# Harmonic Distortion from Diodes

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**Abstract**

Diodes cause mostly even-harmonic distortion of the voltage..... BLAHBLAH

## Introduction

A diode ideally only permits current to flow through it in one direction. While real diodes aren't so perfect, they still do block a significant amount of the current and act as a sort of rectifier. This rectification breaks the pure sine-wave and must therefore add new frequencies. The current that passes through the diode is a function of the voltage, so higher voltage inputs should cause greater harmonic distortion across the diode, since greater magnitudes of current are being blocked by the diode.

## Theory

BLAH

$$Q = \frac{Pd^4}{L} \tag{1}$$

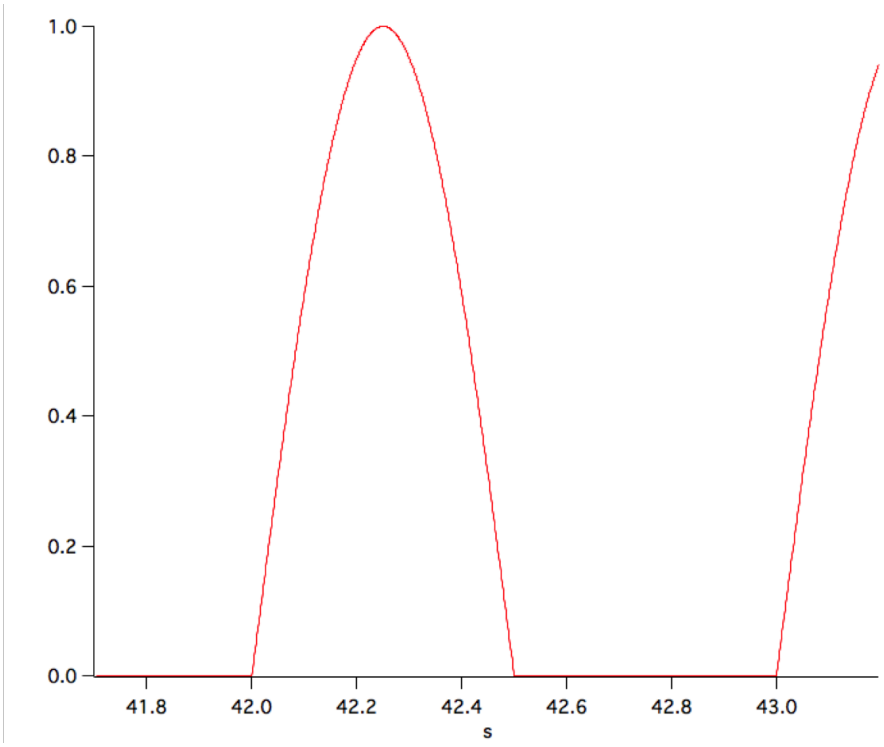


Figure 1: An ideally rectified sine wave.

## Experiment

BLAH Fig. 4.

MORE BLAH

## Results

BLAH

BLAH

BLAH

## Conclusion

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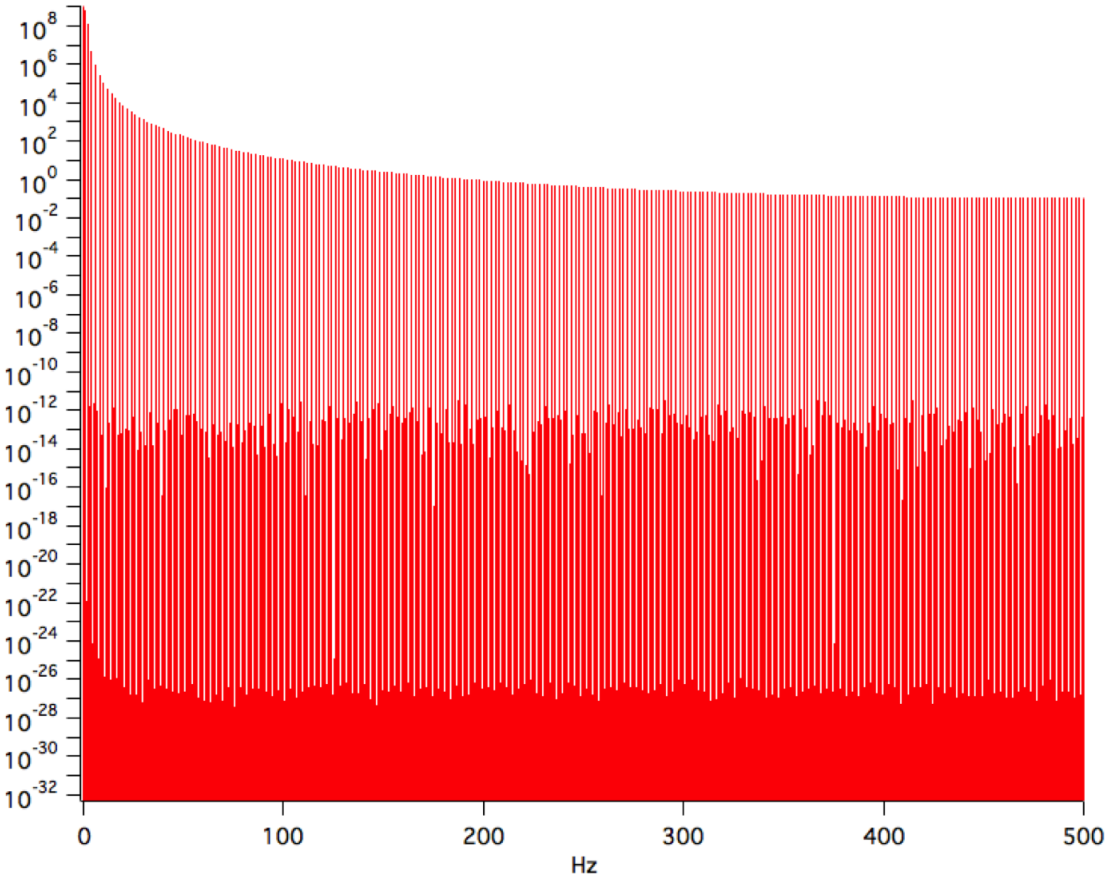


