## 1-2. Agilent N1265A UHC Expander/Fixture

Agilent N1265A UHC Expander (UHCE)/Fixture shown in figure 1-2 is used for measuring packaged power devices, It can basically covers the B1505A`s maximum output range; 1500 A and 10 kV.

UHCU is a built-in test unit in N1265A, and it comes automatically in the configuration.

The other measurement units are connected to N1265A UHCE/Fixture for packaged power device testing.

We use N1259A option 020 High Voltage Bias-Tee for capacitance measurement.

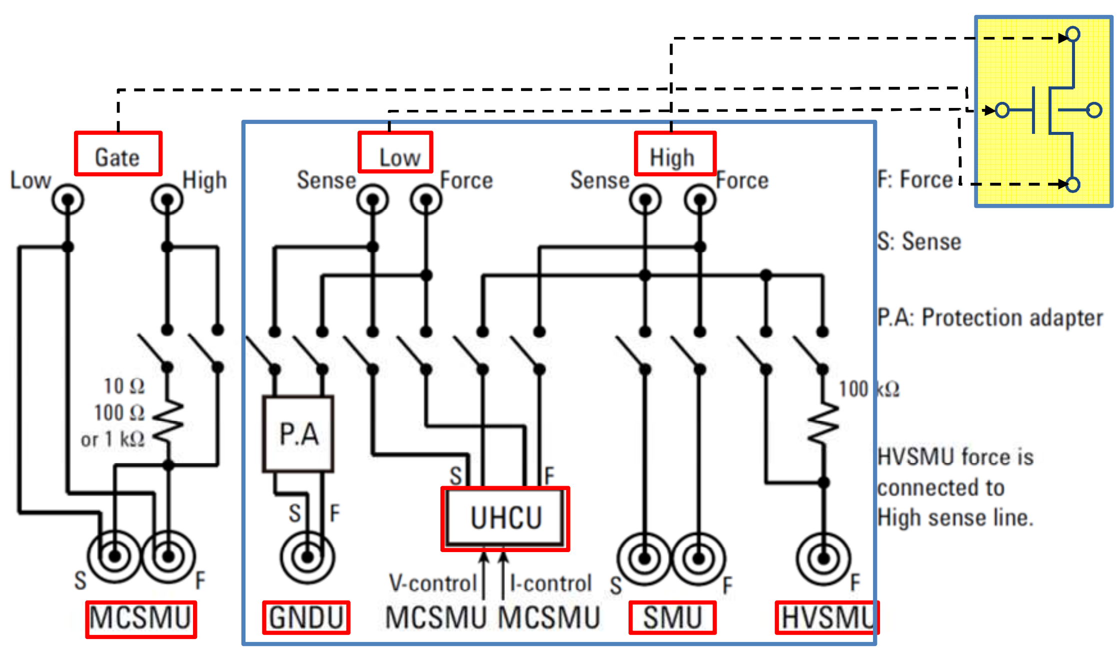
**Figures 1-2. Agilent N1265A UHC Expander/Fixture.**

**Drain/Collector supply is automatically switched between the modules**

N1265A includes a built-in selector as shown in figure 1-3, and the drain/collector supply can be switched between UHCU, HVSMU/HVMCU and MPSMU/HPSMU. Therefore, the measurement can be continued without changing the wire connection between the each measurement unit, and it eliminates any errors related to the cable reconnection and it also reduces the test time.

In the HVSMU path, a 100 kΩ series resistor can be inserted for breakdown test.

In the gate channel, a series resistor from the choice of 0 Ω, 10 Ω, 100 Ω and 1 kΩ can be selected to control the stability of the measurement.




**Figures 1-3. Example connection of the built-in selector of N1265A Expander/Fixture**

## 1-3. The effect of output R of UHCU and HVMCU

There is an output series resistor (Rout) in the Hi Force output of UHCU and HVMCU outside the voltage source (Vcomp) as shown in figure 1-4(a). The cable resistance Rcbl is also connected in series to the Rout.
Since there is no mechanism to compensate the voltage drop by these resistors, the voltage appears at the DUT terminal is different from the Vcomp value which is set by the user.

Figure 1-4(b) shows a typical measurement curve measured by the circuit shown in figure 1-4(a). The drain sweep end points for each gate steps align on a strait line determined by Vcomp/Rout or Vcomp/(Rout+Rcbl).

It is generally not a problem if you just want to check a curve, but it will be a problem if you want to;

- Add specific voltage without knowing the current value
- Measure high current, but do not want to apply a high voltage (close to Vcomp) as shown in figure 1-4(b).

