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| ***Instructions:***   * ***Submission must contain only original, individual, and current work.*** * ***After completion, save as PDF before submitting.*** |

Objective:

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| --- |
| To explore an instrument amplifier using an INA121 |

Circuit Schematic(s):

|  |  |
| --- | --- |
| (a) | (b) |
| Figure : (a) Basic circuit to explore the INA121 (b) Circuit to explore the effect of Vref . | |

Results/Calculations:

#### Step 1

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| --- |
| G = 1 + 50k/G  G = 2  2 = 1 + 50k/G  G = 50k |
| = 50kOhm, used a 47kOhm |

#### Step 4

|  |
| --- |
|  |
| Figure : Vb (Channel 2) and Vout (Channel 1) |

Step 5

|  |
| --- |
| 2.07tri(2pi \* 1000t) – 2  -2 because of the oscilloscope offset |
|  |

Step 6

|  |
| --- |
| Without Rg, G= 1 + 0 |
| New Gain, = 1 |

Step 7-8

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| --- |
|  |
| Figure : Vb (channel 2) and Vout (channel 1) |
| The peaks are out of the range of the chip |

Step 9-11

|  |
| --- |
| Offset of Vout changes equally with Vref |

Step 12

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| --- |
|  |
| Figure 4: Vout (Channel 1) and Vb (Channel 2) |

Conclusion:

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| The INA121 chips are useful to output a desired Gain with AC and DC currents within a certain range. Vref will change the Vout proportionally. |

Objective:

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| --- |
| Design a test set to obtain I-V characteristics of various diodes |

Circuit Schematic(s):

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|  |
| Figure : Diode circuit configuration . |

Step 1

(1a).

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| --- |
| Vs = 4v  Vd = .9v  Rlim + Rsense > (4 - .9) / .03 – 50  Rsense = 10 Ohm  Rlim + 10 > (4-.9)/3 - 50 |
| 47 Ohm  10 Ohm |

(1c-d). (Save your data to be used later.)

|  |
| --- |
|  |
| Figure : Vdut (X) vs. Vout (Y) 1 diode . |

(1g-h).

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| --- |
|  |
| Figure 7: 1N4148 Diode . |

Step 2

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| The diodes in opposite directions would not allow current to flow. |

Step 3

(3b-d).

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|  |
| Figure 8: 1N4148 vs. 1N5819 I-V Characteristics . |

(3e).

Table : Voltage and Power dissipated at 20 mA

|  |  |  |
| --- | --- | --- |
| Diode | Voltage @ I= 20mA ( V ) | Power dissipated @ I= 20mA ( W ) |
| 1N5819 | .2 | .004 |
| 1N4148 | .7 | .014 |

Step 4

(4c).

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|  |
| Figure 9: 1N5819 diode IV Characteristic measurement . |

(4b,d). Measurements and calculations

Table II: Voltage needed to reach +/- 5 mA

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Diode | Voltage  @ I=-5mA ( V ) | Power dissipated  @ I=-5mA ( W ) | Voltage  @ I=+5mA ( V ) | Power dissipated  @ I=+5mA ( W ) |
| 1N5226B | -.47 | .00235 | .47 | .00235 |

Step 5

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| The 1N5226B has its curve in the negative, and the 1N5819 has a steeper I-V curve. |

Conclusion:

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| Using different diodes we can see the difference in watt and voltage output. |



Objective:

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| Diodes and load lines |

Circuit Schematic(s):

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|  |
| Figure : Diode Load Line Test . |

Results/Calculations

Step 1

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|  |

Step 2

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| --- |
|  |
| Figure : I-V Curve against Load Line . |

Step 3-4

Table I: Predicted vs Measured Voltage

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Diode | Predicted VD ( V ) | Predicted ID ( A ) | Measured VD ( V ) | %error in Voltage |
| 1N5226B | .71 | .018 | .7 | 1.4% |
| 1N4148 | .71 | .018 | .7 | 1.4% |

Conclusion

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| --- |
| Load lines are a good way of estimating voltage and current in a diode. |