

# *SSIC*

*(Solid State Inductive Collapse)*

# *Test 1*

*Battle of the cores*

*by drak*

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## Test 1

This test consists simply of pulsing one electrolytic cap into another one through a multi filer coil. Power for logic of mosfets was separated from power being tested.

Coil – Quad filer (Four wires/coils on one coil), 26 gauge magnet wire, 800 turns

Coil1 – Input

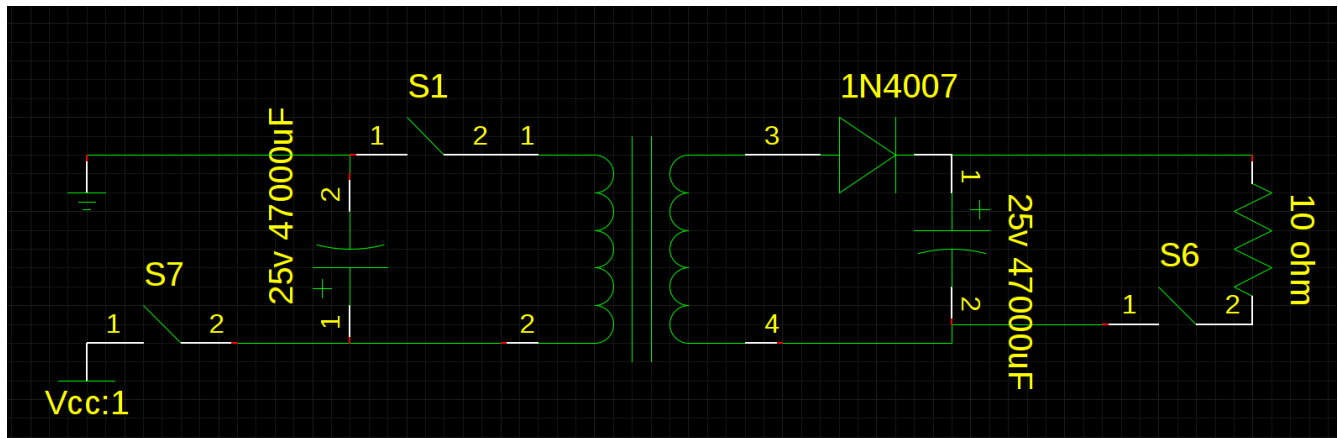
Coil2 – Output

Coil3&4 – not used, ends hanging in air

Input Cap – 25v 47000uF Electrolytic

Output Cap – 25v 47000uF Electrolytic

Circuit:



### Frequency scan test sequence:

S7 & S6 were closed for 6 seconds

Voltage readings were taken from both caps and recorded

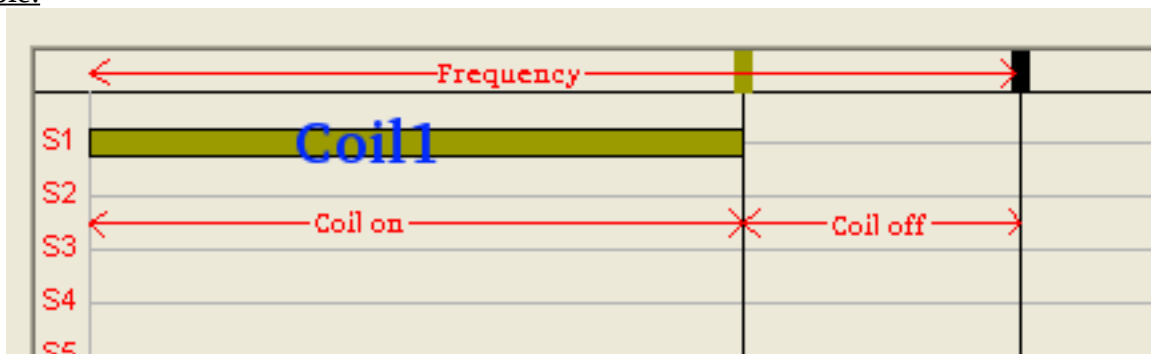
S1 was pulsed at a specified duty load at X frequency for 40 secs

Voltage readings were taken from both caps again and recorded

X was raised by 50 hertz

Process was repeated 100 times

Example:



**Formulas:**

COP was calculated by (Output Joules)/(Input Joules)

Input joules were calculated by  $\frac{((A2^{0.047}) * A2)/2 - ((C2^{0.047}) * C2)/2}$

A2 = Input start cap voltage

C2 = Input end cap voltage

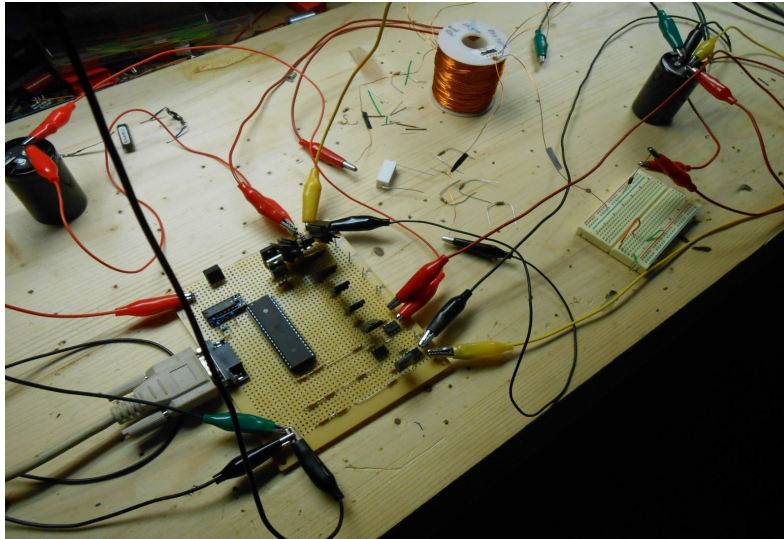
Output joules were calculated by  $\frac{((D2^{0.047}) * D2)/2 - ((B2^{0.047}) * B2)/2}$

D2 = Output end cap voltage

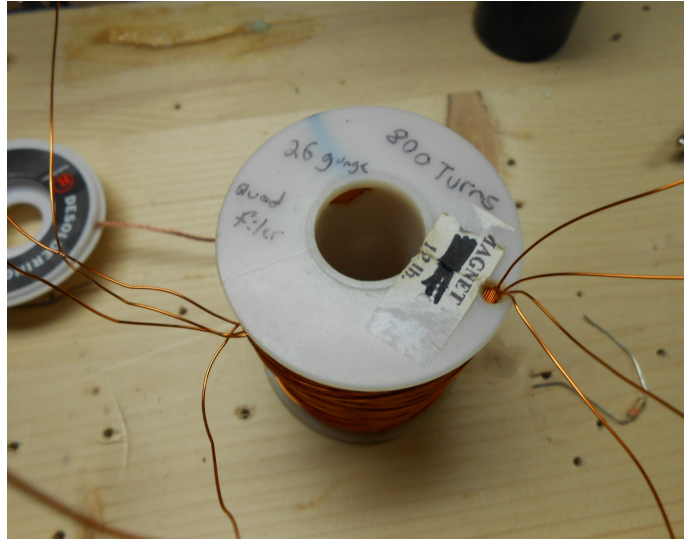
B2 = Output start cap voltage

**Tests:**

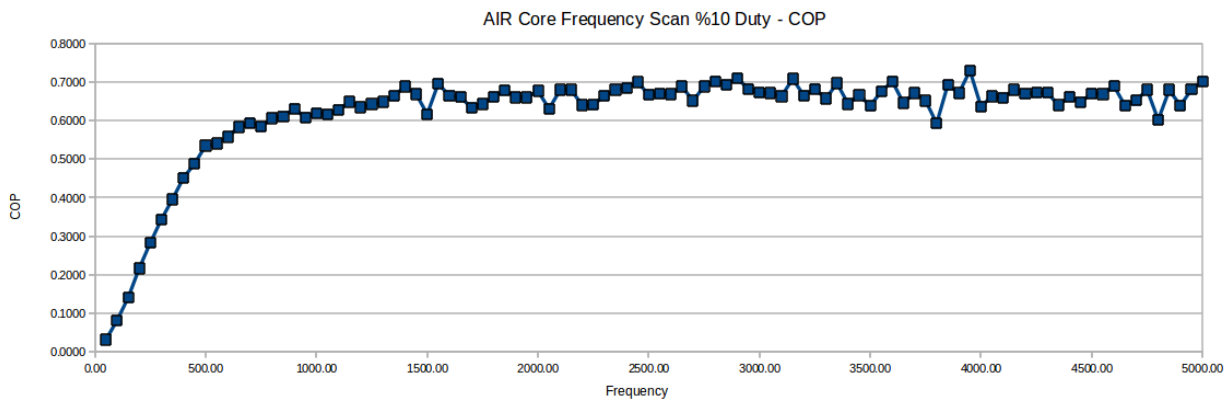
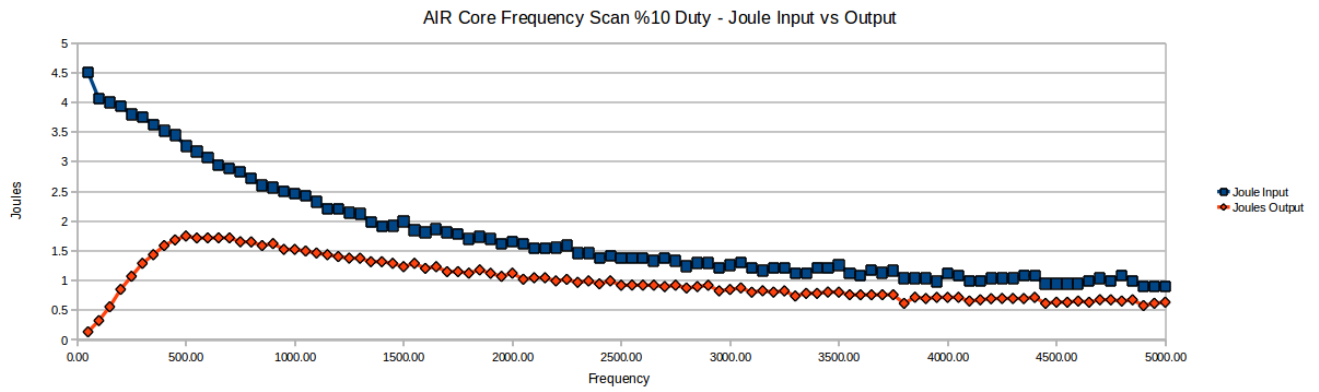
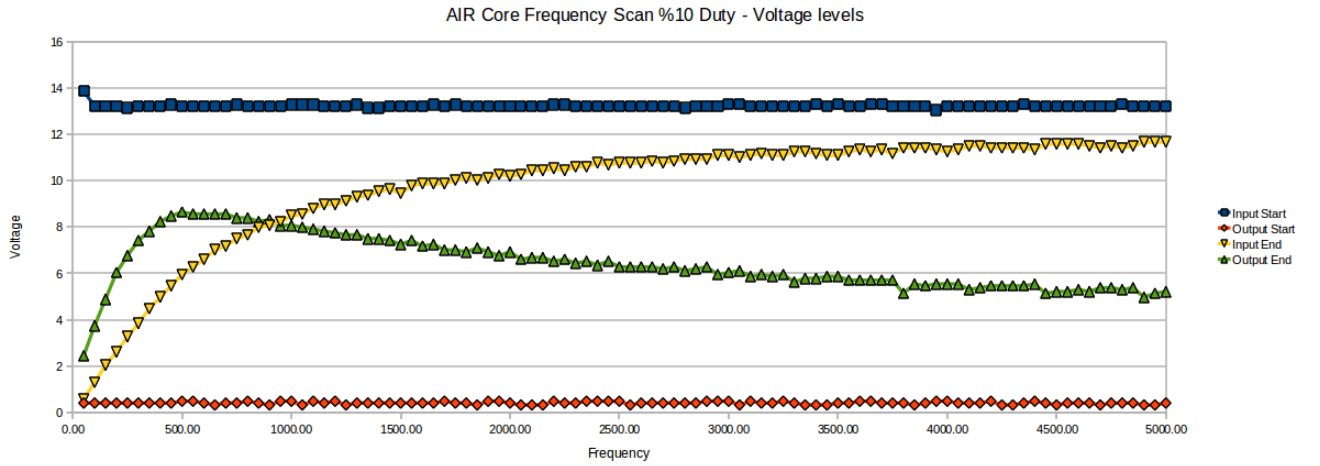
Comparisons per core are at the end of each core run and comparisons of cores are at the very bottom of pdf.



