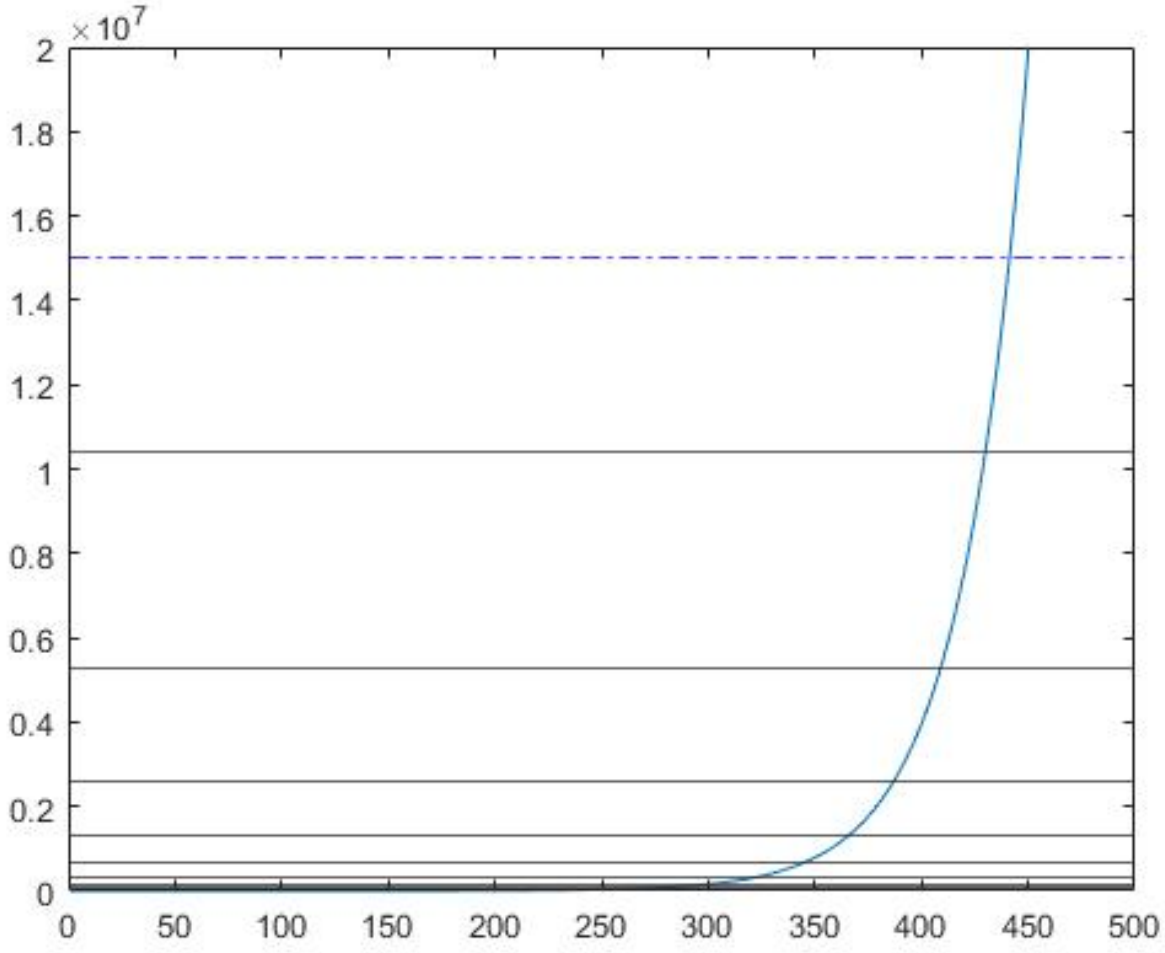
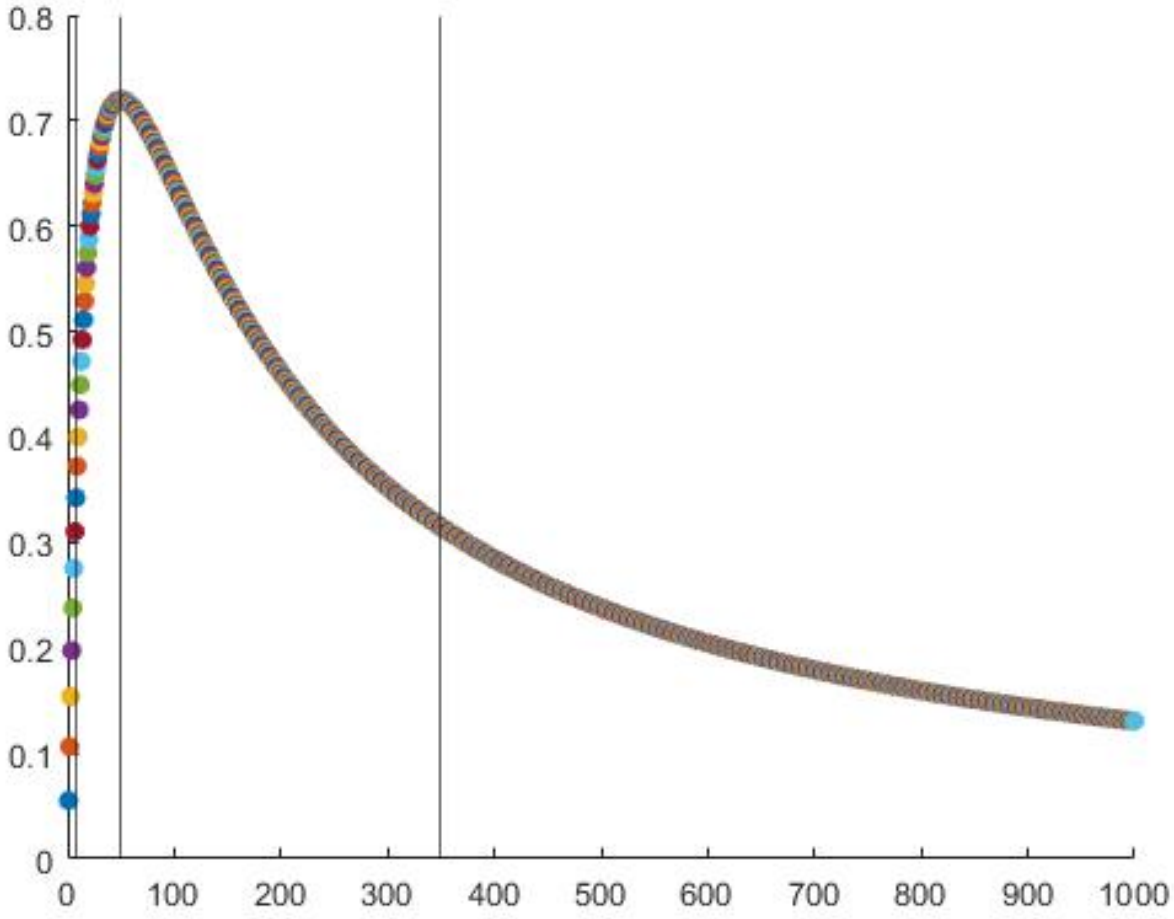
IMPEDANCE MATCH DOCUMENTATION



