

Electronic circuits Assignment:

Experiments using LTspice

Submitted by:

Batch 11

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RC Low Pass Filter

Aim

To design a 2 stage RC low pass filter with cutoff frequency of 2KHz and plot its frequency response.

Design

Circuit

Frequency response

Result

Designed a 2 stage RC low pass filter. It's simulated cutoff frequency is found to be:

Zener Series Regulator

Aim

1. To design a 5V Zener series regulator for a input voltage of +8 to +20V and maximum load current of 50mA
2. Plot and its load regulation and line regulation and find percentage load regulation and line regulation.

Design

- $V_{in}(max) = 20V$
- $V_Z = 5.1V$ $V_{in}(min) = 8V$
- $I_L(max) = 50mA$ $I_L(min) = 10mA$
- $I_Z(max) = 20mA$ $I_Z(min) = 10mA$

$$V_s(max) = V_{in}(max) - V_Z = 20V - 5.1V = \underline{\underline{14.9V}}$$

At minimum load current:

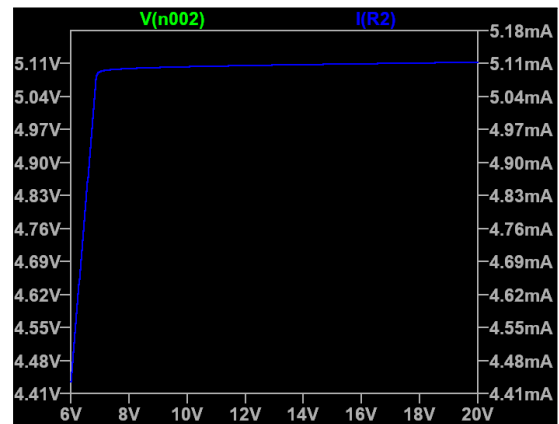
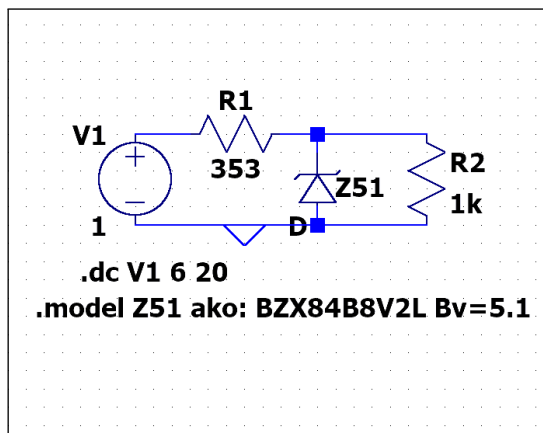
$$R_s max = \frac{V_s(max)}{I_L(min) + I_Z(max)} = \frac{14.9V}{10mA + 20mA} \approx \underline{\underline{500 \Omega}}$$

At maximum load current:

$$R_s min = \frac{V_s(max)}{I_L(max) + I_Z(min)} = \frac{14.9V}{50mA + 10mA} \approx \underline{\underline{250 \Omega}}$$

$$\therefore R_s = \sqrt{R_s max \times R_s min} = \sqrt{500 \times 250} = \underline{\underline{353 \Omega}}$$

Circuit and output waveform



Result

Designed a 5V Zener series regulator and obtained its output plot