Lab #6. Measurement of the detectors of optical radiation used in telecommunication technology

1. Measurement of the characteristics of a photodiode in the photovoltaic regime

Settings for the devices:

Source of the radiation is switched off.

BIAS OFF regime for the amplifier.

The aim of the observation:

IV quadrant of the Volt-Ampere characteristics of a photodiode. Picture from the lab description:

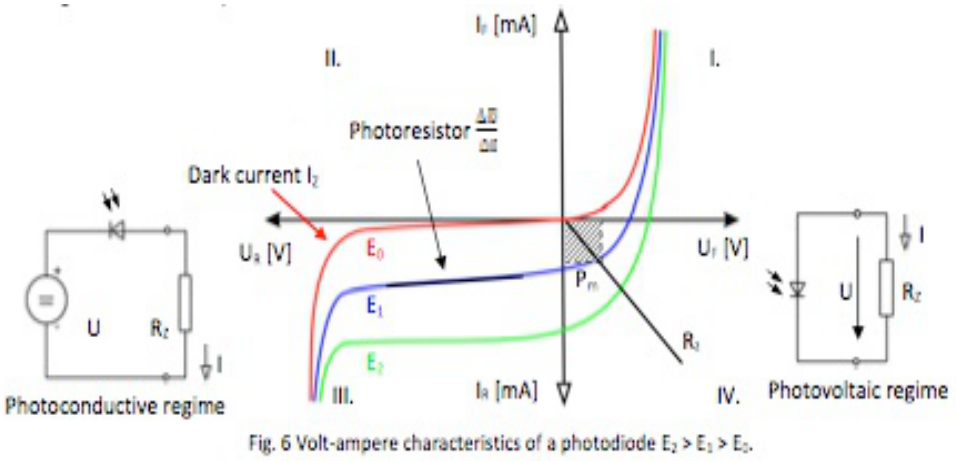

Fig. 6 Volt-ampere characteristics of a photodiode $E_2 > E_1 > E_0$.

Measuring the short circuit current:

illuminance (mA)	Short circuit current (uA)	Power
0	0	0.0
5	0.4	0.4
10	93	103.3
15	284	315.6
20	476	528.9
25	666	740.0

Sensitivity for the power calculation could be retrieved from the graph FGA Series Photodiode Responsivity: (picture from the lab description)

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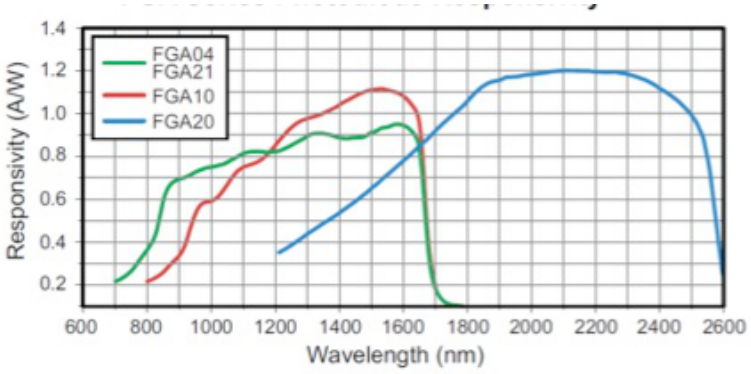
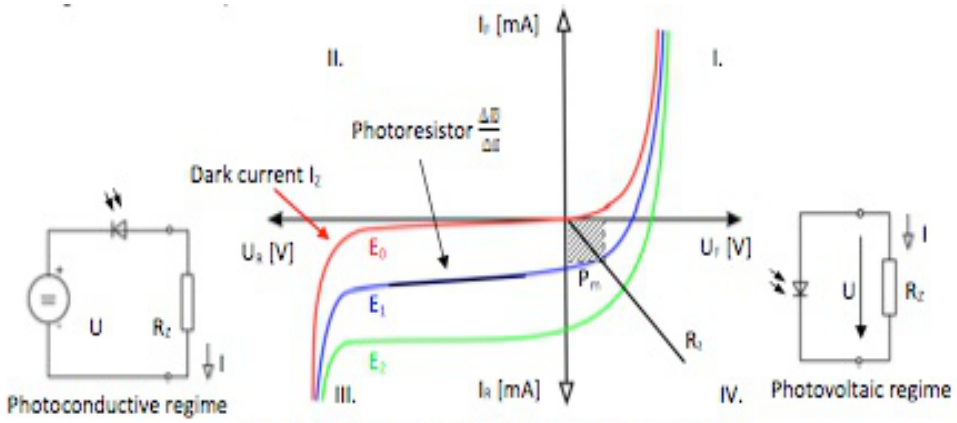


For the "working" telecommunication wavelength 1.55 we can assume 0.9 resposivity.

2. Measurement of the characteristics of a photodiode in the photoconductive regime

Here we should measure "dark current" - reverse current when no optical radiation falls on the photodiode.

Lets' look again at the graph from the lab description with Volt-ampere characteristic of a photodiode. Now we are interested in the III quadrant.



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Results for the three different values of intensity (10mA, 20mA and 25 mA) are shown in tables:

	Current	Voltage
10mA	86	0
	86.4	-3
	86.58	-5
	86.5	-7
	86.43	-9
20mA	495.5	-9
	494.4	-7
	492.2	-5
	489.5	-3
	486	0
25mA	675	0
	686	-3
	683	-5
	683.9	-7
	684	-9

We can notice unstable values for the last measurement. It is connected with temperature and prolonged trial.