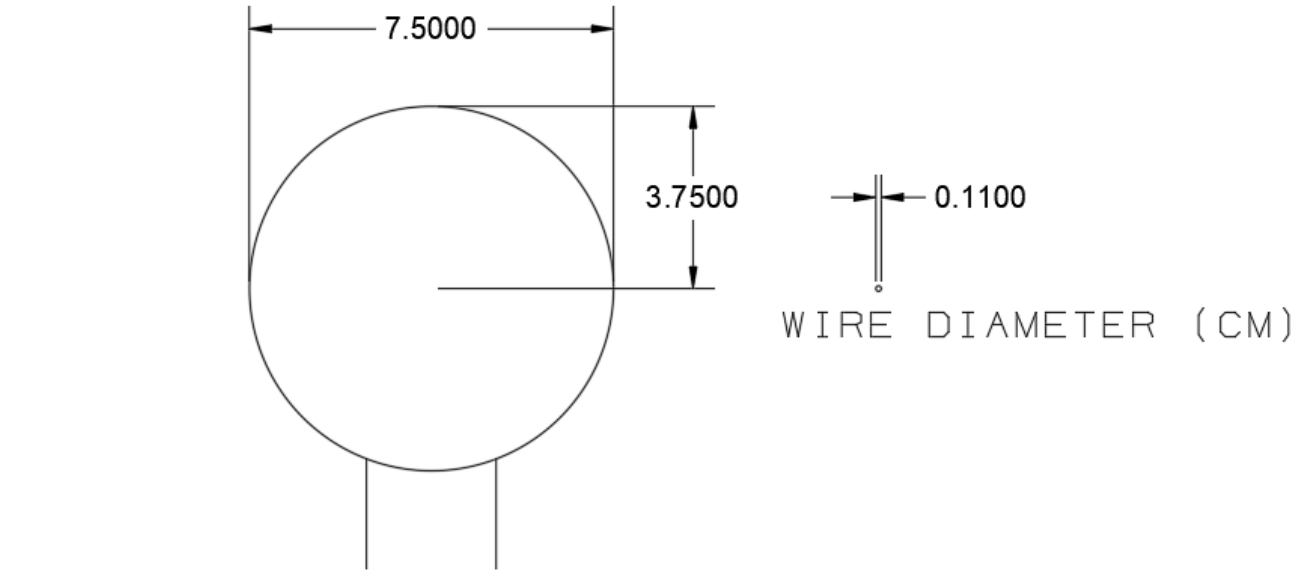

```
octave
19.7055780    161590.8753896   328877.4285826
      2              15               16

40.1057288    2587.1740786     648071.9826312
      3               9               17

79.0306568    5098.1760644     1318986.8961987
      4              10               18

160.8469483   10376.0501977    2599139.9183829
      5              11               19

316.9582089   20446.6066658    5289893.0760982
      6              12               20

645.0884089   41613.9055332    10424040.0702156
      7              13               21

1271.1839969  82002.6061993    21215501.7136245
      8              14               22
```

```
numfreq = 500;
y = logspace(1,8,numfreq);
stopFreq = y(numfreq);
startFreq = y(1);
a = double(startFreq);
c = 1;
figure(4);
plot(y);
xlim([0 numfreq]);
ylim([0 20000000]);
yline(15*10^6,'-.b');

while a <= 15000000

a = a*2;
[val,idx]=min(abs(y-a));
minVal=y(idx);


fprintf('%.7f\n',minVal)

yline(minVal);

c = c+1;
disp(c);

end
```




```
Vs = 12;
Zs = 50;
Zl = 0;
PL = 0;
figure(2);
scatter(Zl,PL,'filled');
x = [];
for c = 1:1000
Zl = Zl+1;
PL = (((Vs)/(Zs+Zl))^2)*Zl;
disp(PL);
scatter(Zl,PL,'filled');
hold on
x = [x, PL];
end
xline(50);
xline(7);
xline(350);
[M,I] = max(x)
```