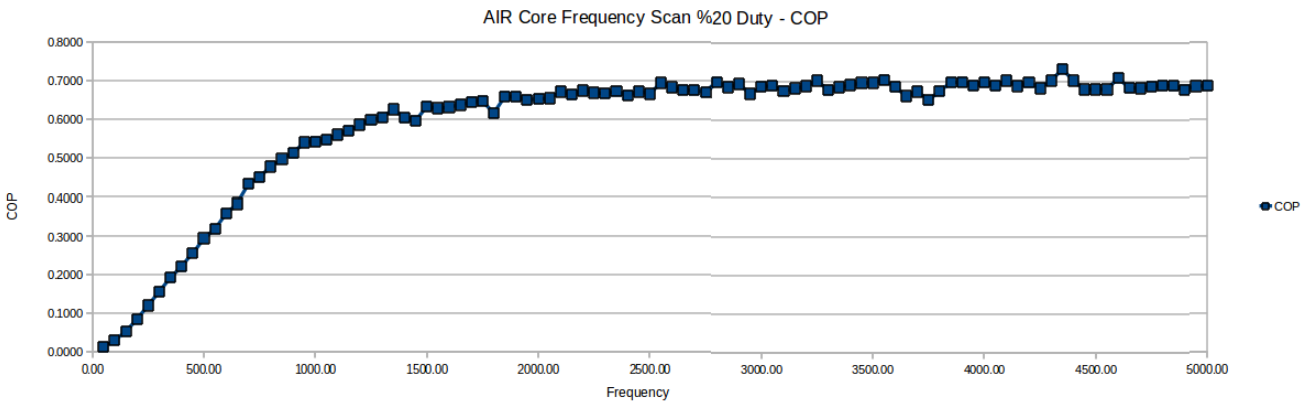
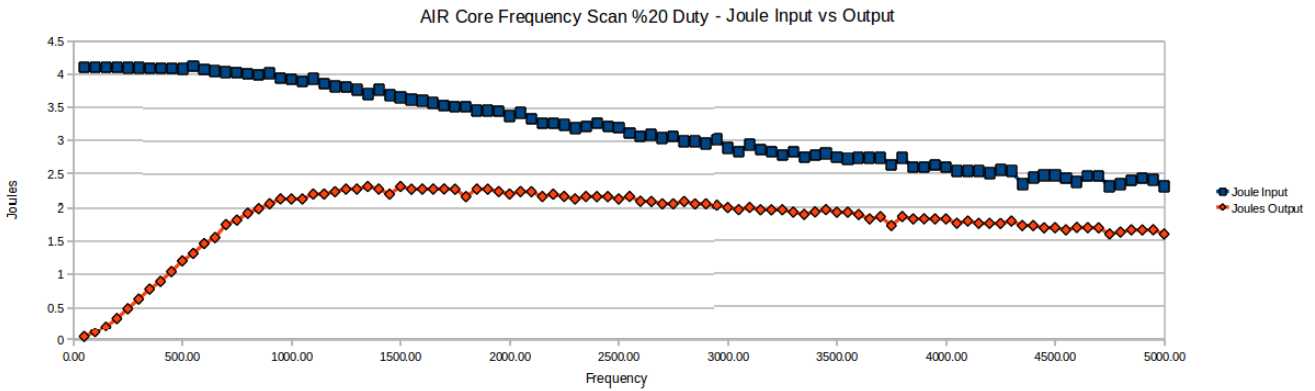
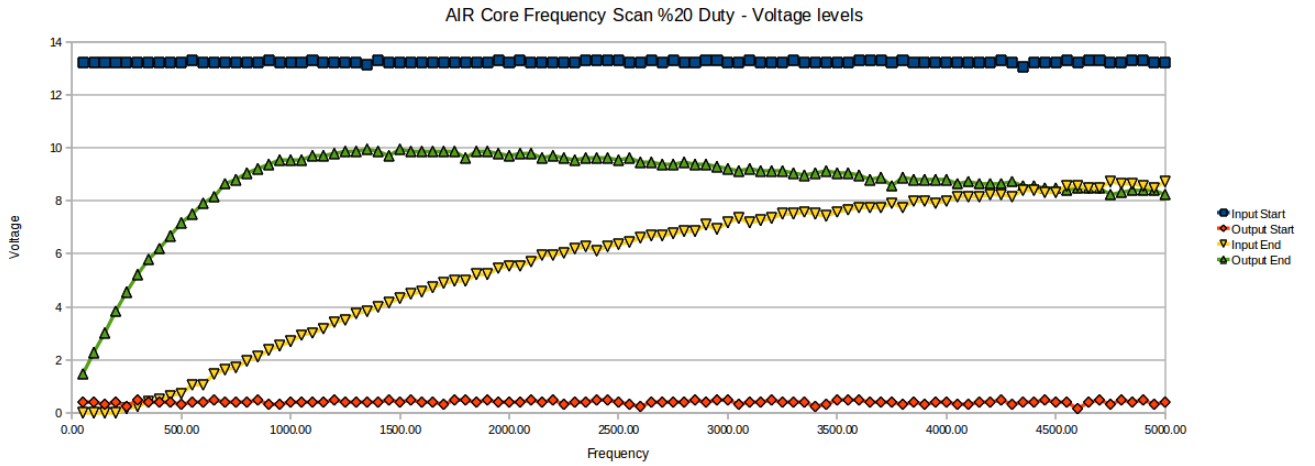
Air



Duty cycle – 10%  
Frequency - 50hz - 5000hz  
Core – AIR

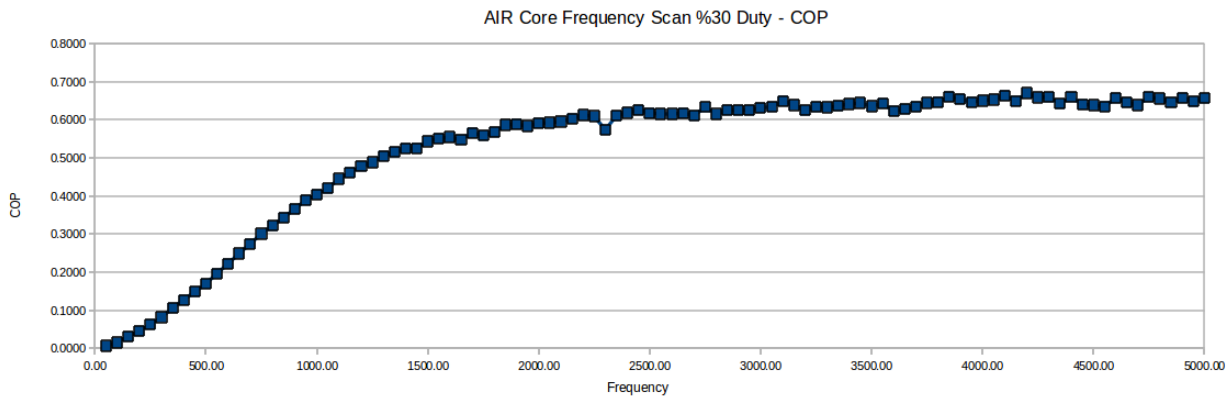
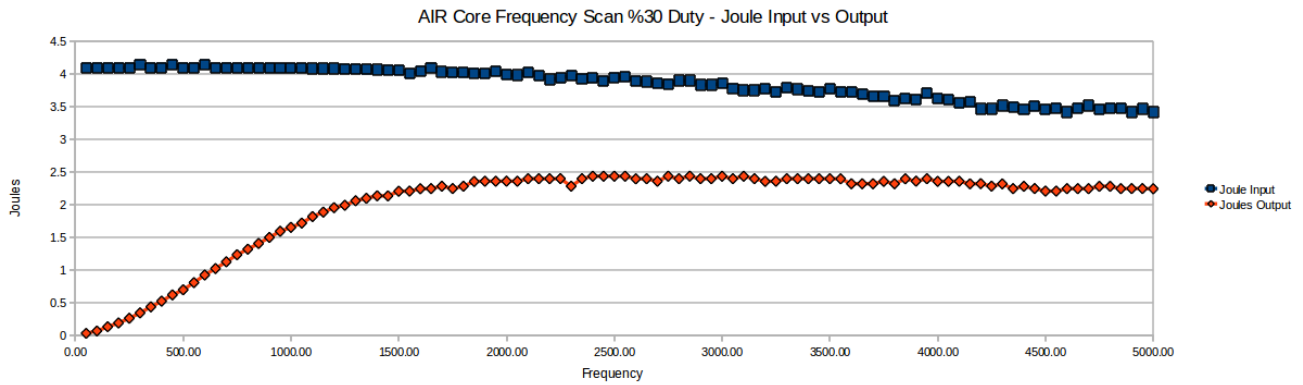
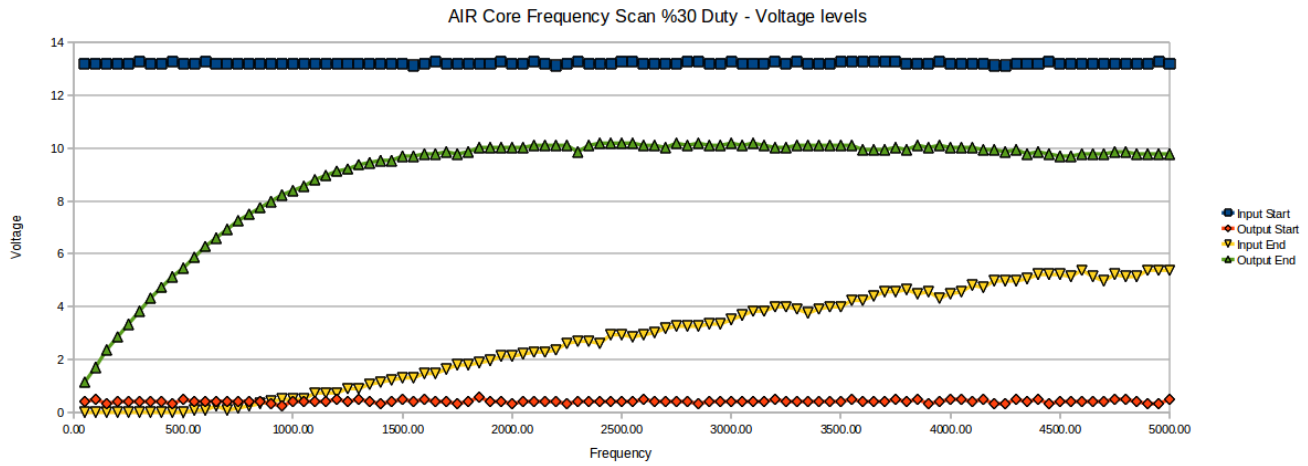


Duty cycle – 20%  
 Frequency - 50hz - 5000hz  
 Core – AIR

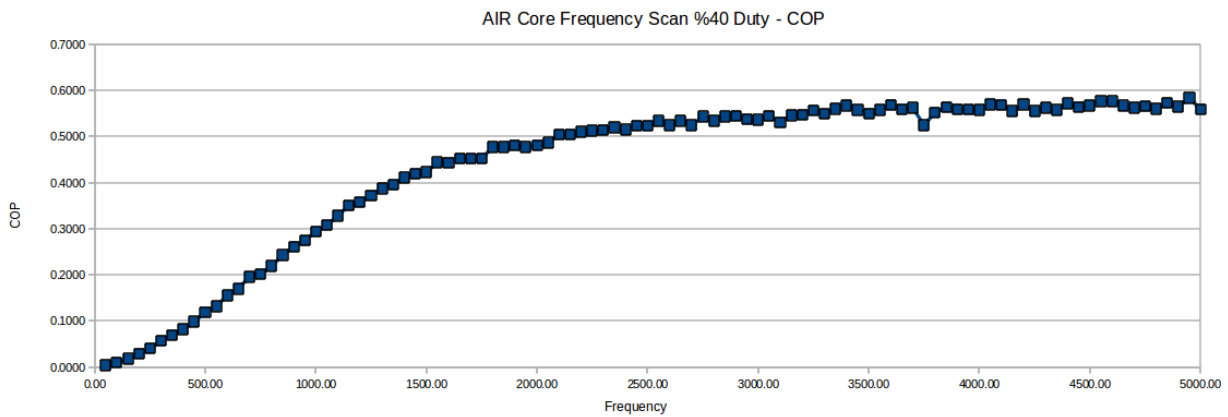
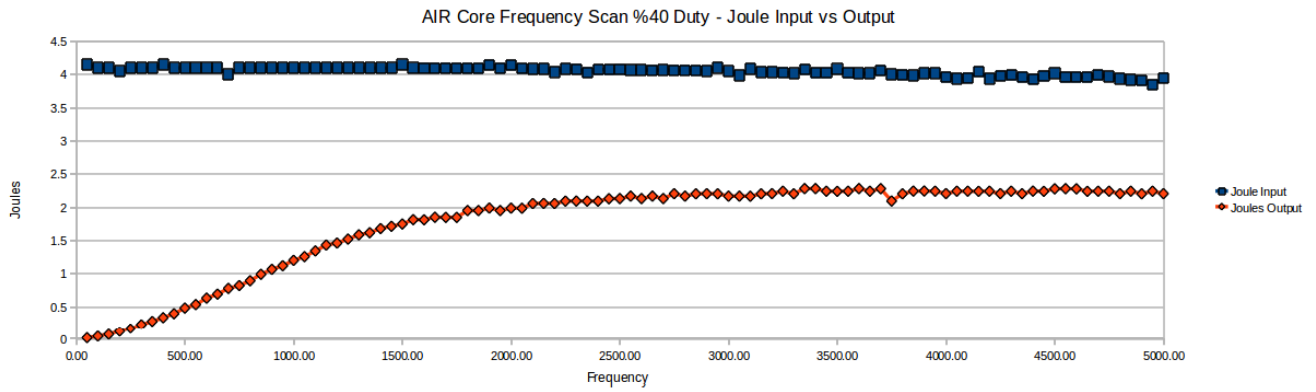
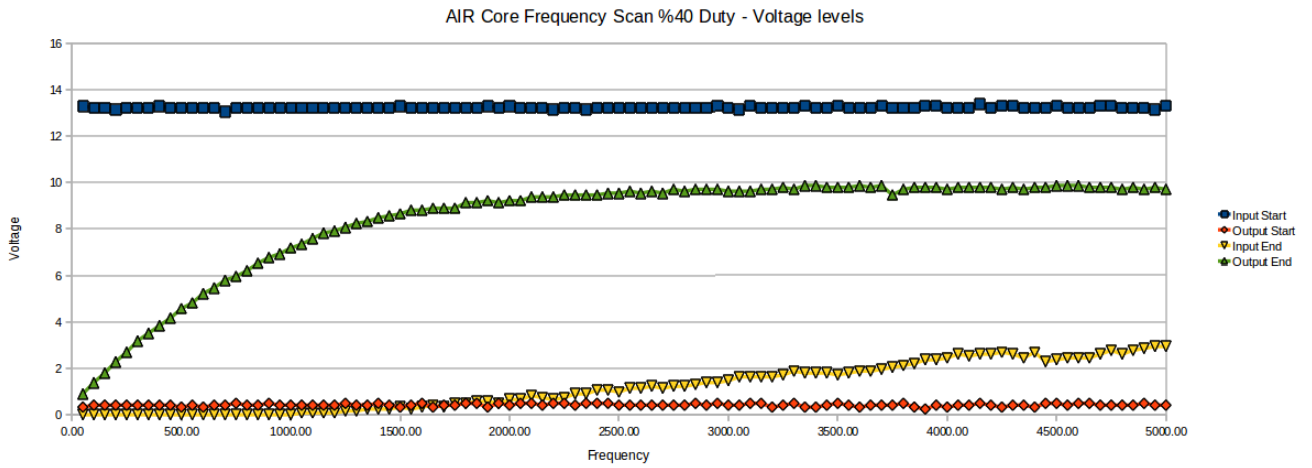




