

HMS7000

PHOTONIC HALL EFFECT MEASUREMENT SYSTEM



HIGHLIGHTS

- ▶ Compact Desktop Design
- ▶ Easy-to-Use
- ▶ Upgradeable system
- ▶ Several test modules

Specifications

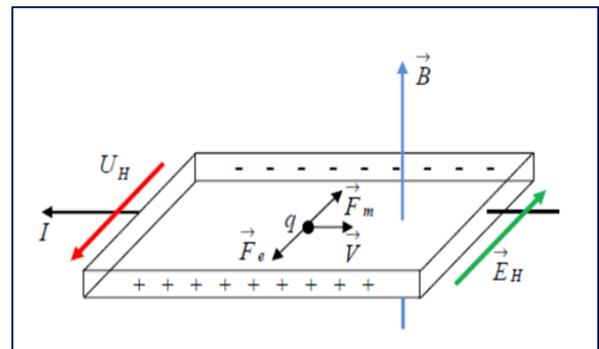
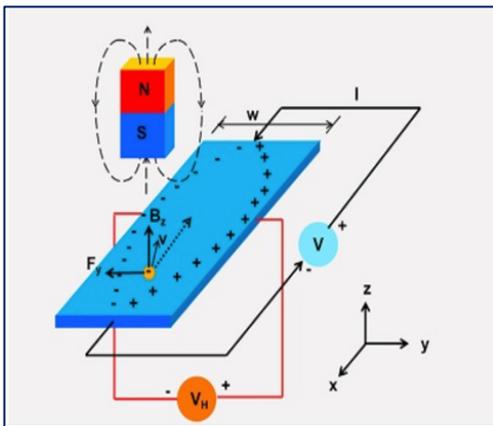
- ▶ 5x5 to 25x25mm
- ▶ Mobility: 1 to $10^7 \text{ cm}^2 \cdot \text{V} \cdot \text{s}^{-1}$
- ▶ Light source : R,G,B
- ▶ Temperature: 77K to 770K

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Hall Effect Measurement System is very useful for measuring Carrier Concentration, Mobility, Resistivity and Hall Coefficient that should be pre-checked in order to grasp the electrical specifications of semiconductor device. Therefore, it is essentially required system to understand the electrical characteristics of semiconductor device.

HMS series consist of constant current source , terminal conversion system by Van der Pauw technique, cold or hot temperature test system and magnetic flux density input system. So, it is well-established system that has all the things needed to Hall Effect Measurement System.



Hall effect Measurement Systems allow the ultra-fast characterization of several intrinsic parameters of conductive, semi-conductive materials. They use the Van Der Pauw method which is perfectly suited to thin film measurements and the Lorentz force in order to monitor around ten characteristics simultaneously under different environmental constraints.

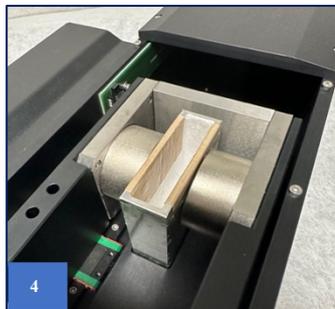
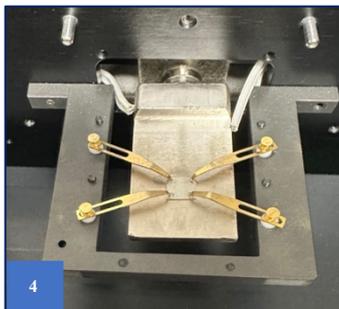
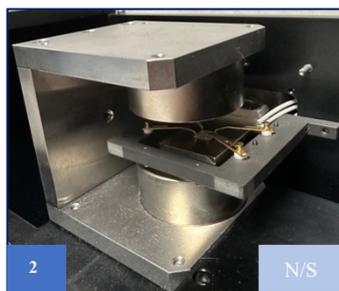
Thanks to several temperature module, the equipment permit to monitor the internal electrical parameters of a layer under different environmental constraints



