Table of contents

1. Introduction
2. Objectives
3. Circuits under Test
4. Experimental Result
5. Conclusion and Remark
6. Appendix: Prelab Assignment

Introduction

The report for lab 1 i.e., Diodes took place on 27 January 2021.Appendix at the end is the prelab Assignment.

Objective

The objective of lab 1 is to examine the voltage and current characteristic of 1n4148 silicon diode and when signal is passed diode. Different metals have different abilities like conducting and insulating current through them and some have strong current conducting ability, and some are partially conducting which are semiconductors, This Diodes we are dealing with are semiconductors. These diodes turn on and off based on the voltage passing through the diode. This experiment is analyzed based on contribution of diode and if the diode is in reverse bias region the diode is off.

Circuit under Test

Diagram, calendar

Description automatically generated

Fig 1: The circuit which we collect the information from by changing the values for table E1.

Diagram

Description automatically generated

Fig 2: This figure shows the left circuit is connected to a diode with a resistor in series, the circuit on the right is a diode is parallelly connected with a resistor and a resistor in series.

Experimental Result

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | ∆ | ∆ |  |
| 10 | 10.671 | 0.671 | 1.5 | 0.669 | -0.002 | -0.446 | 4.48 |
| 7 | 7.657 | 0.657 | 2.2 | 0.655 | -0.002 | -0.297 | 6.73 |
| 5 | 5.645 | 0.645 | 2.7 | 0.644 | -0.001 | -0.239 | 4.184 |
| 2 | 2.617 | 0.617 | 6.8 | 0.615 | -0.002 | -0.09 | 22.22 |
| 1 | 1.5972 | 0.597 | 12 | 0.596 | -0.001 | -0.05 | 20 |

Conclusion Remark

Graph P1 (a), is a triangular AC signal applied to the circuit. There are 4 components in the graphs. The first component is the waveform, a triangular wave whose peak-to-peak voltage value is 24V, generated by the source. The next graph represents the value of the voltage once the wave has passed some source resistance; here, the peak-to-peak value of the wave reduces by a little. The third graph is the voltage across the diode; here, there is a rectification of the wave when the wave is above approximately 0.6V and the wave flattens out before starting to decrease. The last graph is the graph of the waveform of the current passing through the diode; this is also a triangular wave.

However, the wave starts at zero and increases to about the value of IS. The graph P1 (b) is a representation of the voltage over current relationship. Once the voltage of about 0.6V is reached, the current starts to grow exponentially, this relation is evident from the graph.

C2

The two currents are 0.091mA and 0.049mA with 0.615 and 0.598 as respectively. The thermal voltage at room temperature is 25 mV so we have two unknown’s which are and n.

0.049 = 🡺 🡺 1

0.091 = 🡺 🡺2

Equation 1 and 2 is=is

We get 🡺 = 🡺 n= 2.32.

Using n in equation 2 we get Is

0.091 =

==2.26 x 10^-6

Putting Is and n in the equation we get, I = 2.26x10^6() is plotted below ()

Chart, scatter chart

Description automatically generated

MATLAB code for the V-I Characteristic Graph of the diode

Text

Description automatically generated

Appendix: prelab-Assignment

Calendar

Description automatically generated

Fig: the voltage source driving a diode through a series resistance.

A screenshot of a computer

Description automatically generated

Fig: Vs vs t

A screenshot of a computer

Description automatically generated

Fig: vi vs t

A screenshot of a computer

Description automatically generated

Fig: Vd vs T

A screenshot of a computer

Description automatically generated

Fig: Id vs T

Table

Description automatically generated with medium confidence

Fig: the voltage source driving a diode through a series resistance.

Chart, line chart

Description automatically generated

Fig: V-I characteristic of diode.