Duty cycle – 30%  
Frequency - 50hz - 5000hz  
Core – AIR



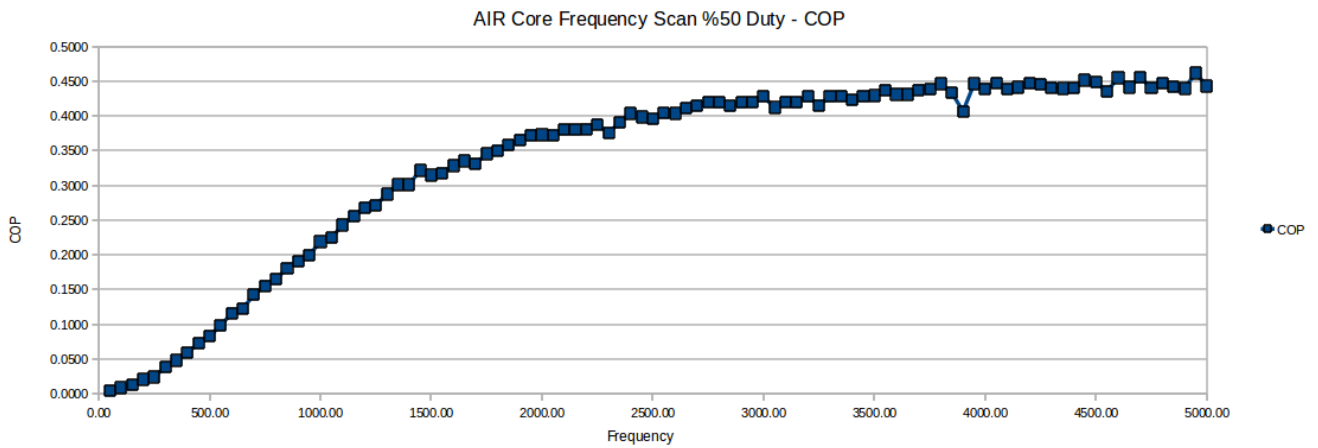
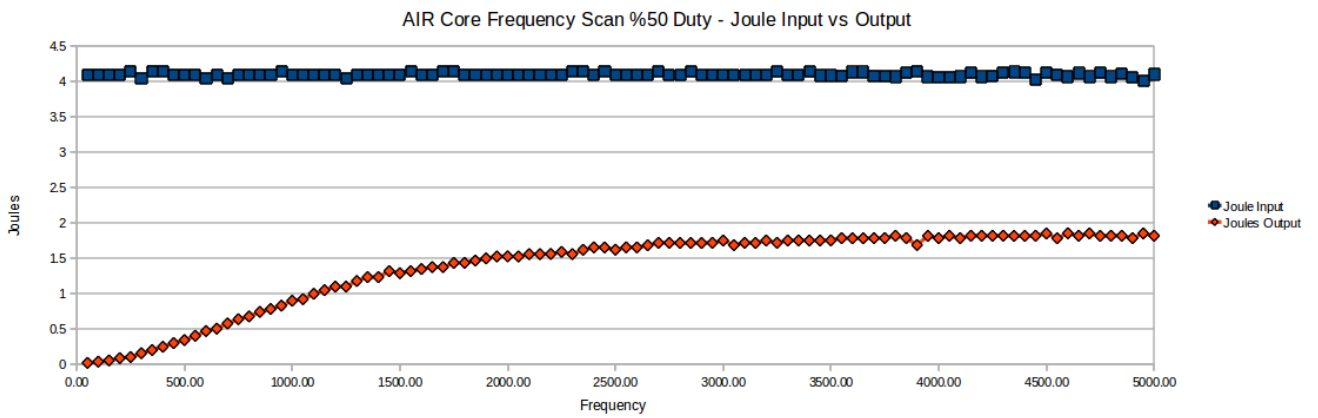
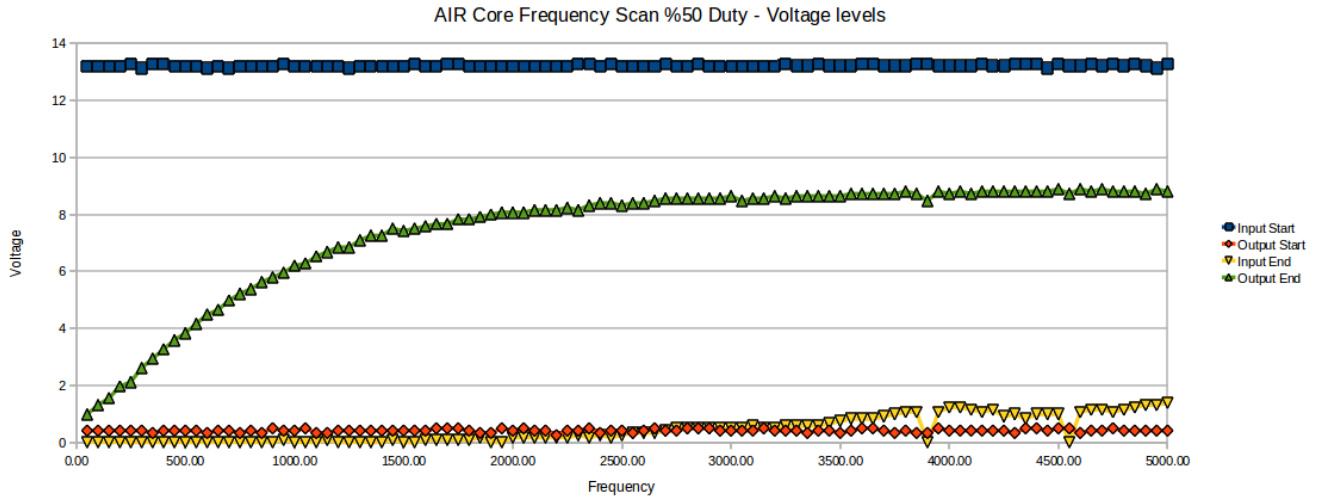
Duty cycle – 40%  
Frequency - 50hz - 5000hz  
Core – AIR



Duty cycle – 50%

Frequency - 50hz - 5000hz

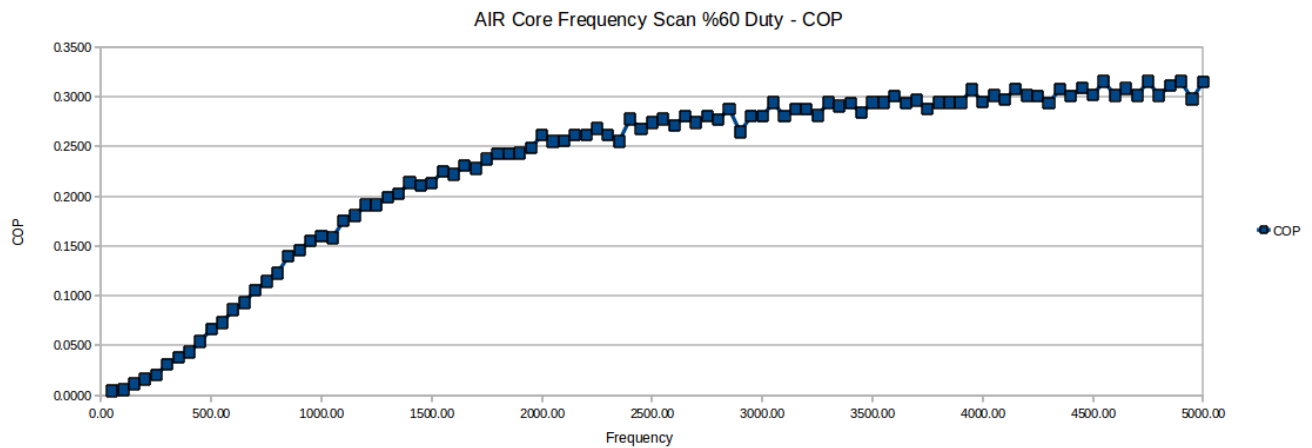
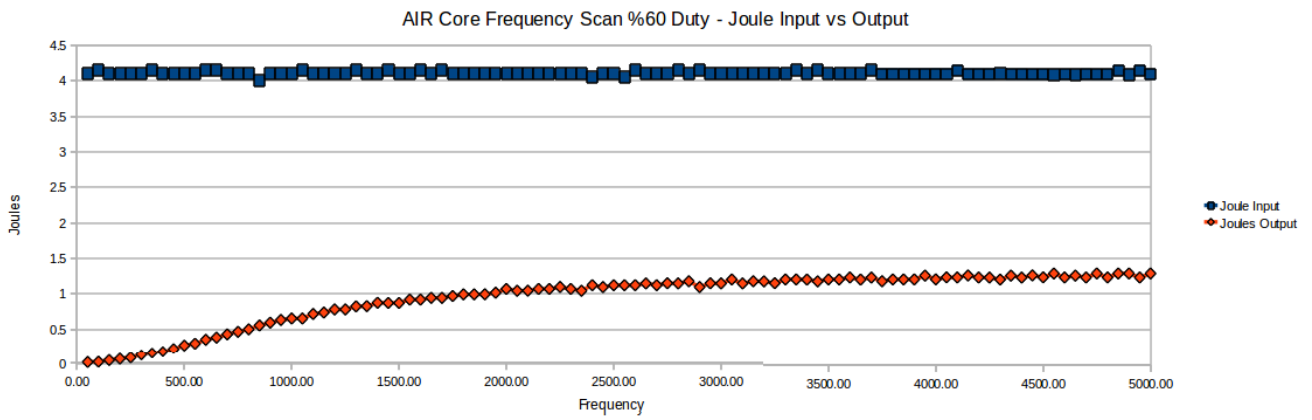
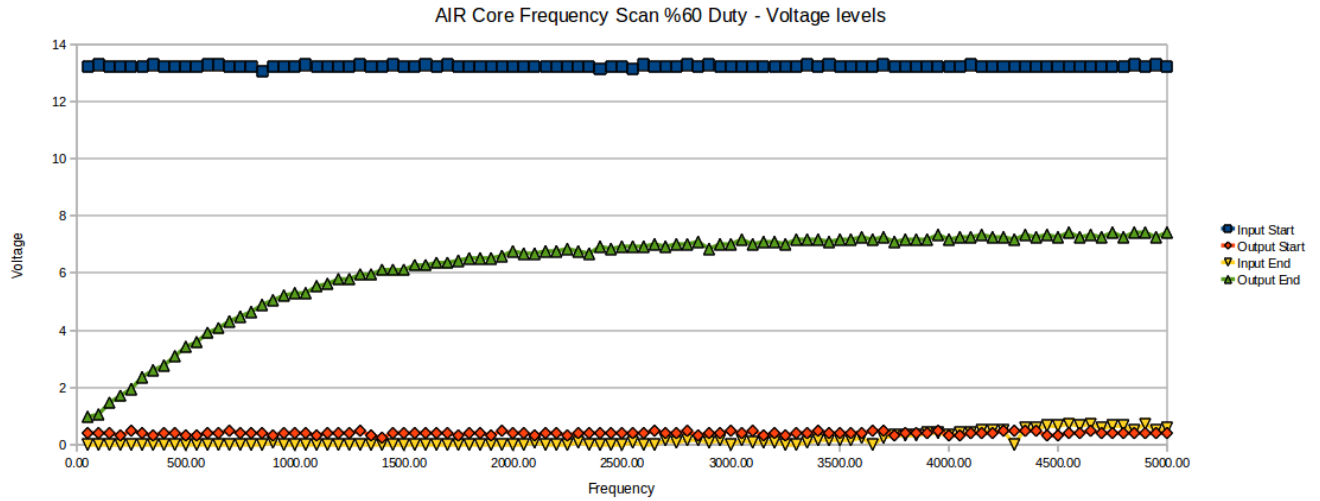
Core – AIR