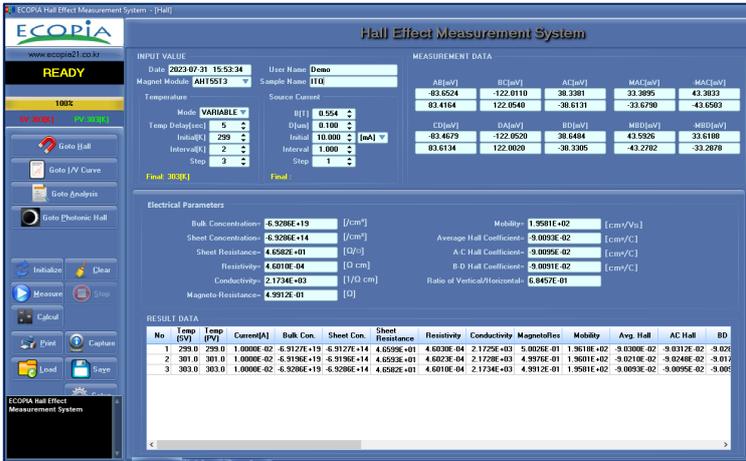
Technical specifications :

Sample size	5x5mm to 25x25mm
Sample thickness max	2.5 mm
Sample material	Si, SiGe, SiC, GaAs, InGaAs, InPGaN, AlZnO, FeCdTe, ZnO...
Magnetic field	0.5T
Magnet resolution	+/- 0.03T
Magnet type	Permanent
Magnet material	Neodym
Magnet movement	Automatic
Temperature range	77K to 770K
Temperature ramp	Yes
SMU	Internal
Current range	1nA to 20mA
Shette resistance range	10^{-4} to $10^7 \Omega.cm$
Concentration range	10^7 to $10^{21} cm^{-3}$
Mobility range	1 to $10^7 cm^2.V^{-1}.s^{-1}$
Software	Windows
Data expot	.csv

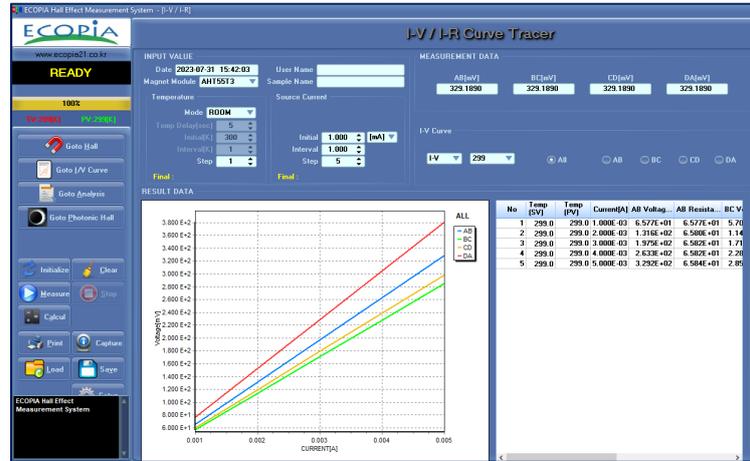
- ▶ Gap between round magnet : 26mm / Round magnet diameter 50mm (1)
- ▶ Magnet moves automatically from N/S position to S/N by controlling on software PC (2)
- ▶ Cover the cap (chamber) to flow gas inside and to prevent air flow cooling (3)
- ▶ Sample holder or LN2 tank were integrated with the magnet kit (4)



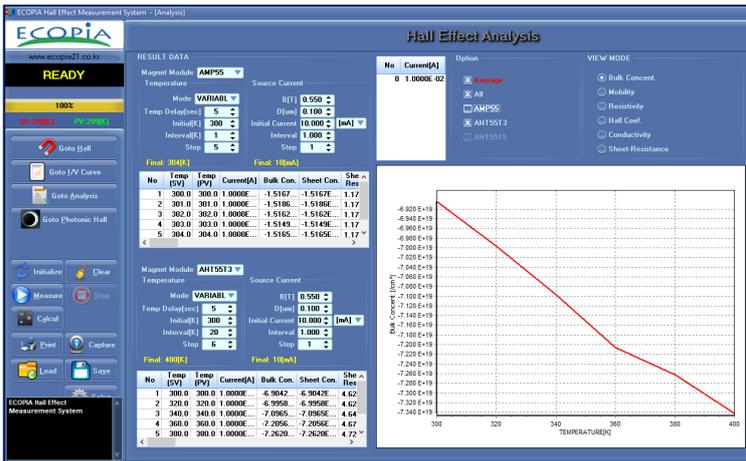
Software :



