1. Measuring of diode's voltage-current characteristics

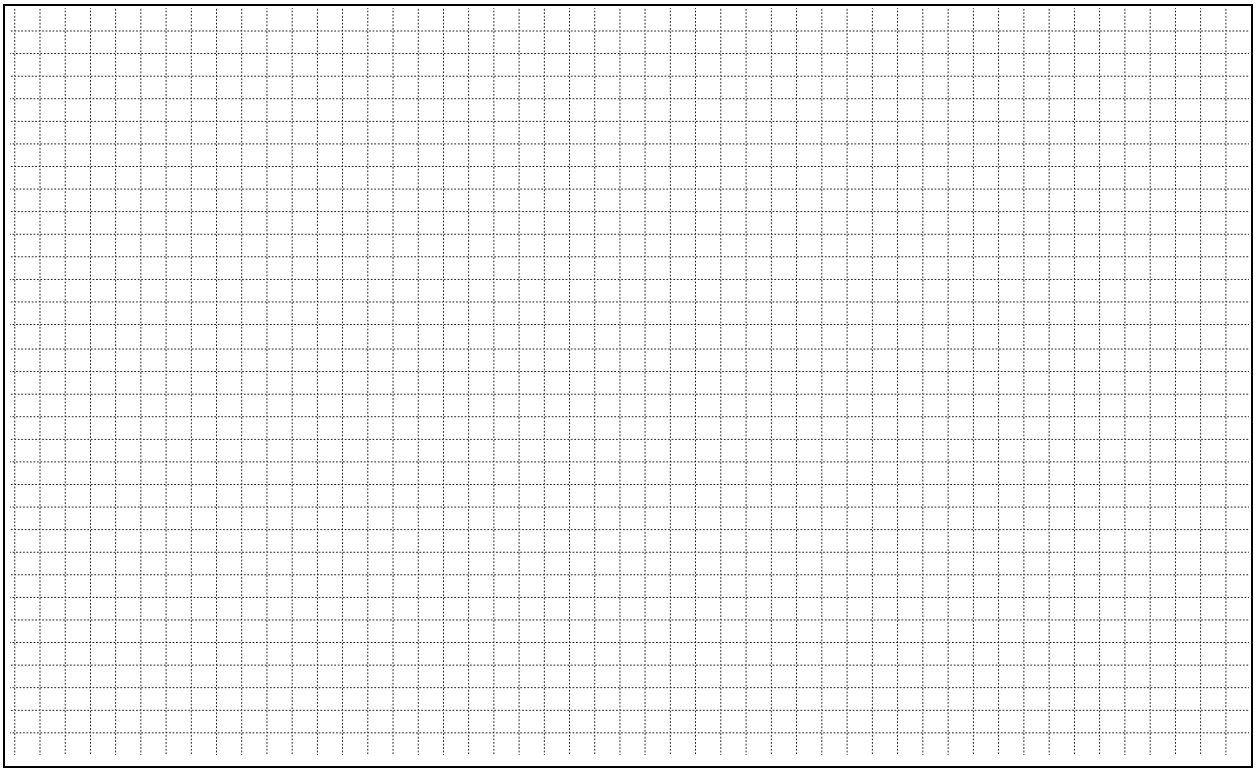
Measure the given diodes forward and reverse characteristics on 8-8 different points.
Useable forward voltage range: 0V … 2V, reverse voltage range: -20V … 0V.

D3 forward	
U_D [V]	I_D [mA]

D3 reverse	
U_D [V]	I_D [mA]

D5 forward	
U_D [V]	I_D [mA]

D5 reverse	
U_D [V]	I_D [mA]