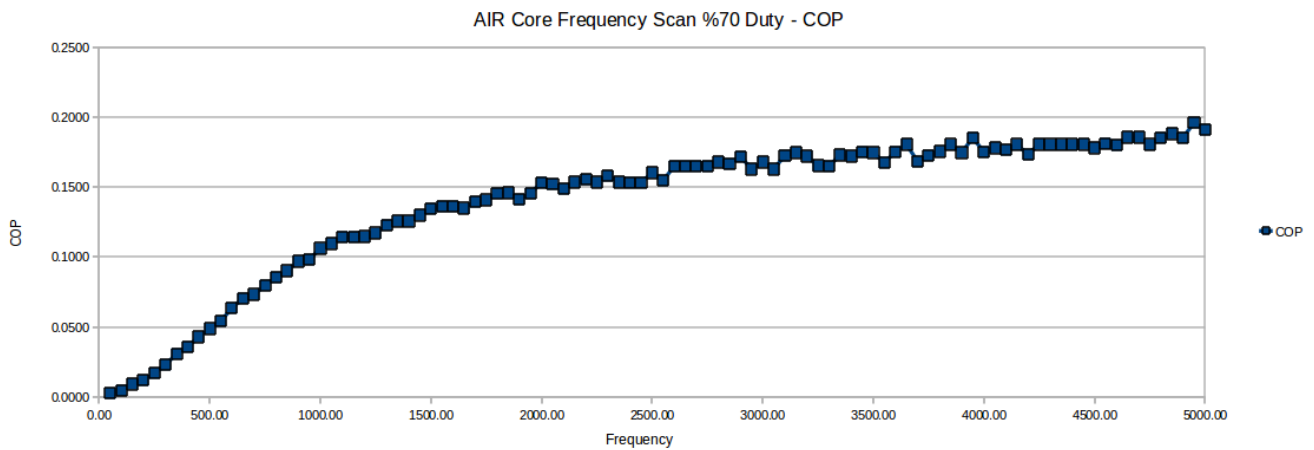
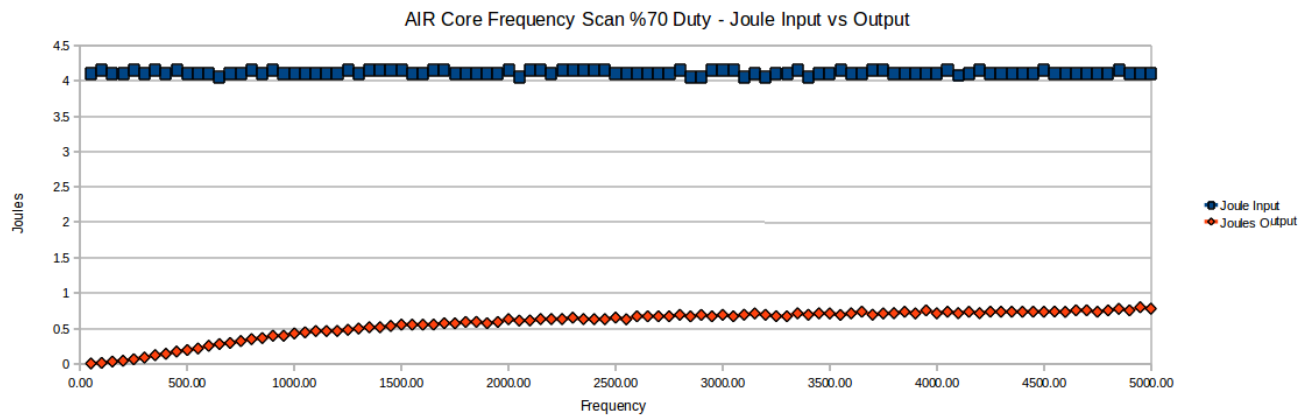
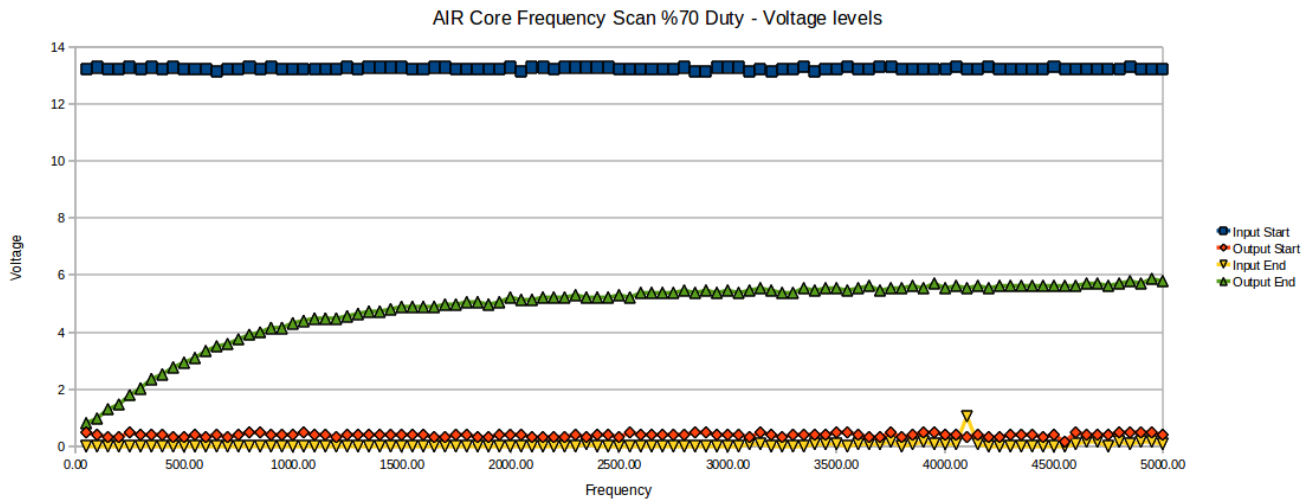
Duty cycle – 60%

Frequency - 50hz - 5000hz

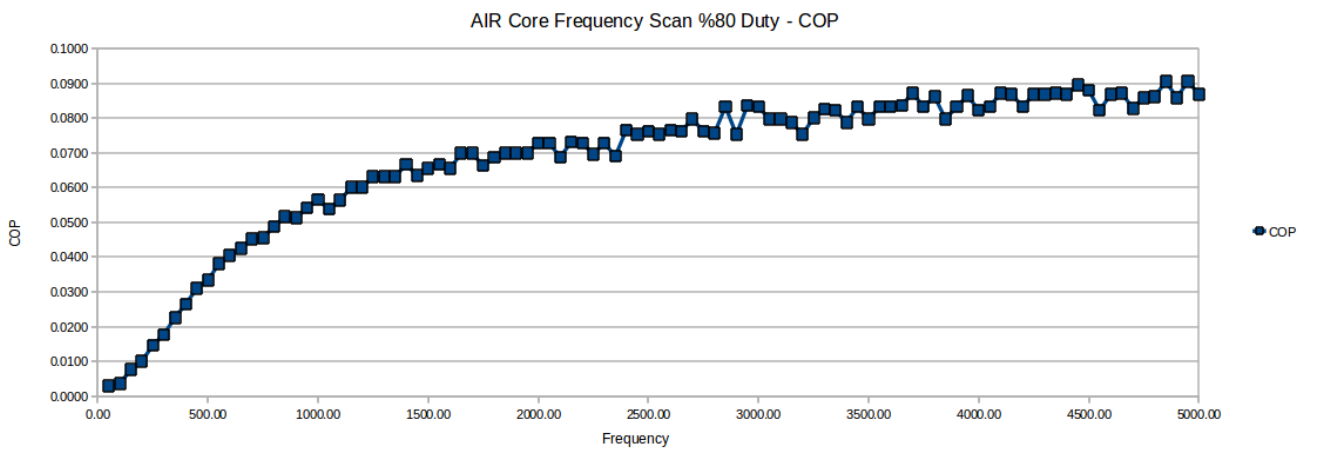
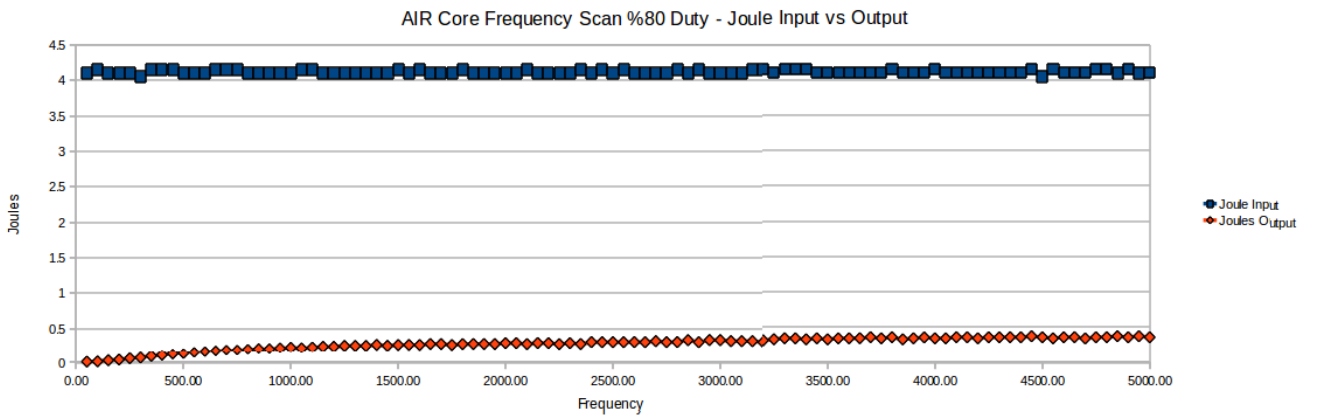
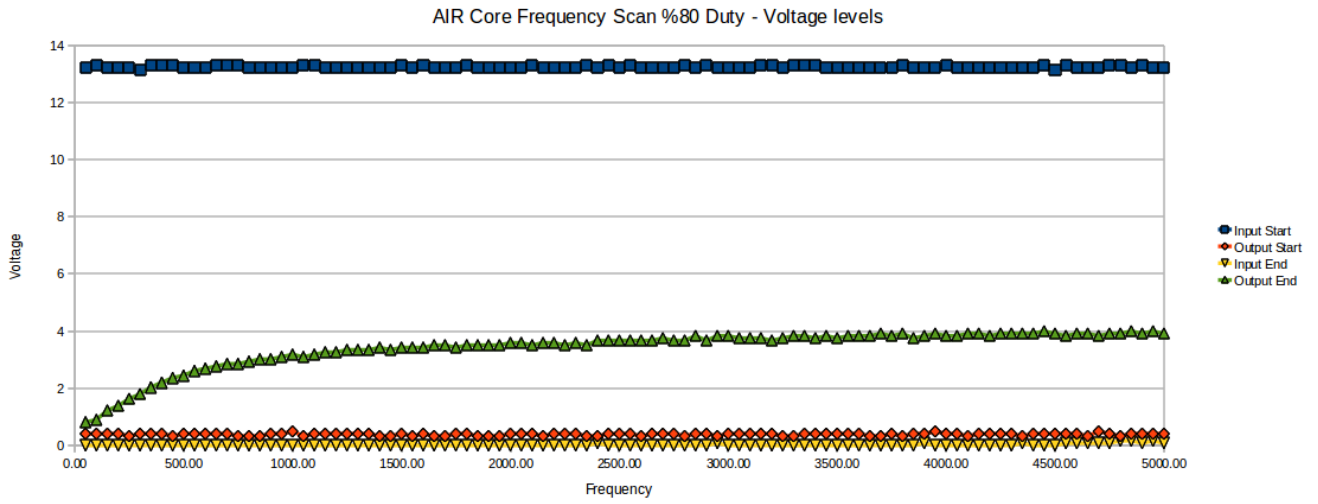
Core – AIR