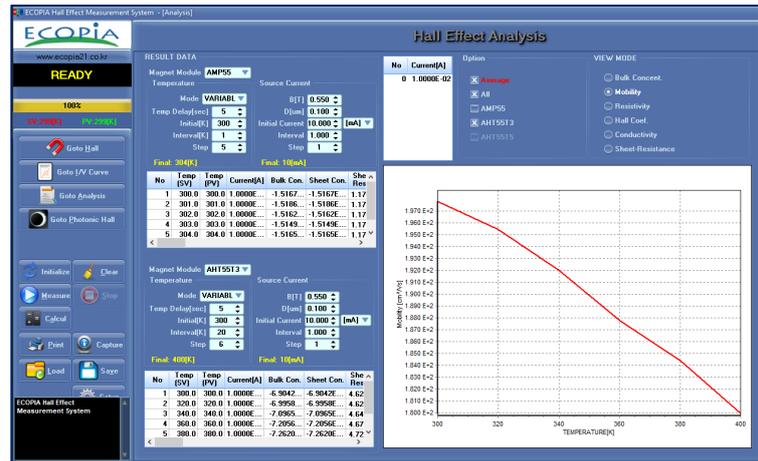
- Temp setup
- Exact magnet value
- Current setup
- Sample thickness



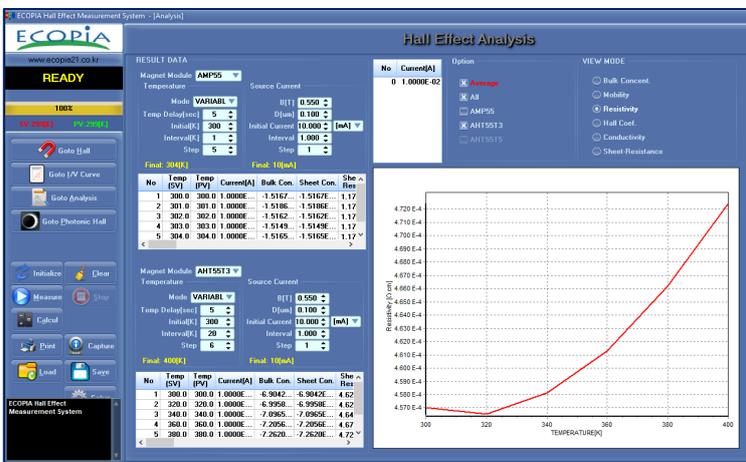
- I(V) curve
- Check ohmic contact
- I(R) curve



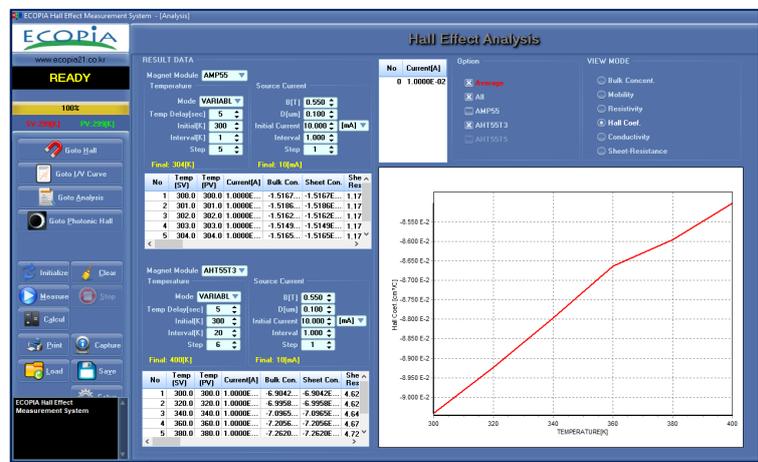
- Bulk concentration vs Temp
- Magneto resistance



- Mobility vs Temp
- Sheet resistance vs Temp



- Resistivity vs Temp
- Conductivity vs Temp



- Hall coeff vs Temp
- Vertical/Horizontal Hall coeff ratio

Temperature Magnet Kit

Module	Temperature	HMS5000	HMS5300	HMS5500
AMP55T - RTSK	77K or 300K	✓	✓	✓
AMP55T – SH80350R	77K to 350K	✓	✓	✓
AHT55T3	300K to 570K		✓	✓
AHT55T5	300K to 770K			✓

