
Voltage Monitor Circuit Test Results

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Voltage Transfer Function

This test used a lab supply to test the total transfer (filter included) for the voltage ranges from 0 to 333, which was the upper limit of the power supply.

```
close all; clear;
```

```
Vin = [ 0 20.3 40.0 60.0 80.8 100.5 120.2 140.9 160.6 180.5 200.3 220.8 ...  
       240.7 260.6 280.7 300.8 320.8 333.5];
```

```
Vout = [0.0 0.0 0.120 0.270 0.440 0.590 0.750 0.918 1.07 1.23 1.39 1.55 ...  
        1.72 1.88 2.08 2.21 2.38 2.47];
```

```
VoFilt = [0.020 0.178 0.335 0.494 0.658 0.811 0.966 1.13 1.29 1.44 1.60 ...  
          1.77 1.92 2.08 2.25 2.41 2.58 2.68];
```

```
% Fit a line
```

```
[p, S] = polyfit(Vin,Vout,1)
```

```
[pf,Sf] = polyfit(Vin, VoFilt,1);
```

```
figure;
```

```
plot (Vin, (p(1)*Vin+p(2)), 'b-', ...  
      Vin, (pf(1)*Vin + pf(2)), 'g-', ...  
      Vin, Vout, 'b.', ...  
      Vin, VoFilt, 'g.');
```

```
xlabel('Input Voltage (V)');
```

```
ylabel('Output Voltage (V)');
```

```
legend(['V_{OUT} = ' num2str(p(1)) 'V_{IN} + ' num2str(p(2))], ...  
       ['V_{OUTFILT} = ' num2str(pf(1)) 'V_{IN} + ' num2str(pf(2))], ...  
       'Location', 'SouthEast');
```

```
title('Voltage Sense Circuit Response');
```

```
grid on;
```

```
p =
```

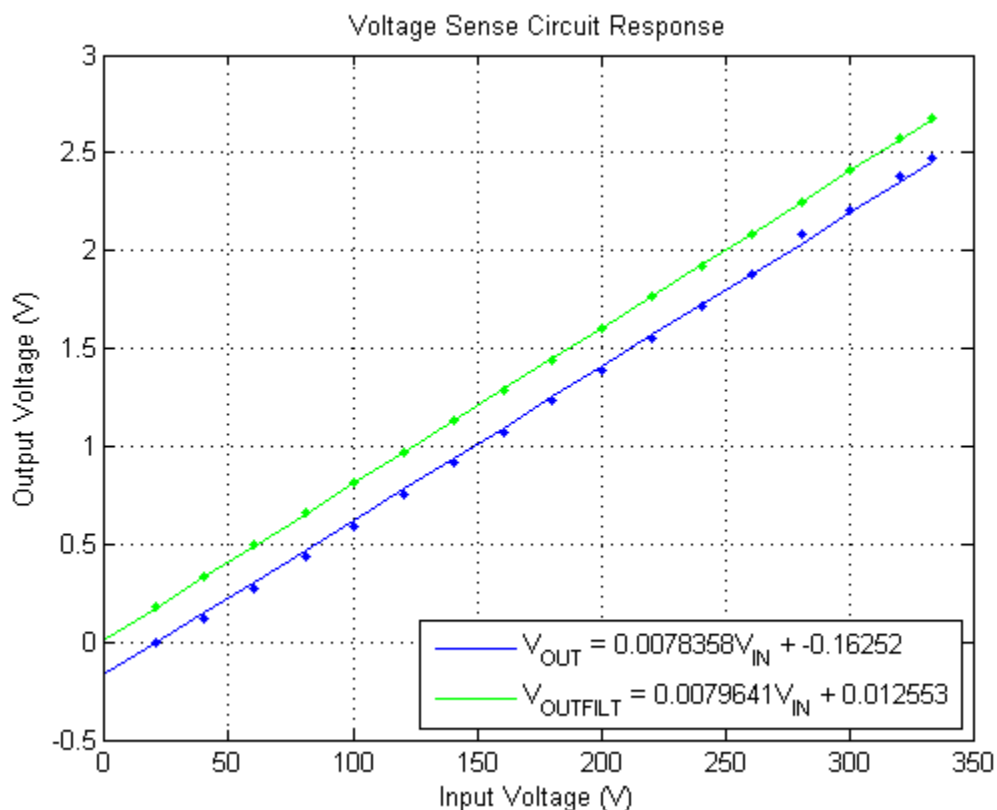
```
    0.0078    -0.1625
```

```
S =
```

```
    R: [2x2 double]
```

```
    df: 16
```

```
normr: 0.1935
```