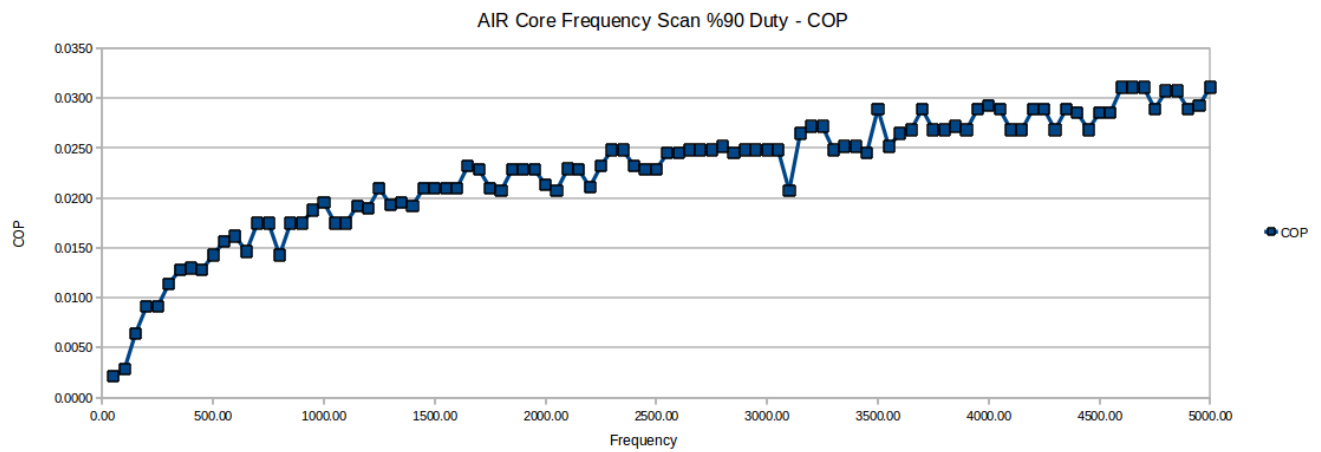
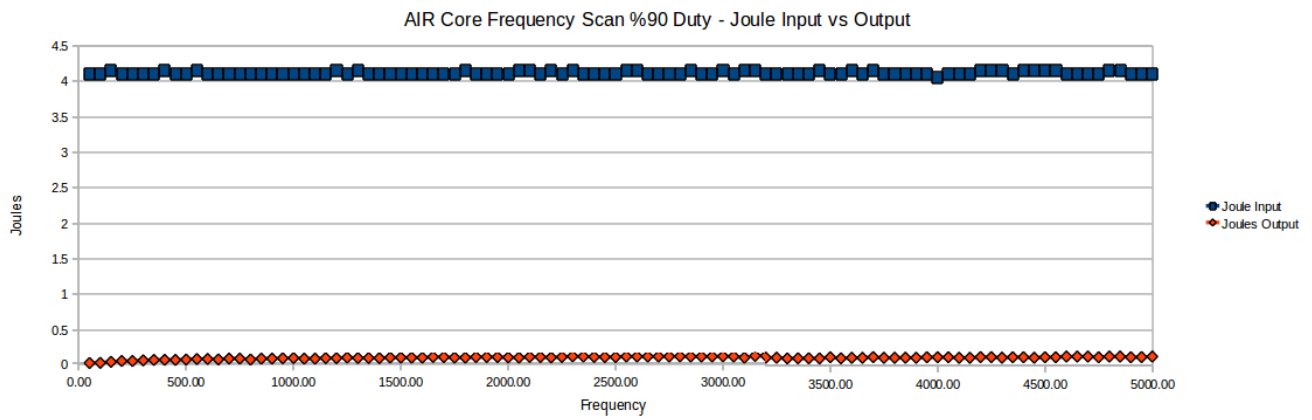
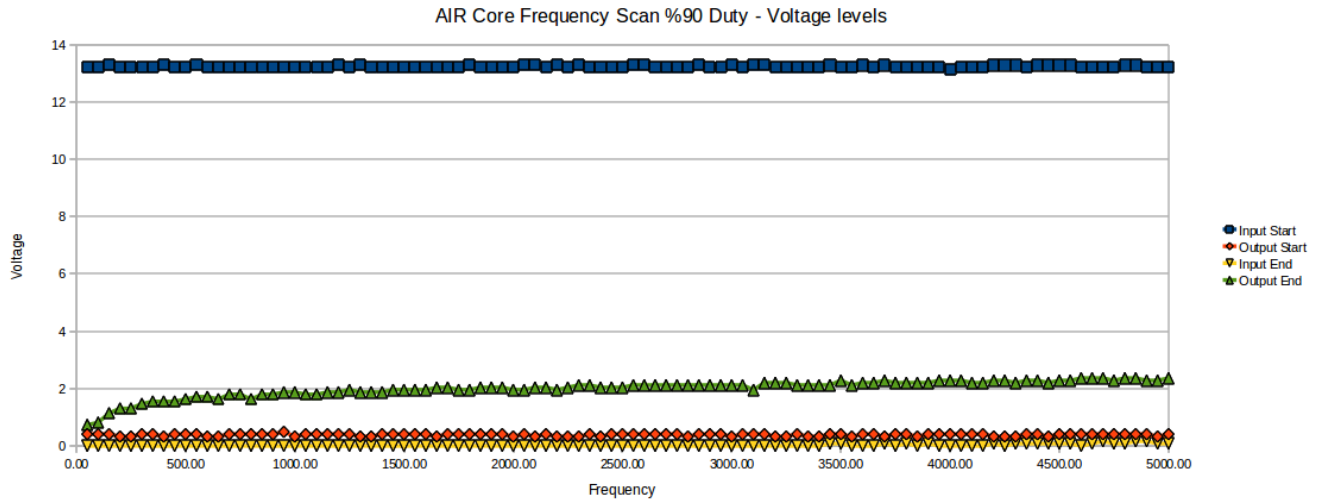
Duty cycle – 70%  
Frequency - 50hz - 5000hz  
Core – AIR



Duty cycle – 80%  
Frequency - 50hz - 5000hz  
Core – AIR



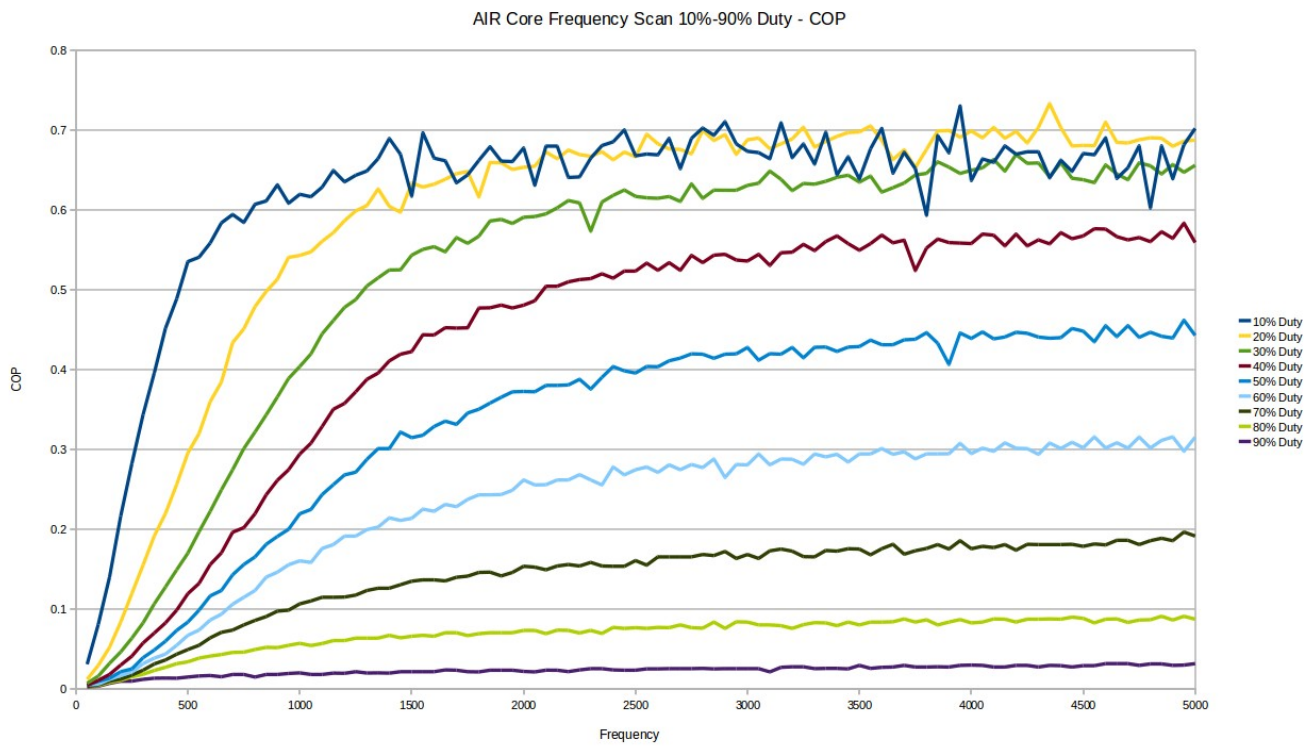
Duty cycle – 90%  
Frequency - 50hz - 5000hz  
Core – AIR