Calculations



Final Coil Inductance: 50.469 uH

Transformer 1

Boundaries:	~%43.75 ----	%100 ----	~%43.75
Primary Impedance:	7Ω	50Ω	350Ω
Transformer 1 Frequency Range:	160.84Hz	1277.17Hz	5.098Khz

Inductor Impedance Formula: Xl = 2ΠfL
f = frequency
L = Coil Inductance

Coil Impedance at 160.84 Hz: 2Π(160.84)(50.469*10^-6) = .05097748Ω

Impedance Matching Formula: (Primary Turns/Secondary Turns) = sqrt(Primary Impedance/Secondary Impednace)

(100/Secondary Turns) = sqrt(7Ω / .05097748Ω)
Secondary Turns: 9
Final Turn Ratio 100:9

(100/90) = sqrt(50Ω / Secondary Impedance)
Secondary Impedance: 2.853
Coil Frequency at Specific Impedance: 0.405 = 2Πf(50.469*10^-6)
Coil Frequency at Specific Impedance: 1277.17Hz

(100/90) = sqrt(350Ω / Secondary Impedance)
Secondary Impedance: 2.835
Coil Frequency at Specific Impedance: Ω2.835 = 2Πf(50.469*10^-6)
Coil Frequency at Specific Impedance: 8.94 Khz

Normalized based on octave allocations: 5.098 Khz
Secondary Impedance at 5.098 Khz: 1.61578Ω
Primary Impedance at 5.098Khz: Ω199.469
Power Transfer at Primary Impedance: 64%