Frequency Analysis of the Filter Designed for PowerBuoy Voltage and Current Sensing

First define the frequencies measured:

```
f = [1 100:100:900 1e3:1e3:18e3];
```

% Single input was sinusoidal, offset by 600mV and Vpp was:

```
Vpp = 2.14;
```

% Now enter the results (Vpp)

```
VoutPP = [2.18 2.14 2.14 2.16 2.16 2.16 2.18 2.18 2.2 2.22 2.24 2.40 ...
          1.16 0.40 0.18 0.12 0.08 0.06 .016 0.012 0.010 0.0076 0.0060 ...
          0.0046 0.0038 0.0032 0.0032 0.0030];
```

% Enter Phase Difference (Degrees)

```
Phase = [ 2.1 3.4 11.5 17 23 27 32 40 45 50 57 131.5 135 180+95 180+74 ...
          180+63 180+50 0 0 0 0 0 0 0 0 0 0 ];
```

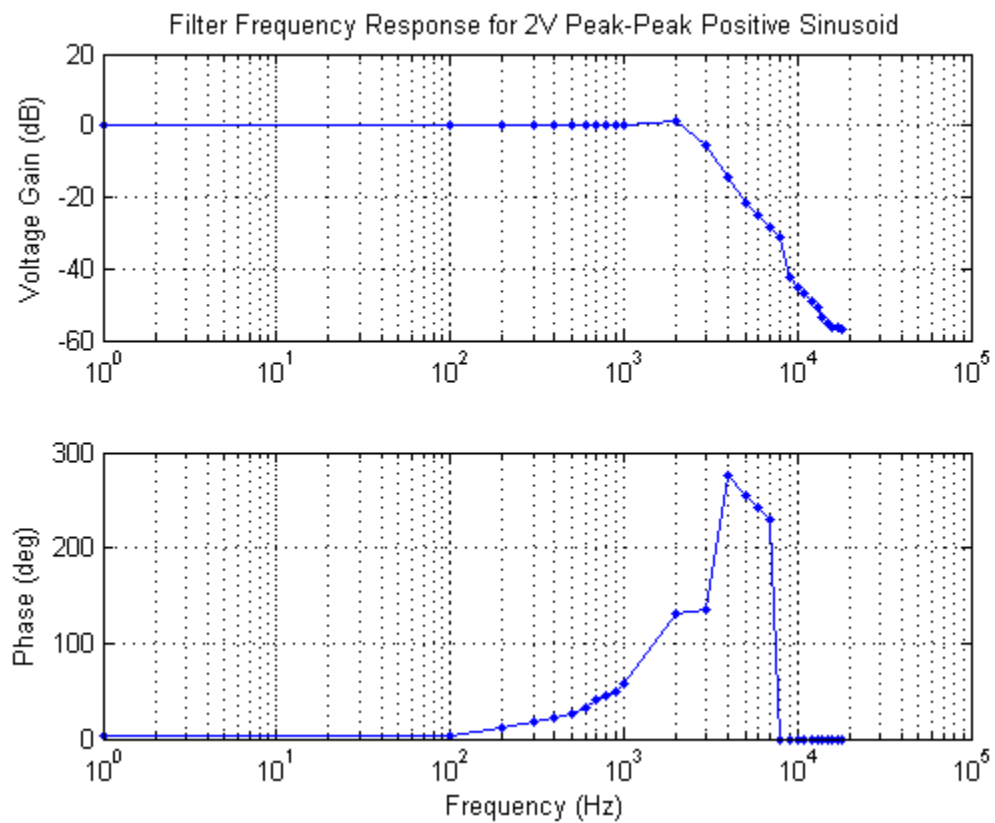
% Calculate the gain

```
Gain = 20*log10(VoutPP./Vpp);

figure
subplot(211);

semilogx(f,Gain,'.-');
grid on;
ylabel('Voltage Gain (dB)');
title('Filter Frequency Response for 2V Peak-Peak Positive Sinusoid');
subplot(212);
semilogx(f,Phase,'.-');
ylabel('Phase (deg)');
xlabel('Frequency (Hz)');
grid on;

% Eric Martin 30 APRIL 2015
```



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