**Figure 1-4. The effect of output resistor.**

Tips:

Measured voltage is accurate because the actual voltage at the DUT terminal is sensed and used for plotting the curve.

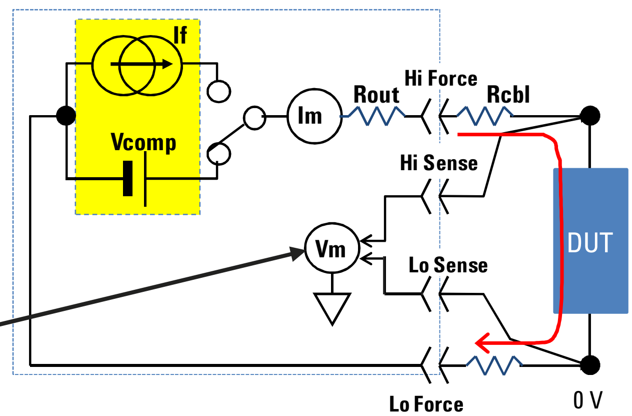



**Figure 1-4 (a). Simplified block diagram**

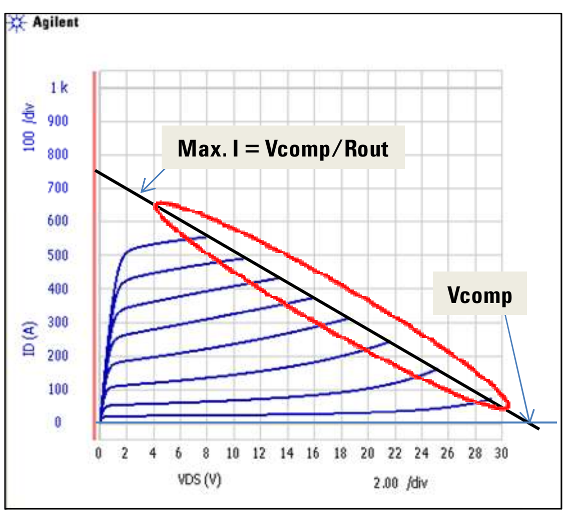



**Figure 1-4 (b). Typical measurement curve under the Rout.**

**Reference information:**

- **SMU case**

Figure 1-5(a) shows a simplified block diagram of HP SMU and MP SMU. The resistive components in the output block of these modules including the resistance in the test cable are located inside the sense loop (refer to (1) and (2) of figure 1-5), and an accurate set voltage appears at the DUT terminal.

Figure 1-5(b) shows a typical Id-Vd measurement example of SMU. The sweep end points for each secondary gate step parameter are aligned in vertical at the sweep end voltage.

It means, in the case of SMU, you can make measurement at the specific voltage which you set independently to the load condition.

This is a big difference compared to the results in figure 1-4(b) where the sweep end voltage varies depending on the load current and the output resistance.

*Note: Since there is no passive resistive component which works as a protective component when DUT breakdowns or sudden short in the SMU side, this architecture may be not the best choice in high power applications.*

**Figure 1-5(a). Simplified Block Diagram of HP/MPSMU.**

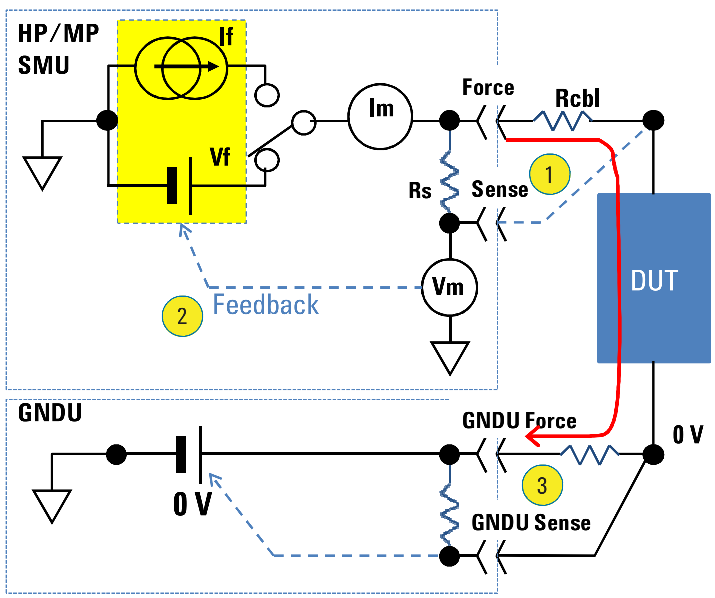



**Figure 1-5(b). Typical Id-Vd example of SMU.**