1.1.1. Dióda mérések

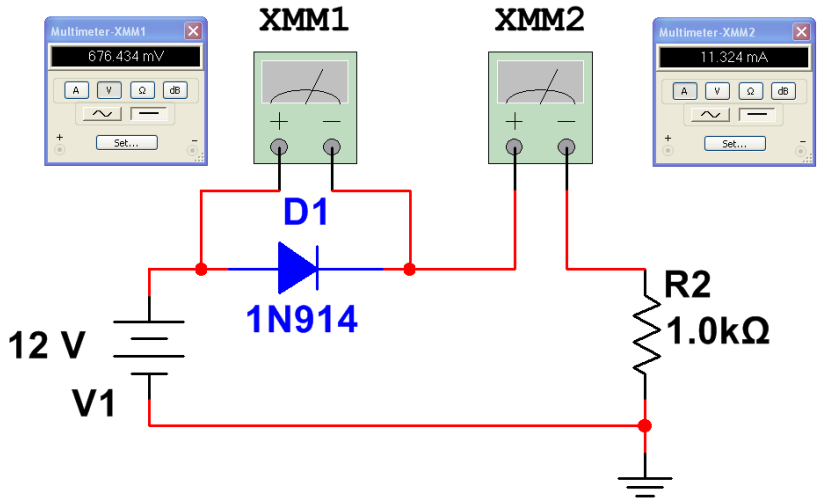
Dióda I/U transzfer karakterisztika meghatározása DC méréssel

The transfer characteristics represents the diode current as a function of the diode voltage. This transfer characteristics is a static property, ie. DC voltage, moreover represents the function connections between currents.

The transfer characteristics can be determined by DC measure or slowly changing saw signal with an oscilloscope.

Diode measuring circuit with DC measuring

On the figure below the diode direction is forward and the virtual devices show real values.



In the measuring circuit the R2 1kΩ resistor is a so-called serial current limiter resistor. In the circuit the value of the current which flows through the diode is determined by the V1 power supply, the R2 resistor and the D1 diode. The polarity shift of the V1 wiring turns the flowing direction of the current which flows in the circuit, because of this the "wiring" of the diode becomes reverse.

The transfer characteristics can be determined in two ways during we change the voltage (the range can be from -20V to +20V):

1. Direct way: with measure the diode voltage with two different voltage meter (on the figure).
2. Indirect way:
   a. Measure the current in the circuit
   b. read the voltage from the power supply voltage
   c. calculate the diode voltage as follows:

In the meanings of Kirchoff's loop rule the following relationship can be written:

$U_{T(PS)}=I_D R + U_D$ where:

$U_{T(PS)}$ = power supply voltage
I_D = diode current (the same as the resistor current)
U_D = diode voltage

Rearranged the formula:

$U_D = U_T - I_D R$, ie. the U_D canbe calculated is we know the U_T, I_D and the R

we can read from the formula, that bigger current can be reached with lower resistance!

In the case of Silicon diode the diode's opening (forward) voltage: 0.6-0.8V.

example: if $\mathbf{I_D = 1\ mA}$

$\mathbf{U_D = U_T - 1mA*1k\Omega = U_T - 1V}$, and

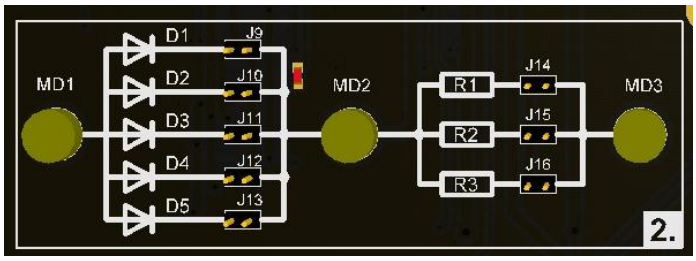
example: if $\mathbf{I_D = 10\ mA}$

$\mathbf{U_D = U_T - 10mA*1k\Omega = U_T - 10V}$

We can use both of these method, but the first one is simplier.

With direct method measure the diode's voltage on 10-15 points.