# Duty cycle – 10% - 90% Comparison of COP

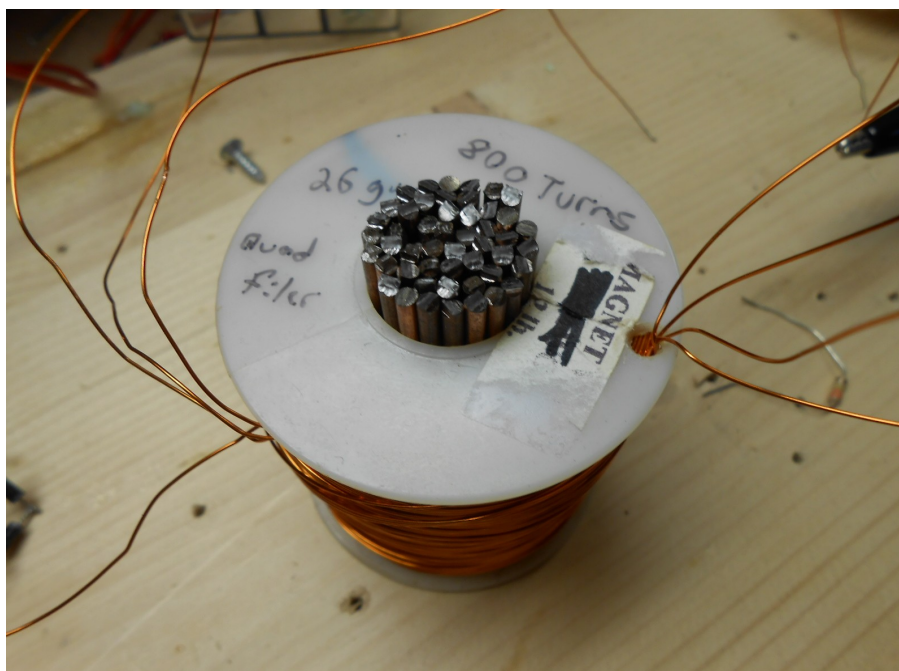
Frequency - 50hz - 5000hz

Core – **AIR**





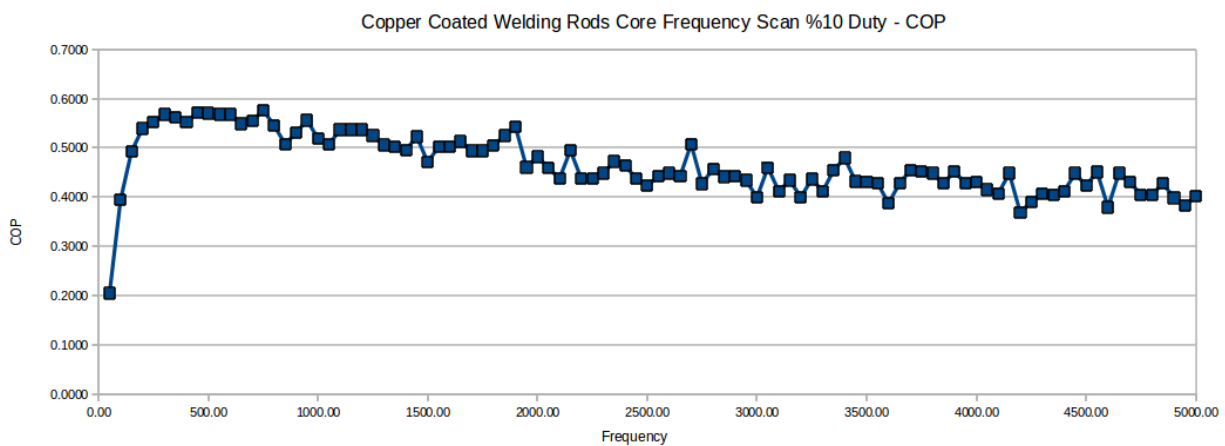
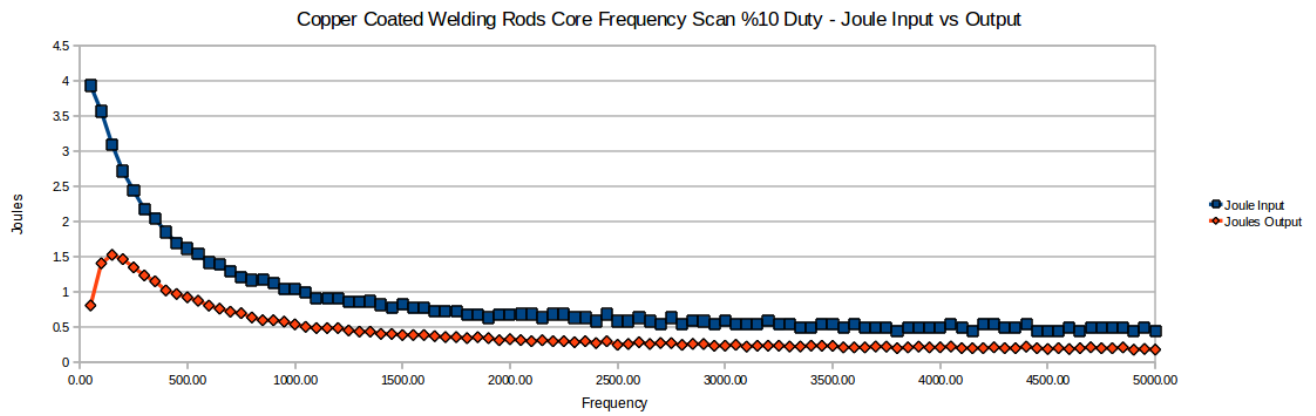
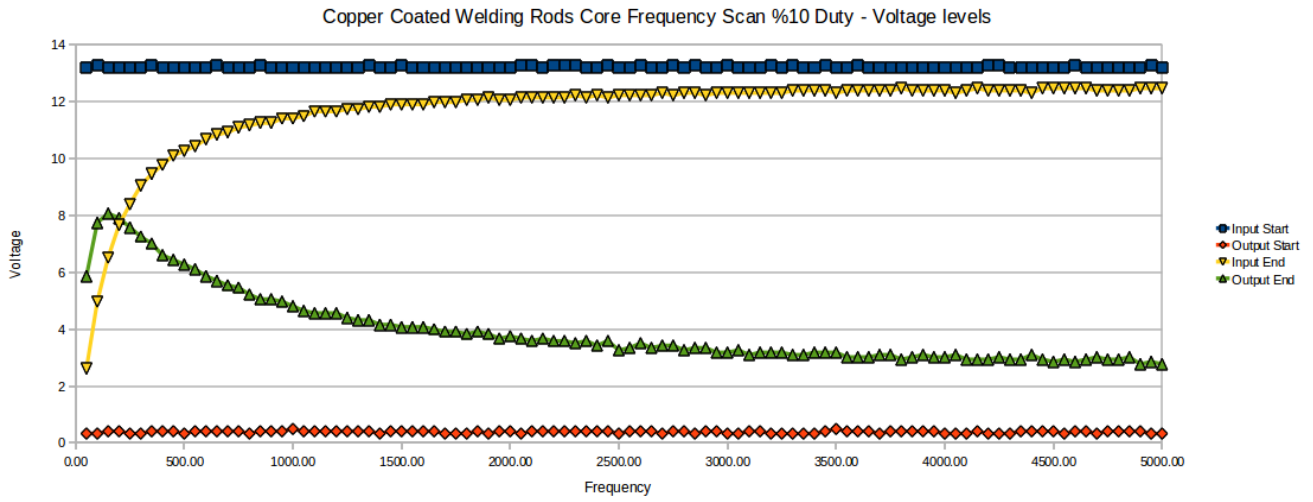
# Copper coated welding rods



Duty cycle – 10%

Frequency - 50hz - 5000hz

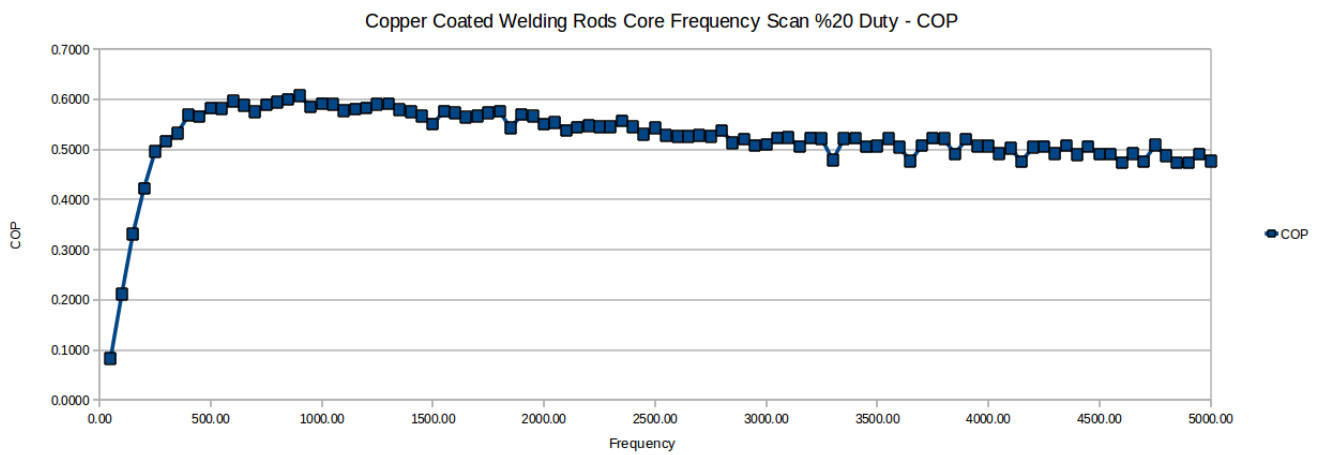
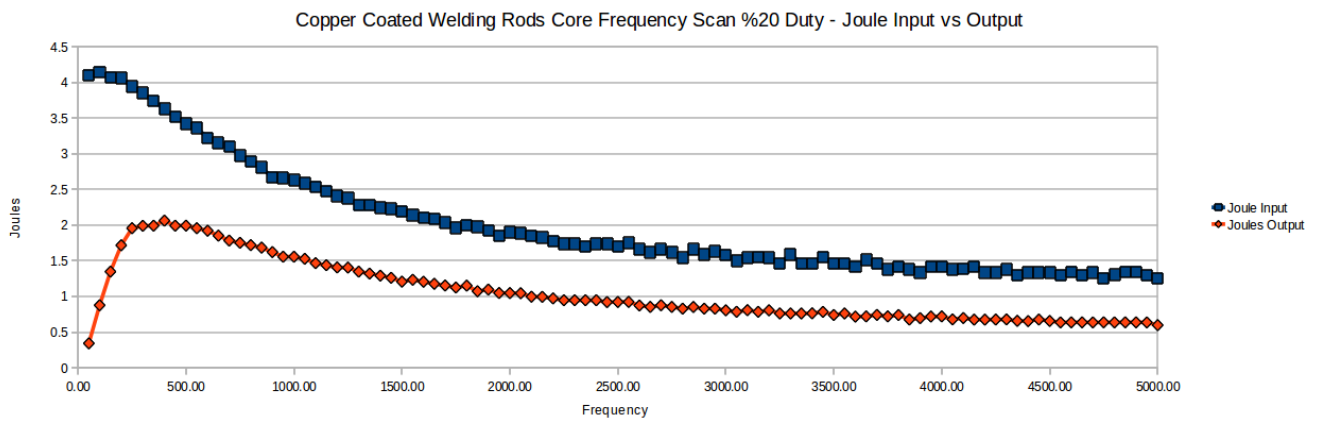
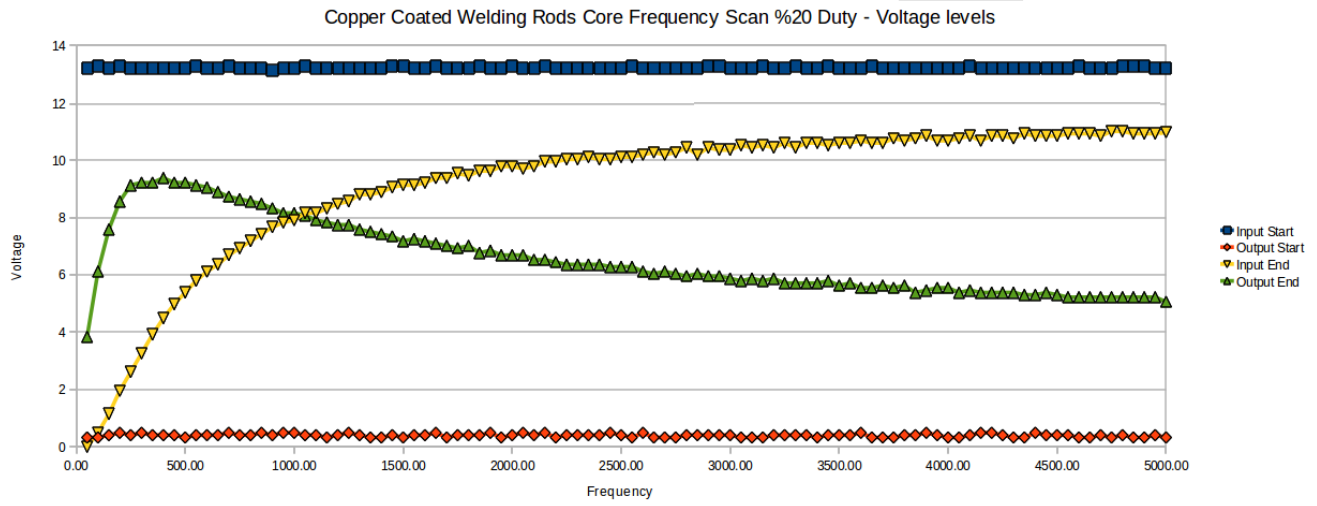
Core – Copper coated welding rods



Duty cycle – 20%

Frequency - 50hz - 5000hz

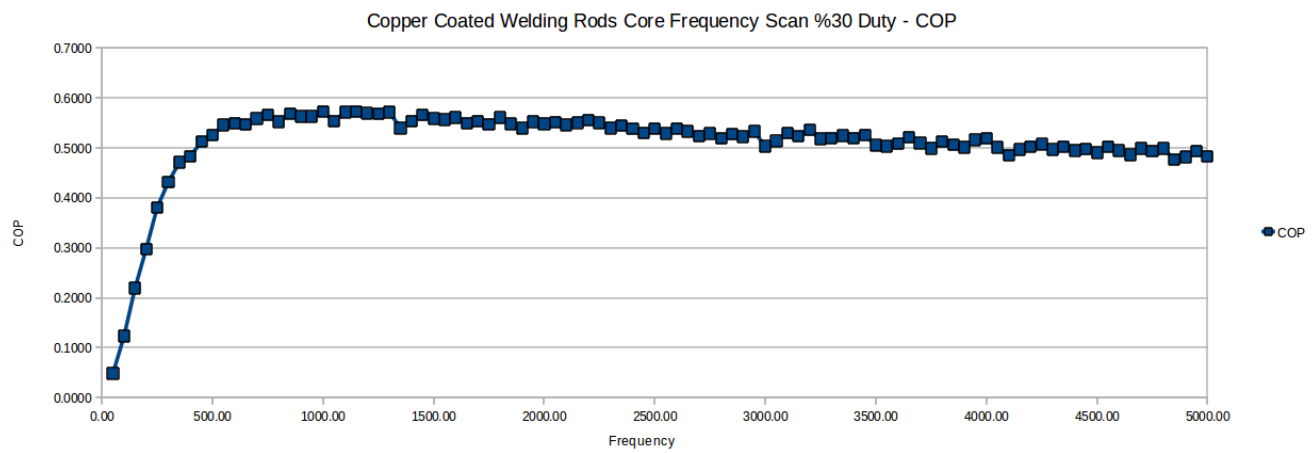
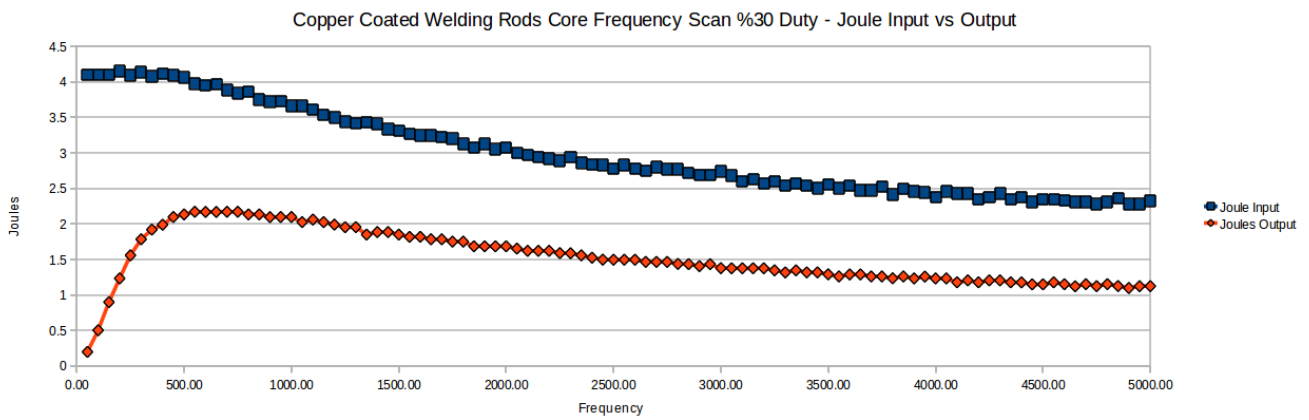
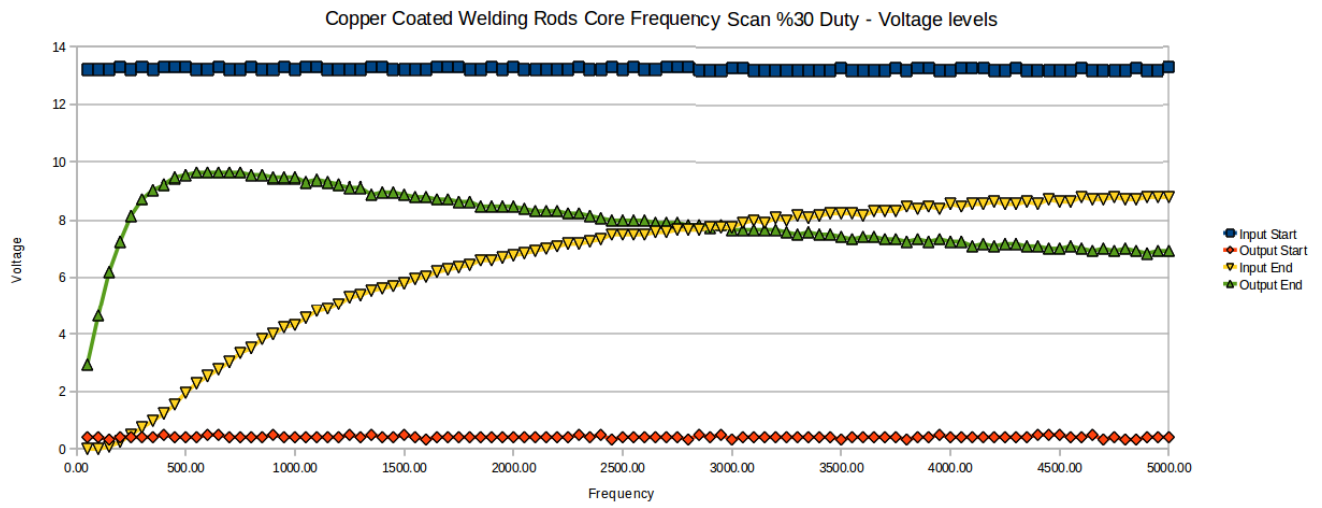
Core – Copper coated welding rods



