

## 1. Z diode characteristics

### Objectives

- Static recording of the current-voltage characteristic  $I_z = f(V_z)$  of a Z diode
- Dynamic representation of the current-voltage characteristic  $I = f(V)$  of a Z diode
- Differential resistance of Z diodes

### Equipment

#### Circuit elements:

- 1 Resistor 330  $\Omega$ /2W
- 1 Resistor 220  $\Omega$ /2W
- 1 Resistor 10  $\Omega$ /2W
- 1 Resistor 1K  $\Omega$ /2W
- 1 Resistor 100  $\Omega$ /2W
- 1 Z diode ZPD 6.2

#### Measuring devices:

- 1 Multimeter M2032
- 1 Multimeter M3E
- 1 Oscilloscope
- 1 DC Power supply units:
- 1 AC Power supply unit

#### Accessories:

- 1 Plug-in board 297x 300
- 1 Measuring cable BNC/4mm
- 1 Set of bridging plugs 19 mm
- 1 Set of connecting leads

## Exercise 1

Static recording of the current-voltage characteristic  $I_z = f(V_z)$  of a Z diode

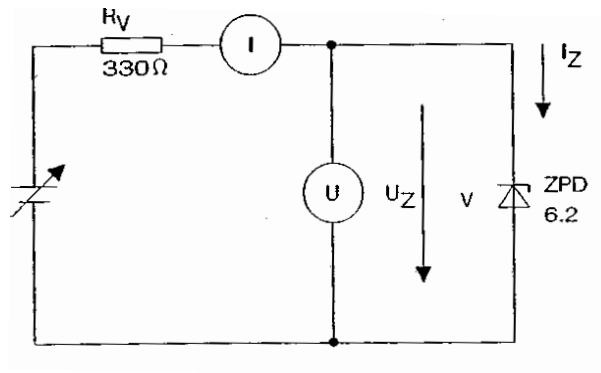


fig.1

Assemble the circuit as shown in fig.1 and carry out the measurements for the voltages given in the table 1.

ZPD 6.2 V	
$V_Z / V$	$I_Z$ mA
0	
1	
2	
3	
4	
5	
5.5	
6.0	
6.1	
6.2	

Draw the corresponding current-voltage characteristic  $I_z = f(V_z)$ .

1. What function does the series resistor  $R_v$  have?
2. Determine the Z voltage  $V_{z0}$  of the diode by drawing a tangent to the approximately linear part of the curve (fig. 2) and reading the voltage from the voltage axis where the tangent intersects it.
3. Set the DC supply (E) to the values appearing in Table 2 and measure both  $V_Z$  and  $V_R$ . Calculate the Zener current,  $I_Z$  using the Ohm's law given in the table and complete the table.
4. Plot  $I_Z$  versus  $V_Z$  using the data in Table 2 on a graph paper.

**Results and Calculations:**

E ( V )	0	1	3	5	7	9	11	13
VZ ( V )								
VR ( V )								
$I_Z = V_R / R$ ( mA )								

Table 2

**Exercise 2**

Dynamic representation of the current-voltage characteristic  $I_z = f(V_z)$  of a Z diode.

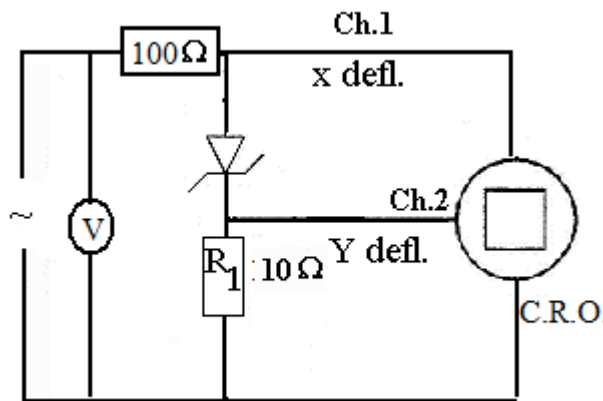


Fig. 3

1. Assemble the circuit as shown in fig.3 and apply a sinusoidal voltage  $V_{p-p} 12\text{ V}$ ,  $f = 50\text{ Hz}$ .
2. Display the current-voltage characteristic of the Z diodes ZPD 6.2 V and ZPD 9.1 V on the oscilloscope and enter the graphs into the diagram in fig. 4.
3. Record the oscilloscope settings of :  
X-deflection: volts/div (DC) & Y-deflection: volts/div (DC, Inverted)
4. Compare the two characteristics and list three differences between them.