering in four points, using iron.

Use the soldering iron to melt the InSn into the four corners of the material. It should be done as close to the edge as possible. If the sample has not been annealed, it might be helpful to keep the soldering iron in contact for about one minutes to improve ohmic contact.

Pushing on four point soldering

Transparent paper

After soldering on the contacts, it is helpful to allow the contact to cool, then using a plastic bag placed over the sample, use the flat edge of the razor blade knife to slightly mash down the contact so that it is flat on top. This will help the spring clip board pin to make better contact.

Soldering finished

Sample, ready to be mounted onto spring clip mounting system of either HMS-5000 or Spring Clip Board of HMS-3000.