Electronics with the Modular System

Basic Electronic Circuits

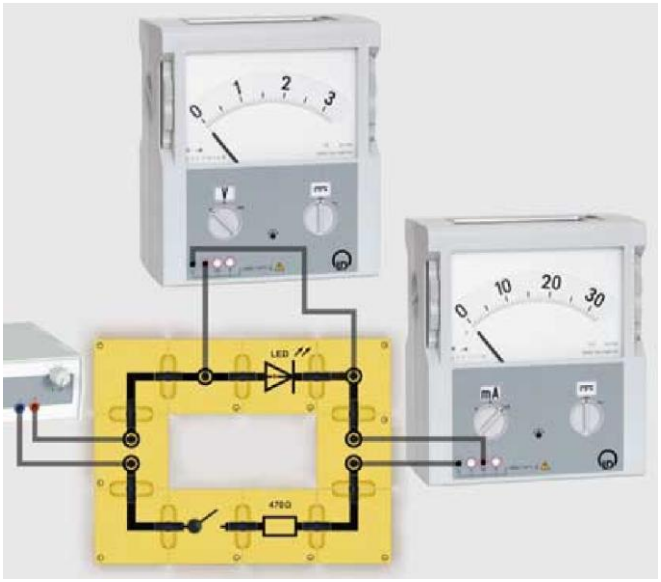
Semiconductor diodes

Characteristics of light-emitting diodes

Objective of the experiment

To investigate the relationship between the voltage *U* and the current *I* for a light-emitting diode connected in forward direction.

Setup



Apparatus

1	539 037	Light-emitting diode, red, BST
1	539 038	Light-emitting diode, green, BST
1	539 010	Resistor 470 Ω, BST
1	539 025	Toggle switch, BST
1	539 002	Connector block BST, straight, 1 socket
2	539 003	Connector blocks BST, straight, 2 sockets
3	539 004	Connector blocks BST, 90° angle
1	539 006	Connector block BST, 90° angle with socket
10	539 000	Bridging plug, BST
2	531 905	Demo multimeter, passive
1	521 49	Power supply, 12 V DC, 230 V
6	500 644	Safety connection lead, 100 cm
1	301 300	Demonstration experiment frame
1	301 301	Adhesive magnetic board

Carrying out the experiment

- Initially, set up the circuit with the red LED and close the toggle switch.
- Gradually increase the voltage U (see the table).
- For each voltage U, read the current I on the demo multimeter and observe the light-emitting diode.
- Replace the red LED with the green LED and repeat the experiment.

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Measuring example

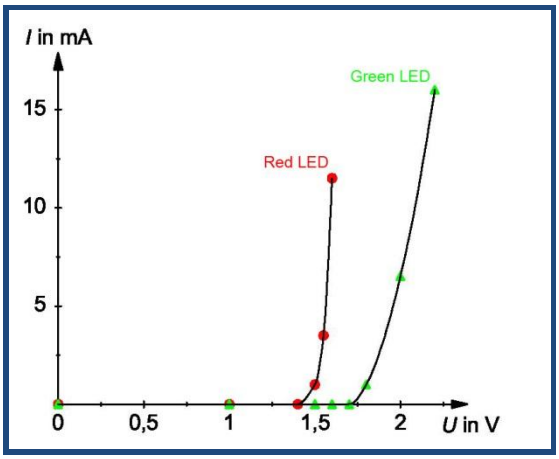
Red LED

Voltage *U* / V	Current *I* / mA	LED lights up
0	0	no
1.0	0	no
1.4	0	no
1.5	1	yes (very dim)
1.55	3.5	yes
1.6	11.5	yes

Green LED

Voltage *U* / V	Current *I* / mA	LED lights up
0	0	no
1.0	0	no
1.5	0	no
1.6	0	no
1.7	0	no
1.8	1	yes (very dim)
2.0	6.5	yes
2.2	16	yes

Evaluation



Light-emitting diodes that emit different coloured lights differ in their characteristic voltages U_S (threshold voltage).

The threshold voltage U_S of a LED is reached when its light is clearly visible.

The threshold voltage U_S of the red LED is approx. 1.6 V.

The threshold voltage U_S of the green LED is approx. 2.0 V.