Transformer 2

Boundaries:	~%43.75	---- %100	---- ~%43.75
Primary Impedance:	7Ω	50Ω	350Ω
Transformer 1 Frequency Range:	5.098Khz	36.32Khz	328.7Khz

Inductor Impedance Formula: Xl = 2ΠfL
f = frequency
L = Coil Inductance

Coil Impedance at 5.098Khz Hz: 2Π(5098)(50.469*10^-6) = 1.61578Ω
Impedance Matching Formula: (Primary Turns/Secondary Turns) = sqrt(Primary Impedance/Secondary Impednace)

(100/Secondary Turns) = sqrt(7Ω / 1.61578Ω)
Secondary Turns: 48
Final Turn Ratio 100:48

(100/90) = sqrt(50Ω / Secondary Impedance)
Secondary Impedance: 11.52Ω
Coil Frequency at Specific Impedance: 11.52Ω = 2Πf(50.469*10^-6)
Coil Frequency at Specific Impedance: 36.3215 Khz

(100/90) = sqrt(350Ω / Secondary Impedance)
Secondary Impedance: 80.64Ω
Coil Frequency at Specific Impedance: 80.64Ω = 2Πf(50.469*10^-6)
Coil Frequency at Specific Impedance: 254.299824 Khz

Normalized based on octave allocations: 328.7Khz
Secondary Impedance at 328.7 Khz: 104.17Ω
Primary Impedance at 5.098Khz: 452.126Ω
Power Transfer at Primary Impedance: 35.27%

Transformer 3

Boundaries: ~%43.75 ---- %100 ---- ~%43.75
Primary Impedance: 7Ω 50Ω 350Ω
Transformer 1 Frequency Range: 328.7Khz 2.397Mhz 21.215Mhz

Inductor Impedance Formula: Xl = 2ΠfL
f = frequency
L = Coil Inductance

Coil Impedance at 328.7 Khz: 2Π(328.7Khz)(50.469*10^-6) = 104.17Ω
Impedance Matching Formula: (Primary Turns/Secondary Turns) = sqrt(Primary Impedance/Secondary Impedance)

(100/Secondary Turns) = sqrt(7Ω / 104.17Ω)
Secondary Turns: 48
Final Turn Ratio 10:39

(100/90) = sqrt(50Ω / Secondary Impedance)
Secondary Impedance:760.5Ω
Coil Frequency at Specific Impedance: 760.5Ω = 2Πf(50.469*10^-6)
Coil Frequency at Specific Impedance: 2.398 Mhz

Coil Impedance for a Frequency of 21.215Mhz: 6723.9Ω = 2Π(2398251)(50.469*10^-6)
Primary Impedance: 442.07
Power Delivery at this Impedance: %36.51

Lower Bound	Upper Bound	Span		Turn Ratio	~43.75% Max Power	100% Max Power	~43.75% Max Power
160.84Hz	316.95Hz	156.110Hz					
316.95Hz	645.08Hz	328.130Hz					
645.08Hz	1.271KHz	615.920Hz	Transformer 1	100:9	160.84 Hz	1277.17 Hz	5.098 Khz (64%)
1.271KHz	2.587KHz	1.3160KHz					
2.587KHz	5.098KHz	2.511KHz					
5.098KHz	10.376KHz	5.278KHz					
10.376KHz	20.446KHz	10.070KHz					
20.446KHz	41.613KHz	21.1670KHz					
41.613KHz	82.002KHz	40.389KHz	Transformer 2	100:48	5.098 Khz	36.3285 Khz	328.877 Khz (35.27%)
82.002KHz	161.590KHz	79.588KHz					
161.590KHz	328.877KHz	167.287KHz					
328.877KHz	648.071KHz	319.194KHz					
648.071KHz	1.328MHz	680.0KHz					
1.328MHz	2.599MHz	1.271MHz					
2.599MHz	5.289MHz	2.690MHz	Transformer 3	10:39	328.877 Khz	2.39721 Mhz	21.215MHz (36.51%)
5.289MHz	10.424MHz	5.135MHz					
10.424MHz	21.215MHz	10.791MHz					