



Cal Power

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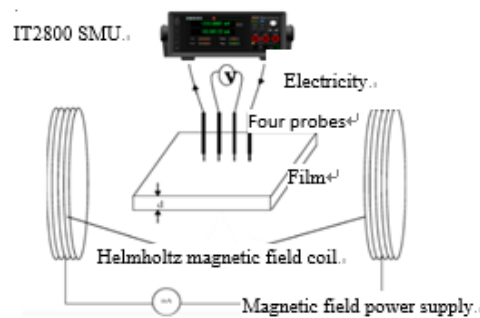
How to use IT2800 Graphical Source Measure Unit to conduct a magnetic resistance test?

Background

In electromagnetism, when the current passes through the conductor perpendicular to the direction of the external magnetic field, there is a potential difference between the two sides of the conductor perpendicular to the magnetic field and current direction. This phenomenon is hall effect. When a magnetic field is applied on a metal or semiconductor with current passing through, its resistance value will change obviously. This phenomenon is called magneto-resistance effect. In the recent one hundred years, with the rapid development of electromagnetism research, electromagnetism has been deeply applied in all aspects of science and life. For example, giant magneto-resistance is the magnetic material with a great change in the resistivity when applied with or not applied with an external magnetic field. The development of giant magneto-resistance leads to revolutionary change in computer storage. Today, we can no longer only observe with eyes only in the field of research and need to use mechanical instruments to measure. The research and development of advanced materials and devices need test devices with the highest performance to complete tests.

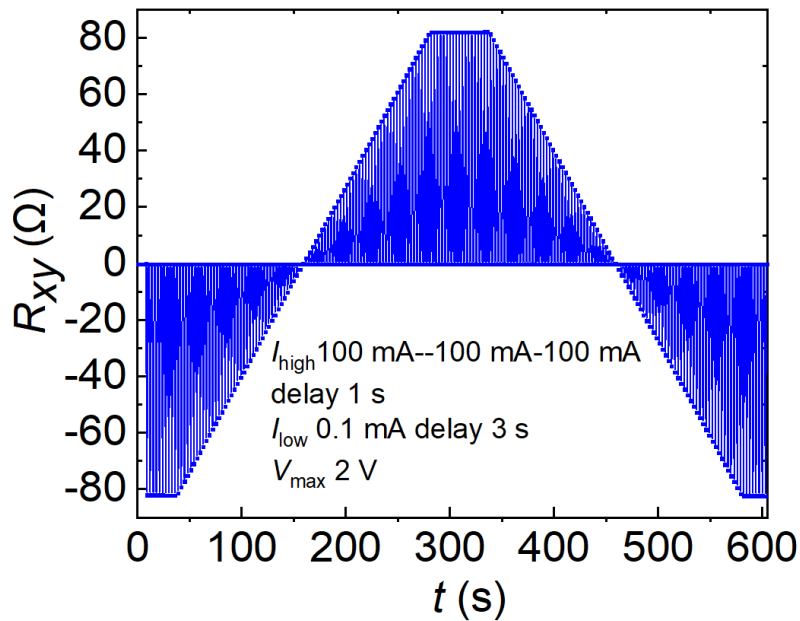
Case study

An ITECH user in the material field needs to conduct resistivity test of thin film magnetic resistance. In this test, it is required to build a changing magnetic field and input high-accuracy constant current source to the magnetic resistance under test, then test the magnetic resistance and magnetoelectric properties of the film magnetic resistance through the four probe method. The constant current source needs to be output at a constant current of 1mA, and the resolution is 1nA. In addition, a pulse scanning function is required to scan the high level from 100mA to -100mA and scan the low level to 0.1mA. Therefore, the power supply with a constant current source is required to have high resolution and accuracy to ensure accurate and stable tests as well as continuous and stable scanning function from positive current to negative current. The user selects the IT2800 Graphical Source Measure Unit to complete this test. The test principle is as shown in the figure below.



Wiring principle of thin film magnetic resistance test

ITECH IT2800 Graphical Source Measure Unit features a compact size (2U half-rack) and a 5-inch touchscreen. It integrates 6 kinds of devices as a whole: four-quadrant voltage source, current source, 6 ½ digital multimeter, pulse generator, battery simulator, and electronic load. The current ranges has 9 sub-ranges that meet all kinds of small current testing requirements. The resolution at the 1mA range is 1nA and the accuracy is 0.02%+60nA. Its ultra-high accuracy material ensures the accuracy of material testing.



Voltmeter test data

Built in with a standard SWEEP mode, IT2800 supports linear and logarithmic, single and dual up and down scanning function, as well as constant and pulse scanning function. The LIST scanning function can effectively execute any waveform output, which is extremely helpful in tests when the characterization response changes with the voltage or current change. You can generate a scanning curve of any shape through excel import or panel editing. Up to 99999 points of data can be imported, making this device an ideal choice for UI characteristic curve test. In the test, SWEEP can be used to complete all scanning for the positive and negative voltage and positive and negative current tests without changing wiring. You can observe the actual output curve on the Scope interface.



Sweep/Scope



IT2800 Graphical Source Measure Unit

IT2800 SMU covers a current range from 10fA to 10A and the voltage range from 100nV to 1000V. In addition to the DC working mode, the IT2800 SMU is also capable of pulse measurement, and IT2806 has the 10A high-current pulse function. The graphical user interface and various display modes help improve test efficiency greatly for engineers. Its wide array of applications include discrete semiconductor devices, power chips, passive devices, photoelectric devices, micropower measurement, material research, and other fields.

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