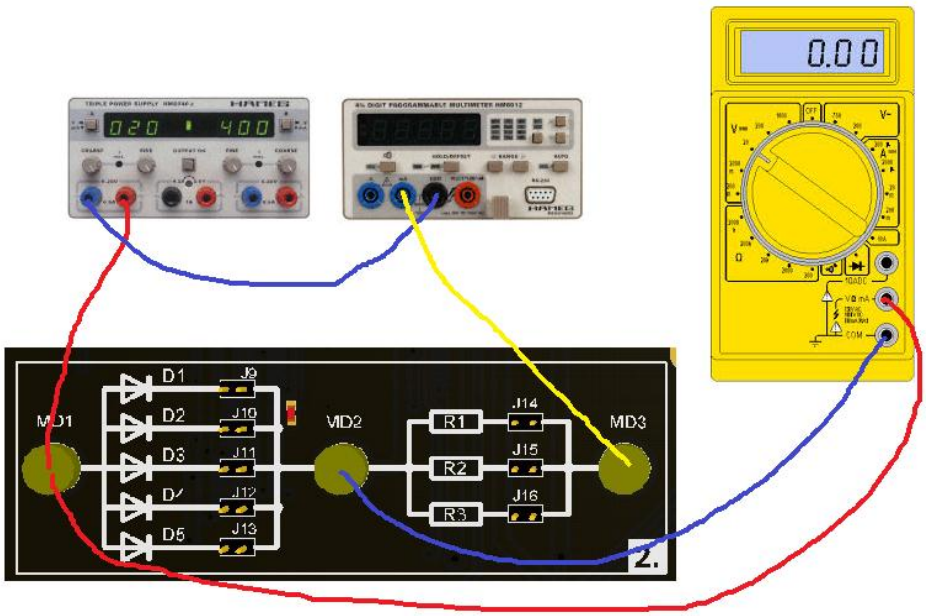
Depict the transfer characteristics on the given plane: the voltage is the horizontal axis and the current is the bertical axis..



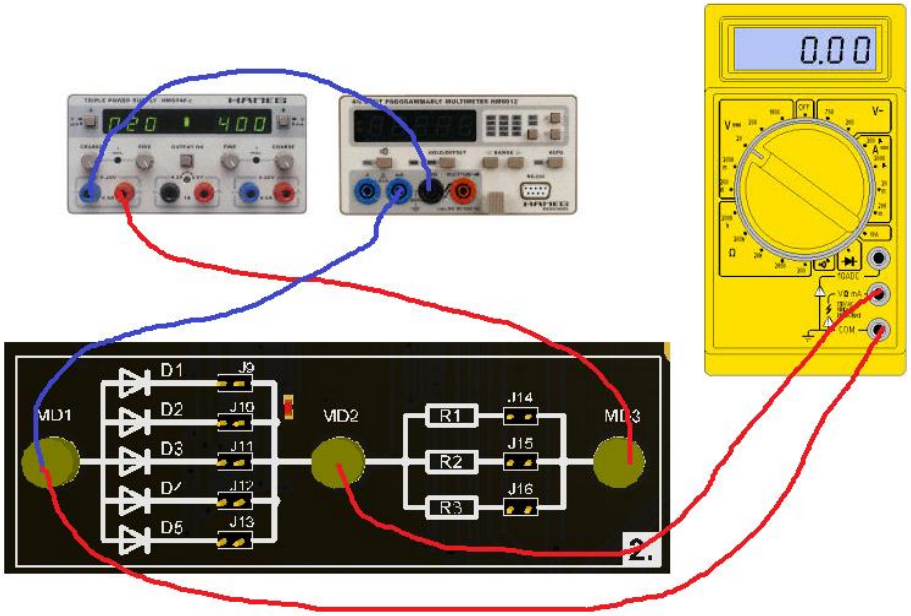
Identifier	Resistor value	accuracy	power
R1	500Ω	1%	$0,5W$
R2	$1K\Omega$	1%	$0,5W$
R3	$5K\Omega$	1%	$0,5W$

Identifier	Type
D1	B340-13-F
D2	S3K-E3/57T
D3	1SMA4739
D4	1SMA5914BT3G
D5	green LED

ID	Direction	Voltage range	Note
M1		-20V … +20V	signal input, or ground
M2	output		measuring point
M3		-20V … +20V	signal input or ground



Forward direction



Reverse direction