

**Faculty of Engineering and Technology**

**Department of Electrical And Computer Engineering**

**Electronics Lab**

**(ENEE3112)**

**Experiment #10 (Prelab)**

**Zener Diodes and Voltage Regulators**

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1. **Zener Diode.**

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Figure 1 zener diode circuit.

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| **E(V)** | **VR(V)** | **VZ(V)** | **I** |
| **0.3** | **35.6mv** | **264.4mv** | **35.6uA** |
| **0.4** | **103.6mv** | **296.41mv** | **103.6uA** |
| **0.5** | **187.2mv** | **312.81mv** | **187.2uA** |
| **0.6** | **276.6mv** | **323.41mv** | **276.6uA** |
| **0.7** | **368.8mv** | **331.17mv** | **369uA** |
| **0.8** | **462.74mv** | **337.27mv** | **462.7uA** |
| **0.9** | **557.72mv** | **342.3mv** | **557.7uA** |
| **1** | **653.46mv** | **346.5mv** | **653.5uA** |
| **2** | **1.63** | **371.38mv** | **1.63mA** |
| **3** | **2.62** | **384.7mv** | **2.62mA** |
| **4** | **3.61** | **394mv** | **3.61mA** |

1. **Replace the 1k to 100 ohm :**

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| **E(V)** | **VZ (V)** | **I**  |
| **0.1** | **99.7mV** | **3.053uA** |
| **0.5** | **498.5mV** | **15.26uA** |
| **1** | **1V** | **30.52uA** |
| **2** | **2V** | **61.04uA** |
| **3** | **2.991V** | **91.56uA** |
| **4** | **3.99V** | **122.1uA** |
| **5** | **4.99V** | **152.6uA** |
| **6** | **5.98V** | **183.1uA** |
| **7** | **6.72V** | **2.773mA** |
| **8** | **6.75V** | **12.53mA** |
| **9** | **6.762V** | **22.44mA** |
| **10** | **6.764V** | **32.38mA** |
| **11** | **6.764V** | **47.4** |
| **12** | **6.765V** | **56.9** |
| **13** | **6.767V** | **64.7** |
| **14** | **6.769V** | **74.64** |
| **15** | **6.77V** | **83.3mA** |

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| **E(V)** | **10** | **11** | **12** | **13** | **14** |
| **VL(V)** | **6.73** | **6.74** | **6.745** | **6.748** | **6.751** |

|  |  |  |  |  |
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| **RL** | **8.2K** | **6.8K** | **4.7K** | **2.2K** |
| **VL(V)** | **6.73** | **6.73** | **6.73** | **6.727** |

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| **RL** | **open** | **1k** | **680** | **470** | **220** | **100** |
| **Vo** | **12** | **12** | **12** | **12** | **12** | **12** |
| **Io** | **zero** | **12mA** | **17mA** | **25mA** | **55mA** | **122mA** |

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| **RL** | **open** | **1k** | **680** | **470** | **220** | **100** | **50** |
| **Vo** | **12** | **9.5** | **8.7** | **8.3** | **7.8** | **7.2** | **6.9** |
| **Io** | **zero** | **3mA** | **3mA** | **3mA** | **3mA** | **3mA** | **3mA** |

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| **RL(OHM)** | **VL(V)** | **IL(mA)** |
| **25** | **4.9V** | **196mA** |
| **50** | **4.98V** | **99.5mA** |
| **100** | **5.02V** | **50.2mA** |
| **200** | **5.03V** | **25.2mA** |
| **400** | **5.04V** | **12.6mA** |
| **800** | **5.05V** | **6.3mA** |
| **1200** | **5.05V** | **4.21mA** |

$$load regulation= \frac{∆V\_{L}}{∆I\_{L}}=\frac{5.05-4.9}{(4.21-196)m}=0.782=78.2\%$$

**R=100**

|  |  |  |
| --- | --- | --- |
| **Vi(V)** | **VL(V)** | **IL(Ma)** |
| **8** | **5** | **50** |
| **9** | **5** | **50.1** |
| **10** | **5** | **50.25** |
| **12** | **5** | **50.4** |
| **14** | **5** | **50.55** |

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1. **Vi = 10V, R1 = 100Ω, RL=1 kΩ.**

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| **R2** | **VL(V)** | **IL(mA** |
| **0** | **1.25** | **1.25** |
| **100** | **2.5** | **2.5** |
| **200** | **3.75** | **3.75** |
| **300** | **5** | **5** |
| **500** | **7.5** | **7.5** |
| **700** | **8.24** | **8.24** |

1. **RL = 1k, R1 = 100Ω, R2 = 220Ω.**

|  |  |  |
| --- | --- | --- |
| **Vi** | **VL(V)** | **IL(mA** |
| **10** | **4** | **4** |
| **12** | **4** | **4** |
| **14** | **4** | **4** |
| **15** | **4** | **4** |
| **16** | **4** | **4** |
| **17** | **4** | **4** |

1. **Vi = 10V, R1 = 100Ω, R2 = 220Ω**

|  |  |  |
| --- | --- | --- |
| **RL** | **VL(V)** | **IL(mA** |
| **100** | **4** | **40** |
| **200** | **4** | **20** |
| **400** | **4** | **10** |
| **500** | **4** | **8.01** |
| **600** | **4** | **6.68** |
| **700** | **4** | **5.7** |
| **1000** | **4** | **4** |