High-Voltage CV Curves

Matteo Polo matteo.polo-1@unitn.it

December 14, 2023

Procedure to generate CV curves with $|V_{bias}|$ >30V.

1 Connections

The box shown in figure 1 is needed to perform the measurement.

Figure 1: Scatola necessaria per effettuare la misura

- OUT: HV + probe signal, to be connected to the device under test.
- HIG: connect to HPOT CVU1 of the parameter analyzer.
- KEY: connect to the SMU output of the parameter analyzer that you want to use as the voltage source.

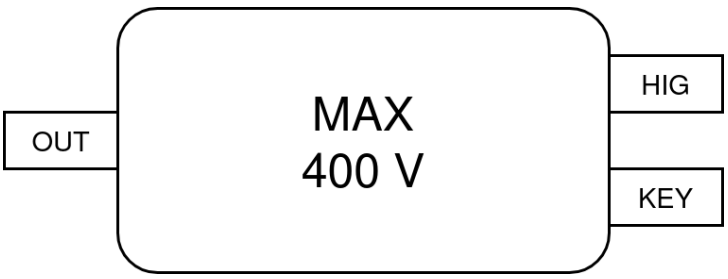

Figure 2: Figura connessioni scatola

2 Software

Program to be used as a reference:

`hvcv_HV_2_sweep`

It is important to pay attention and use the library:

`hivcvulib_2sweep`

which is used for the measurement. It allows sweeping in voltage, $0 \rightarrow V_{set} \rightarrow 0$, with V_{step} both on the forward and reverse sweep. On the other hand, the library

`hvcv_HV_2_sweep`

performs $0 \rightarrow V_{set}$ with a step of V_{step} and $V_{set} \rightarrow 0$ in a single step. It could potentially damage the device.

For further information on how to set up the parameter analyzer, refer to table 1 or visit the website: `https://download.tek.com/document/1KW-60637-0_HighVoltageC-V_4200A-SCS_AN.pdf`

Parameter	Range	Description
OpenCompensate	0:Enables 1:Disables	Open Compensation for CVU
ShortCompensate	0:Enables 1:Disables	Short Compensation for CVU
CVUCableLen	0 1.5m 3m	Set cable length for CVU
SweepSMU	1-4	SMU number that will force voltage in CV sweep
MeasISMU	1-4	SMU number that will measure current during the CV sweep
StartV	–200 to +200	Start voltage for sweep
StopV	–200 to +200	Stop voltage for sweep
StepV	–200 to +200	Step voltage for sweep
SweepDelay	0 to 10 s	Time between voltage steps
PresoakV	–200 to +200	Voltage bias before start of sweep
PresoakTime	0 to 600 s	Time to apply soak voltage
SMU1Bias	–200 to +200	Voltage forced by SMU1 during sweep (ignored with SMU1 is SweepSMU)
SMU2Bias	–200 to +200	Voltage forced by SMU2 during sweep (ignored with SMU2 is SweepSMU)
SMU3Bias	–200 to +200	Voltage forced by SMU3 during sweep (ignored with SMU3 is SweepSMU)
SMU4Bias	–200 to +200	Voltage forced by SMU4 during sweep (ignored with SMU4 is SweepSMU)
Frequency	10e3 to 10e6	Test frequency
ACVoltage	0.01 to 0.1V	AC test voltage of CVU
Speed	0 fast 1 normal 2 quiet	Speed of CVU
CVRange	0=Auto 1μA 30μA 1mA	CVU measure range

Table 1: Main parameters to be set for performing CV measurements