Figure 2: The fourier transform of this ideal diode.

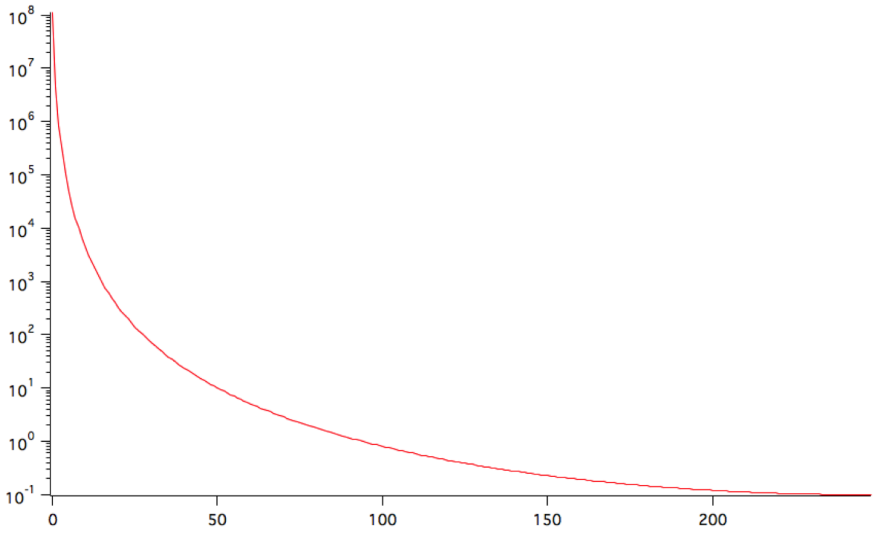


Figure 3: The even harmonics, which are the highest peaks in the Fourier transform, decay as shown. This is on a linear scale for the normalized frequencies, but the amplitude is logarithmic.

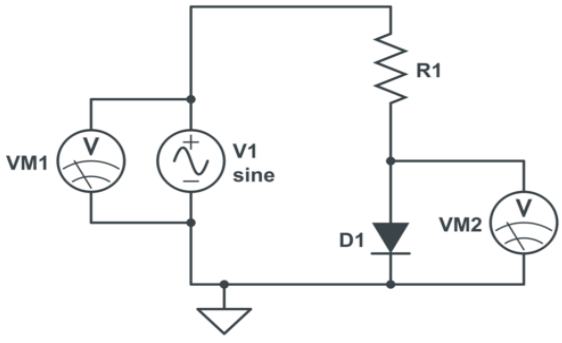


Figure 4: This is the circuit used to test the diode. The function generator outputted a sine wave of magnitudes 0.2 V to 4 V, and the resistor had a resistance of 150 kΩ.