Duty cycle – 30%

Frequency - 50hz - 5000hz

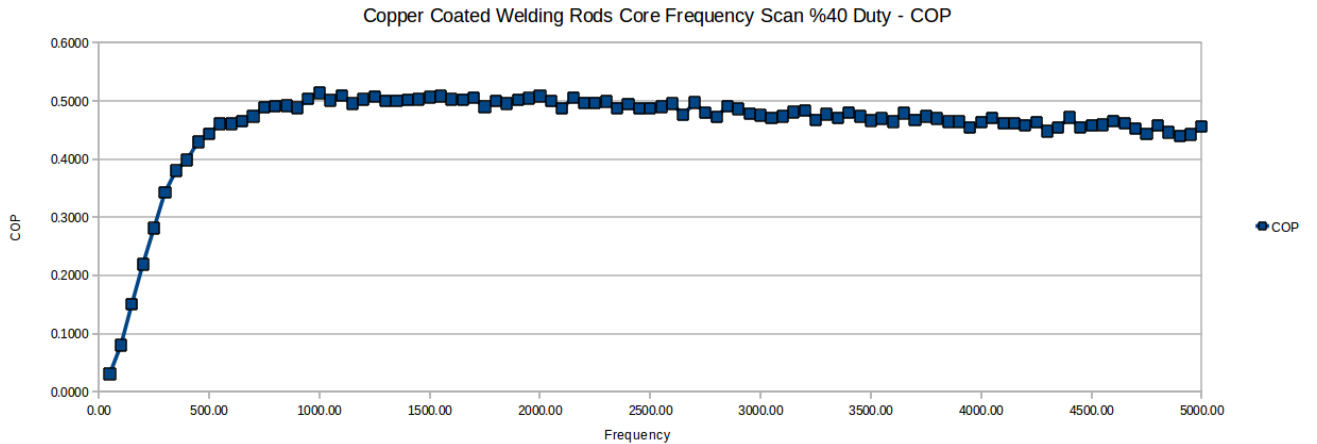
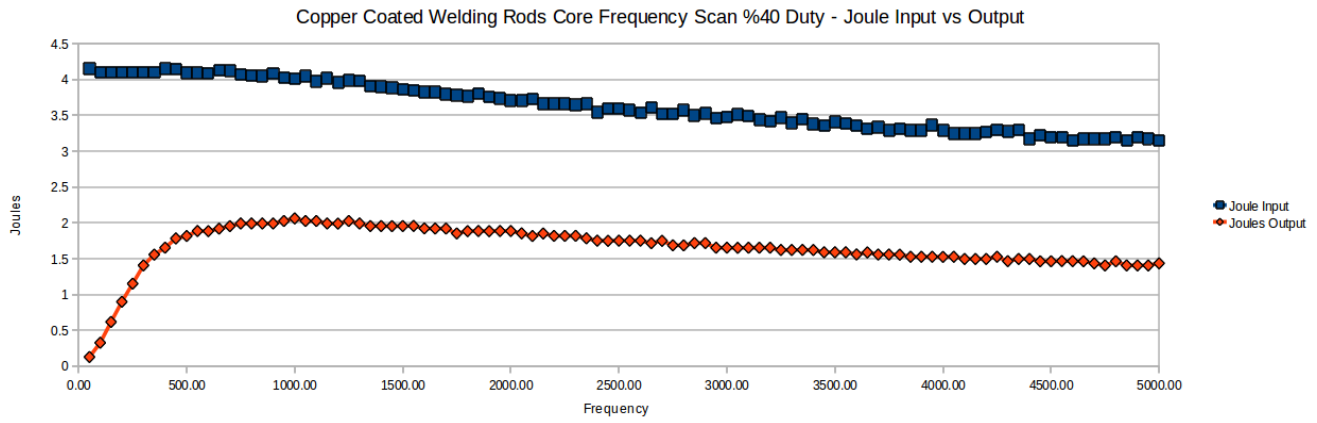
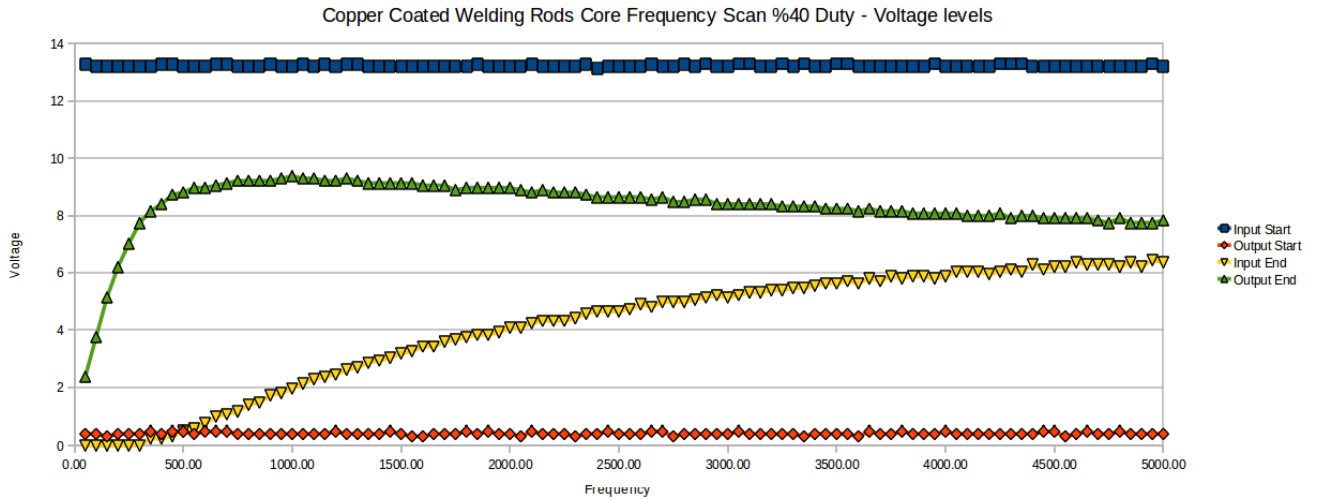
Core – Copper coated welding rods



Duty cycle – 40%

Frequency - 50hz – 5000hz

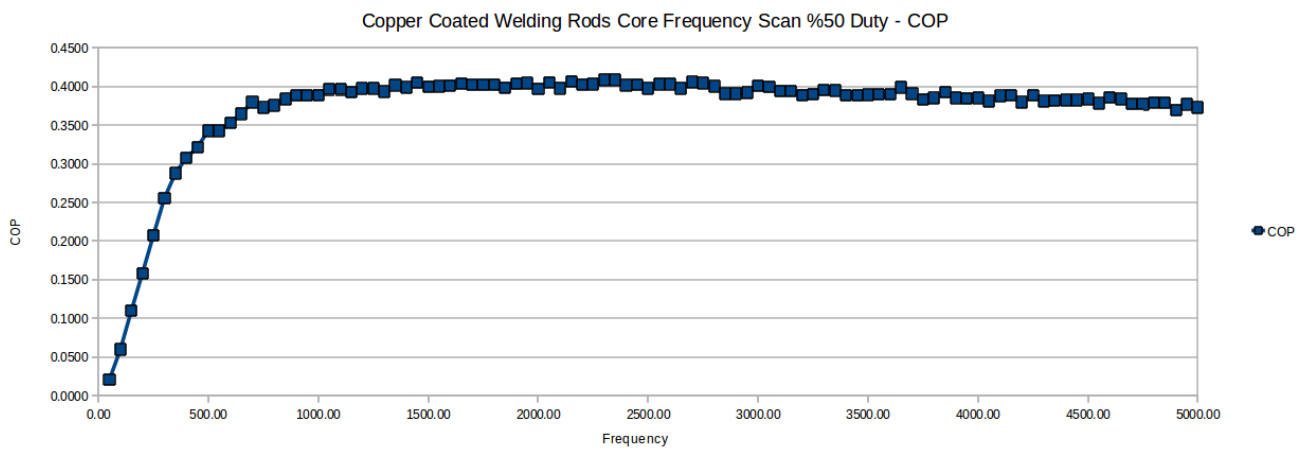
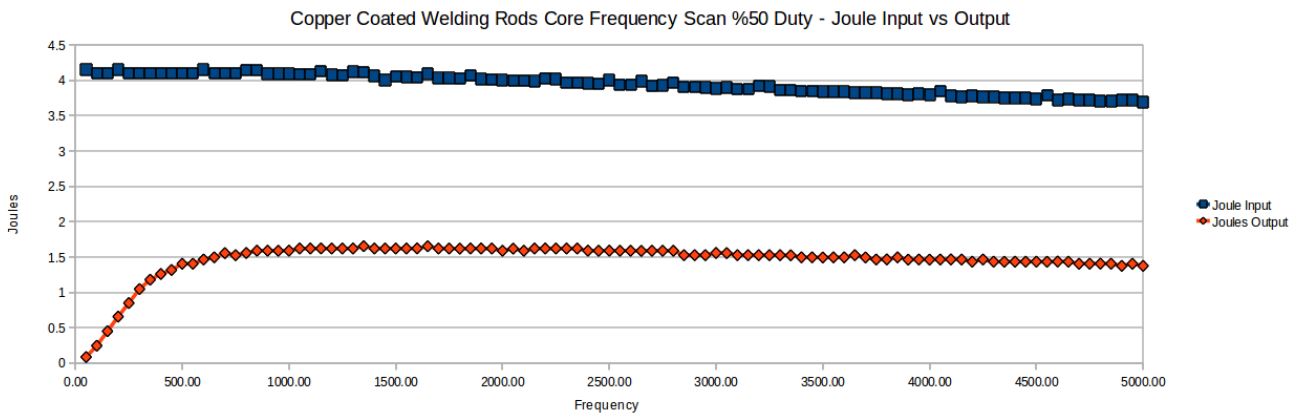
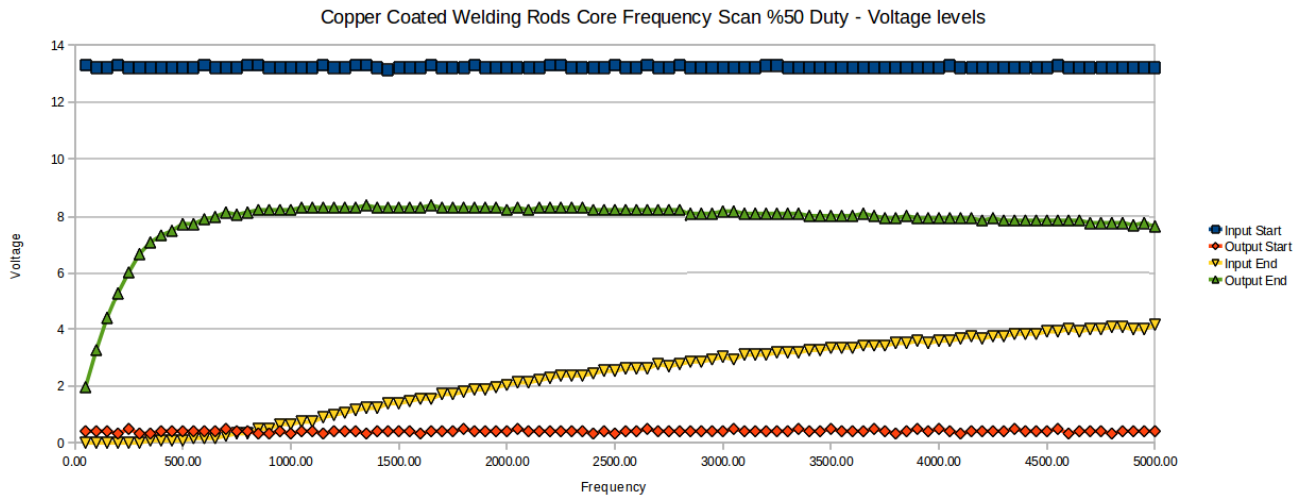
Core – Copper coated welding rods



