**DC Output Power Supply Calculations Summary**

(jas, DC Output Power Supply Calculations Summary.docx, 12/13/2024)

For this portion of the DC Output Power Supply Project, completeyour calculations for R5, Icalc, Rbias2, Ibias2 for Vin = 21 V, R1, Rf, IR1, Cf and Input Ripple Voltage VR for ILoad = 0.9Icalc. Then replace the blue text in **Table 1** with your values, which should be within the ranges given. Please reference the document “DC Output Power Supply Project.docx” for details on how to perform the following calculations. Utilize standard 5% resistor values and standard 10% capacitor values for all calculated resistor and capacitor values. Standard 5% resistors and 10% capacitor values are as follows:

* Standard 5% resistor values are limited to the following numerical values per decade of resistor values: 10, 11, 12, 13, 15, 16, 18, 20, 22, 24, 27, 30, 33, 36, 39, 43, 47, 51, 56, 62, 68, 75, 82 and 91. For example, 1.0 Ω, 10 Ω, 100 Ω, 1.0 kΩ, 10 kΩ, 100 kΩ, etc., are standard 5% values.
* Standard 10% capacitor values are limited to the following numerical values per decade of capacitor values: 10, 12, 15, 18, 22, 27, 33, 39, 47, 56, 68, and 82.

Include your calculations below for the following component values for your DC Output Power Supply: R5 and Icalc, Rbias2 and IRbias2 for Vin = 21 V, R1, Rf and IR1, Cf and Input Voltage Ripple VR for ILoad = 0.9Icalc. Points will be deducted for missing calculations.

62.5 ˚C/W thermal resistance

50 ˚C ambient temperature

175 ˚C maximum operating junction temperature

V\_R5 = 0.66 V

V\_ Diode = 0.7 V

**R5 and Icalc**

**Rbias2 and Ibias2 for Vin = 21 V**

### R1, Rf and IR1

**Cf and Input Ripple Voltage VR for ILoad = 0.9Icalc**

After performing the calculations, check your values by downloading and running the [calcCheck\_Student.m](https://content.byui.edu/file/f8b44dda-2a96-41cd-8a40-6a1483b29dc2/1/MATLAB/ECEN350_calcCheck_student.m) MATLAB script. This can be done using a downloaded version of MATLAB on your desktop/laptop or using [MATLAB Online](https://matlab.mathworks.com/). The MATLAB file calcCheck\_Student.m provides a quick check of your calculations and chosen values prior to soldering components onto the PCB. To utilize this MATLAB script, first run the script and then when prompted in the Command Window enter your values for Vout, R5, Rbias2, R1, Rf and Cf followed by Enter. The MATLAB script then provides feedback information for you in the Command Window.

### Replace the Ranges of Values in the Table below with your values including units.

**Table 1**: Power Supply Design Chosen and Calculated Values.

|  |  |
| --- | --- |
| Vout | 9.0 V |
| R5 | 3.6 Ω |
| Icalc | 183 mA |
| Rbias2 for Vin = 21 V | 24 kΩ |
| IRbias2 for Vin = 21 V | 742 uA |
| R1 | 24 kΩ |
| Rf | 62 kΩ |
| IR1 | 0.104 mA |
| Cf | 1000 µF |
| Input Ripple Voltage VR for ILoad = 0.9Icalc. | 1.38 V pk-pk |