

Standard Operating Procedure: Polaris
B1500 Agilent Semiconductor Characterization System

This system is used for ultrafast temperature IV/CV measurements. It is a product by Agilent B1500 characterization system.

Following Measurement can be done:

1. Room temperature 2, 3, 4 terminal IV.
2. Room temperature 2 terminal CV.
3. Temperature dependent IV/CV measurement.
4. Stress measurement/ Pulse measurement.

Following Measurement cannot be done:

1. Frequency/ Noise measurement.
2. Low temperature measurement.

Instruments Presents:

1. B1500 WGFMs - 2
2. SMU's -2
3. DSO60128 – 1

Specification:

Current versus voltage (IV) measurement

- Accurate and precise measurement ranges of 0.1 fA - 1 A and 0.5 μ V - 200 V
- Spot and sweep measurement
- Time sampling measurements (100 μ s minimum sampling rate)

1. Capacitance measurement

- Multi-frequency AC impedance measurement supports CV (capacitance versus voltage), C-t (capacitance versus time) and C-f (capacitance versus frequency) measurement
- Capacitance measurement frequency range of 1 kHz to 5 MHz

Ground unit (GNDU) specification:

- The GNDU is furnished standard with the B1500A mainframe.
- Output voltage: 0 V \pm 100 μ V Maximum sink current: \pm 4.2 A
- Output terminal/connection: Triaxial connector, Kelvin (remote sensing)

Instrument Connections (according to present connections):

2. Two WGFMs are connected to manipulator B and D respectively.
3. Manipulators A and C is connected to ground.
4. Chuck connected to ground.

Part A: Hardware Setup Usage Instruction

Step1:

Switch on the vacuum pump. Then press VAC button. The vacuum reaches the center of the chuck through a hole. This creates a suction force to the DUT(Device under test). This vacuum hold the device firmly on the chuck.

Step 2:

Switch on the light source. The intensity of light is controllable using knob.

Step 3:

The chuck is movable in X-Y plane by pressing both X-Y button. X and Y button moves chuck in X and Y direction respectively. Pull the chuck out. Move chuck down by using lever. Place the DUT exactly at the center of the chuck. Then move chuck up by using a lever.

(Caution: Before making the chuck up, make sure that probe needle is sufficiently up so that chuck does not hit the probe tip.)

Step 4:

There are 4 manipulators named as A, B, C, D. The chuck is always ground. Focus the lens of microscope properly till contacts of sample are clearly visible. Probe the DUT with probe needle. Switch off the light source after probing is done.

There are three knobs associated with each manipulator. These are used for moving the probe needle in X, Y and Z direction. Once the probe tip makes contact with DUT, it will slide over DUT indicating contact is done. Now Z- direction knob should not be rotated further otherwise it will damage the DUT or the probe needle can break.

Part B: Software Setup Usage Instruction

1. Login using your charlab domain username and password.
2. If you are first time user, then **“Initialize New User”**.
(Start -> All Programs -> EasyEXPERT -> Initialize New workbook(if required, or simply continue)) .

3. Window opens with various classic and application tests.
4. Select a test definition on the EasyEXPERT main screen while the Application Test/Classic Test tab has been selected. The tab is in the leftmost column on the screen.
5. Make a User folder in dropdown list appears in rightmost column. Save the selected test (can be changed in test definition according to requirement)
 - a. Don't save changes in main test list.
 - b. Save the test in personal folder and then make changes as these are built-in test.
6. Results -> Auto transport data ->
 - Add location to save the output. Format of output can also be adjusted here.

Post Measurement Steps:

1. Switch off vacuum pump.
2. Move probe needle up by rotating the knob.
3. Move chuck down by using lever.
4. Safely remove the sample.
5. Close the EasyEXPERT application.

Temperature Controller Operation:

1. Switch ON the power supply
2. Switch ON the temperature controller by pulling up the level at the back side of the instrument.
3. Press I/O key on the front side of the instrument.
4. Press the SETUP key.
5. Select the line (T1/T2).
6. Input the temperature by using the keypad.
7. Press ENT key.

For reducing the temperature:

1. Reduce the temperature to initial value (25°C) using the procedure mentioned above.
2. Wait for 5 minutes to settle the temperature down.
3. Press I/O key.
4. Pull the lever up and switch off the power supply.