► **AMP55T-RTSK:**



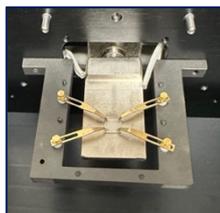
- Several sample holder compatible (See SPCB brochure)
- -196°C or ambient

► **AMP55T-SH80350R:**



- Adjustable sample holder pin
- From -196°C to 70°C
- Temperature regulation system

► **AHT55T3 / AHT55T5 :**



- Adjustable sample holder pin
- From -196°C to 300°C (T3)
- From -196°C to 500°C (T5)

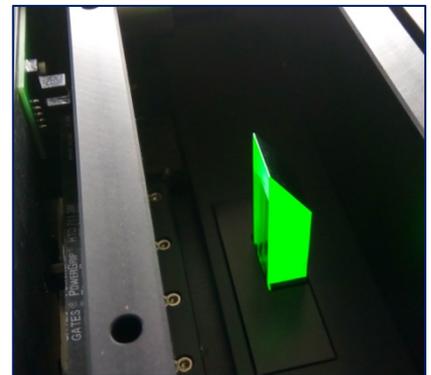
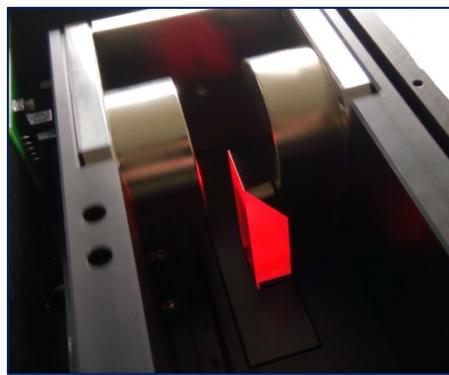
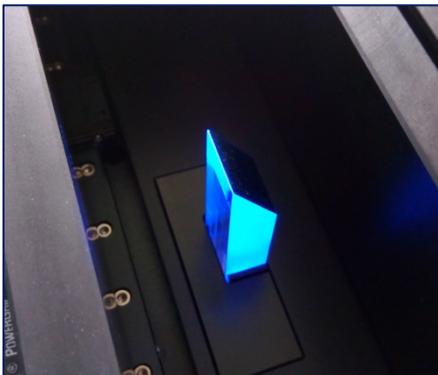
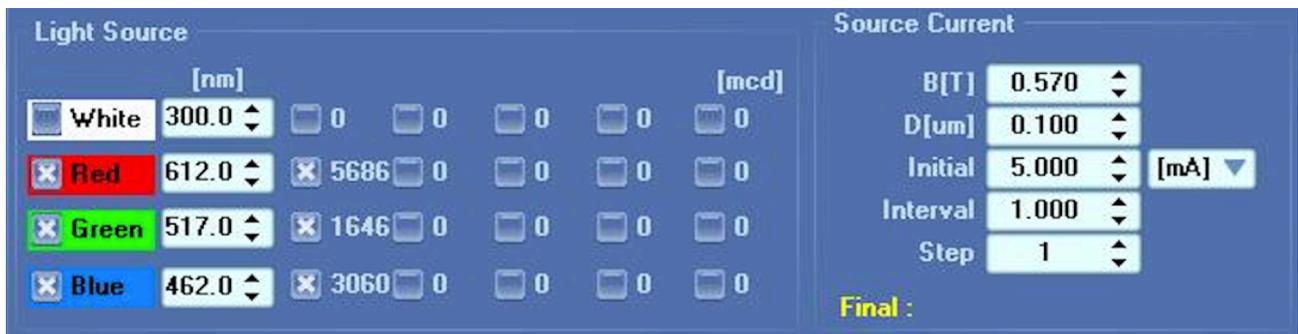


► **Photonic module**

Photonic hall effect measurement is to read various electrical properties by illuminating light of various range of wavelength on the sample, in addition to flowing current and applying magnet field strength.

It is great to see RGB (Red, Green, Blue) light intensity vs carrier density, carrier mobility, resistivity, hall coefficient in order to reveal phenomenon of electrical trapping by TLM (Transmission Line Method) for example.

Thanks to the HMS7000 software, it is possible to set the wavelength by adjusting the current in the LED. A document is provided to relate each current to the associated wavelength.



LED selected



Light source