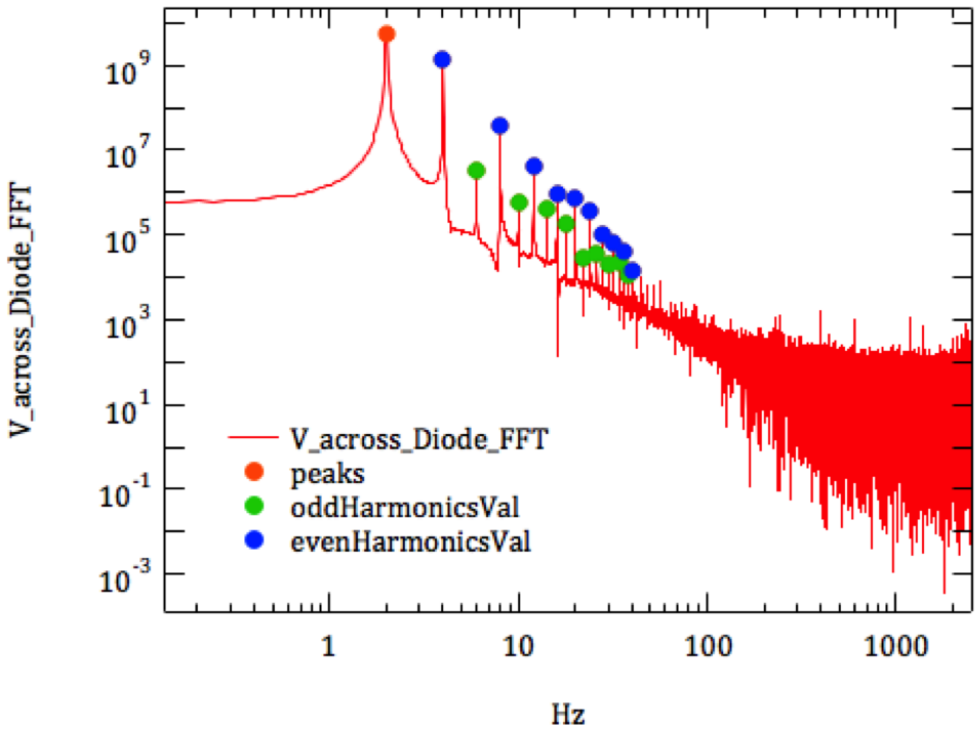


Figure 5: An example of the fourier transform of the voltage across the diode for a sinusoidal 3.5 V input. The main peaks were located and split as follows: the orange dot represents the fundamental frequency, about 2 Hz, the blue represents the even harmonics (odd overtones) and the green represents the odd harmonics (even overtones.)

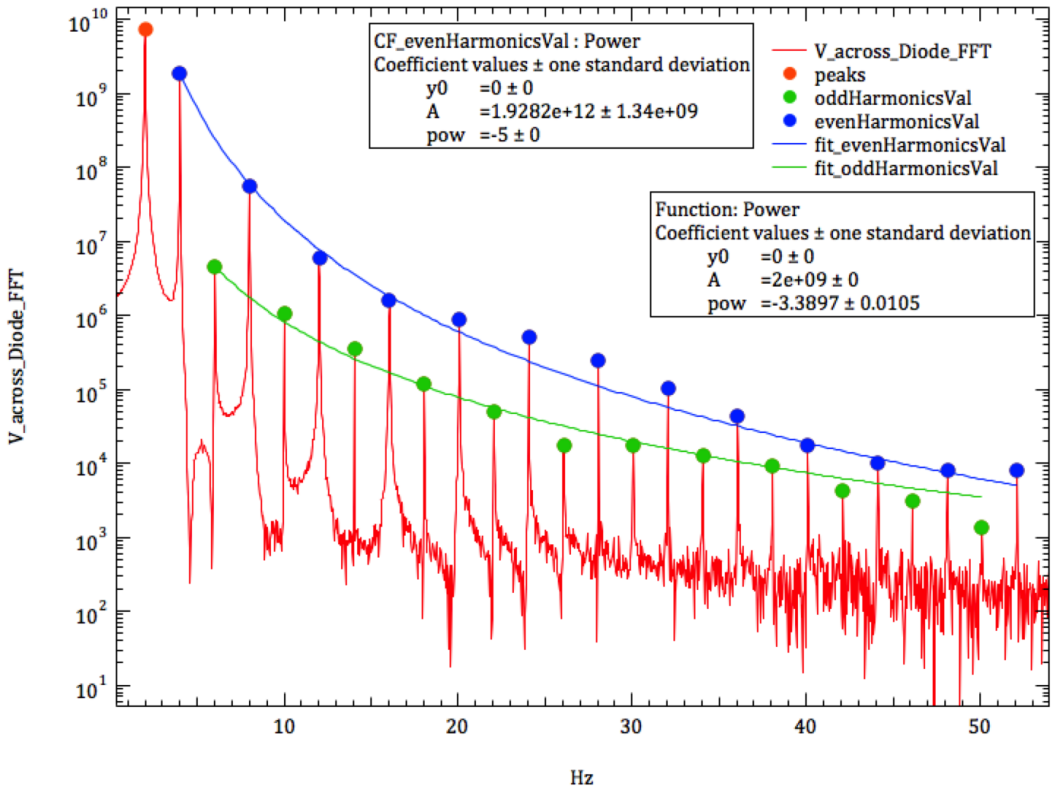


Figure 6: Here's me trying to fit a curve to the peaks...