Duty cycle – 50%

Frequency - 50hz - 5000hz

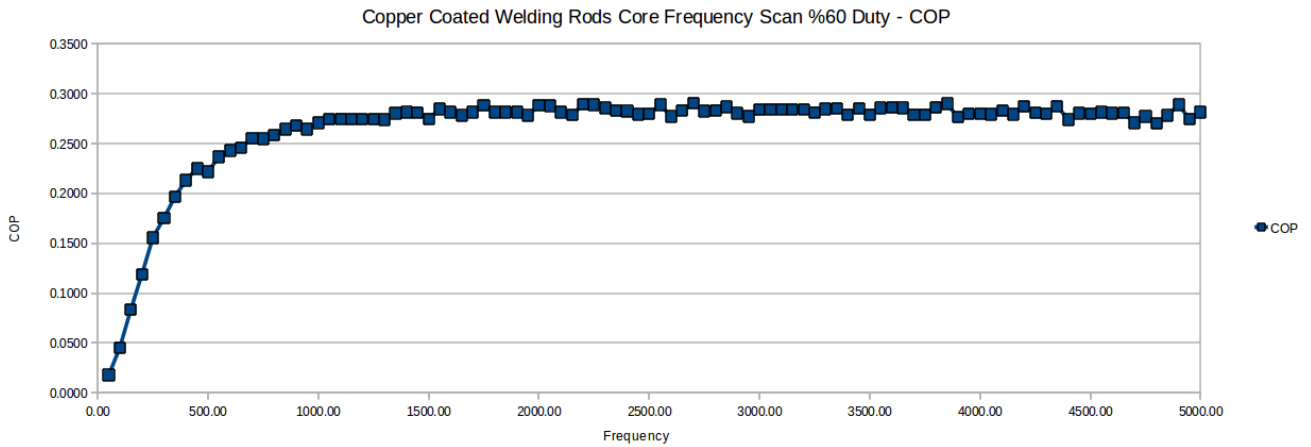
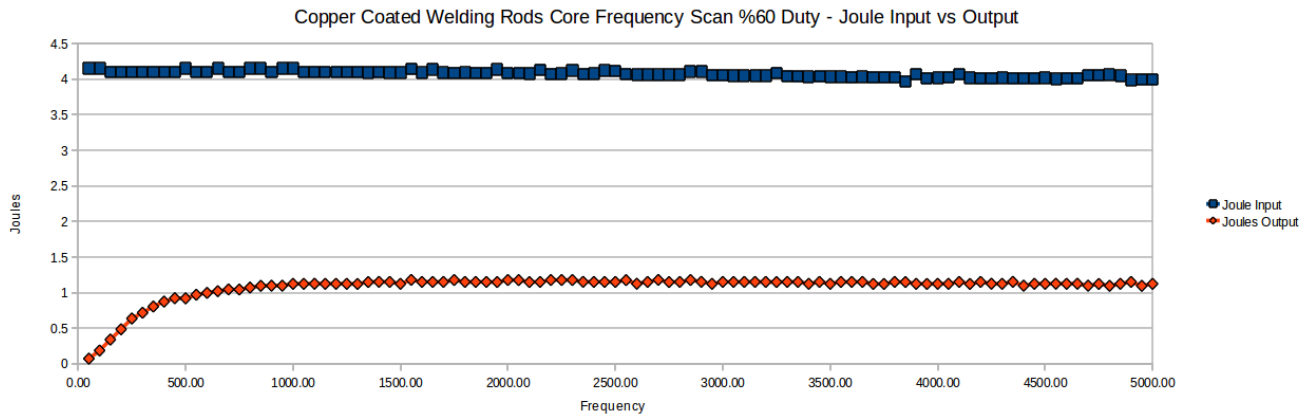
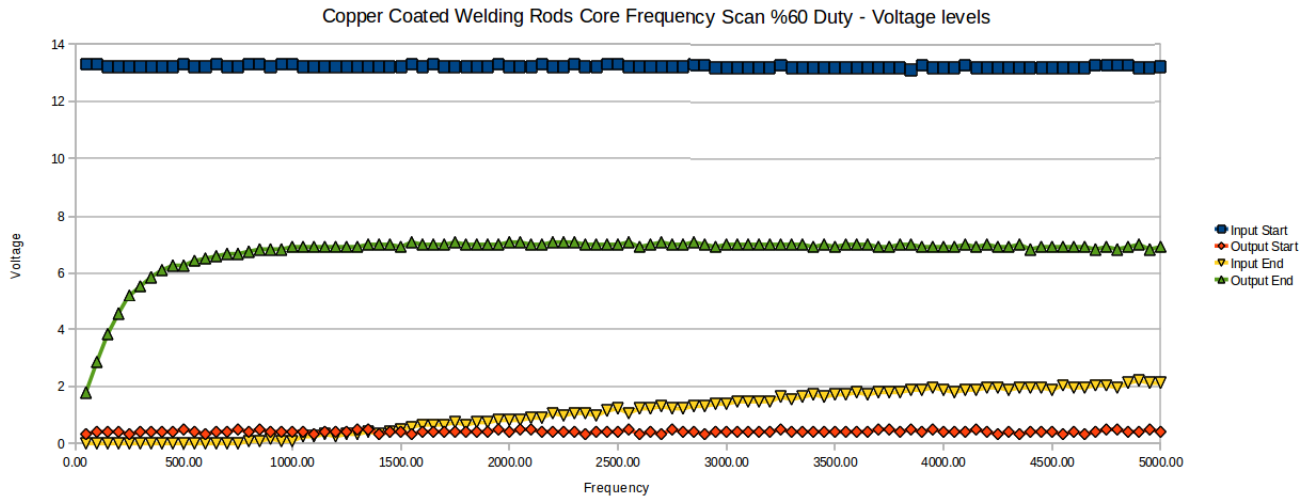
Core – Copper coated welding rods



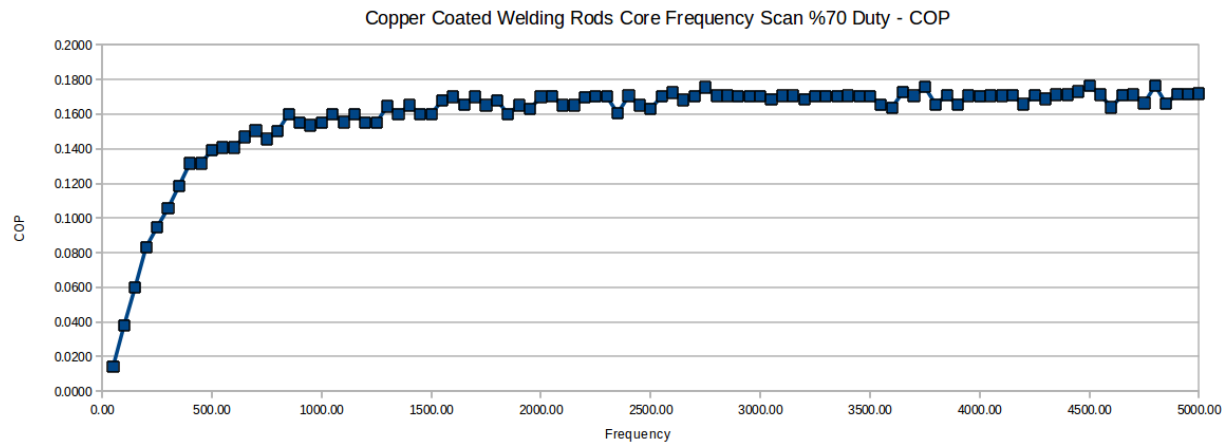
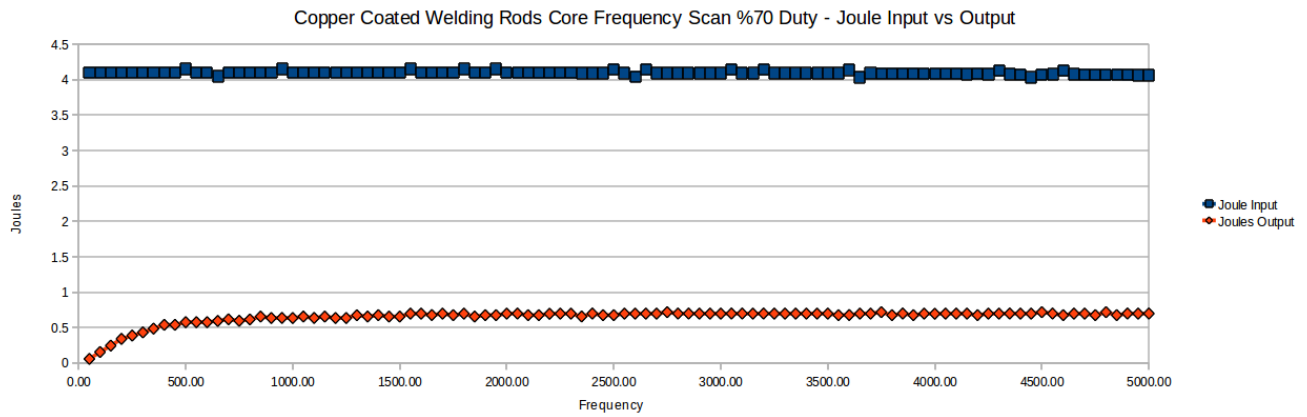
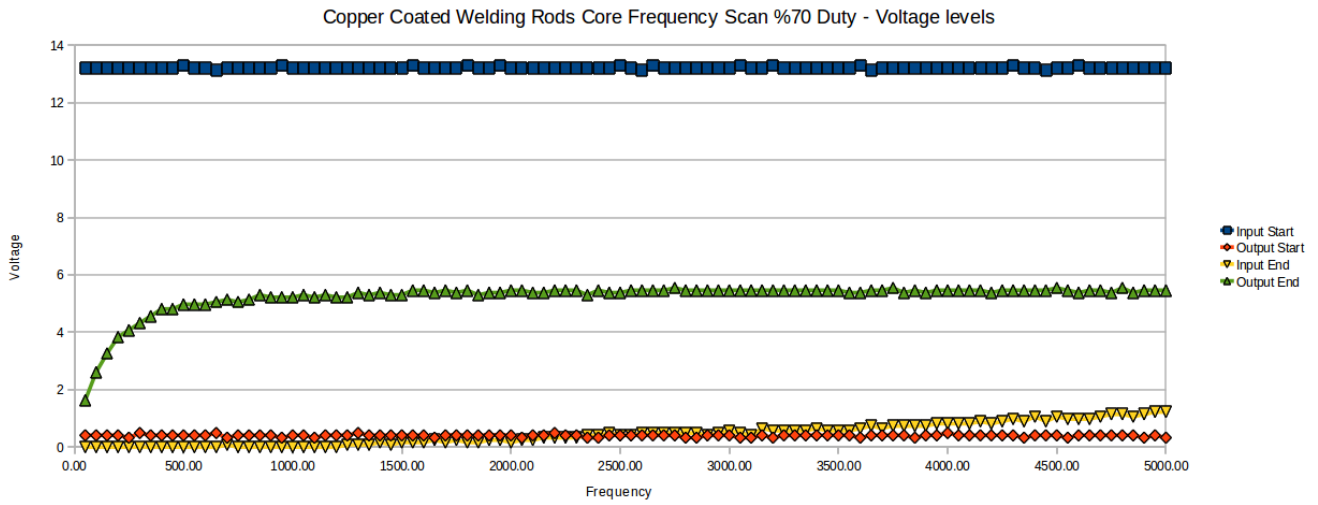
Duty cycle – 60%

Frequency - 50hz - 5000hz

Core – Copper coated welding rods



Duty cycle – 70%  
Frequency - 50hz - 5000hz  
Core – Copper coated welding rods

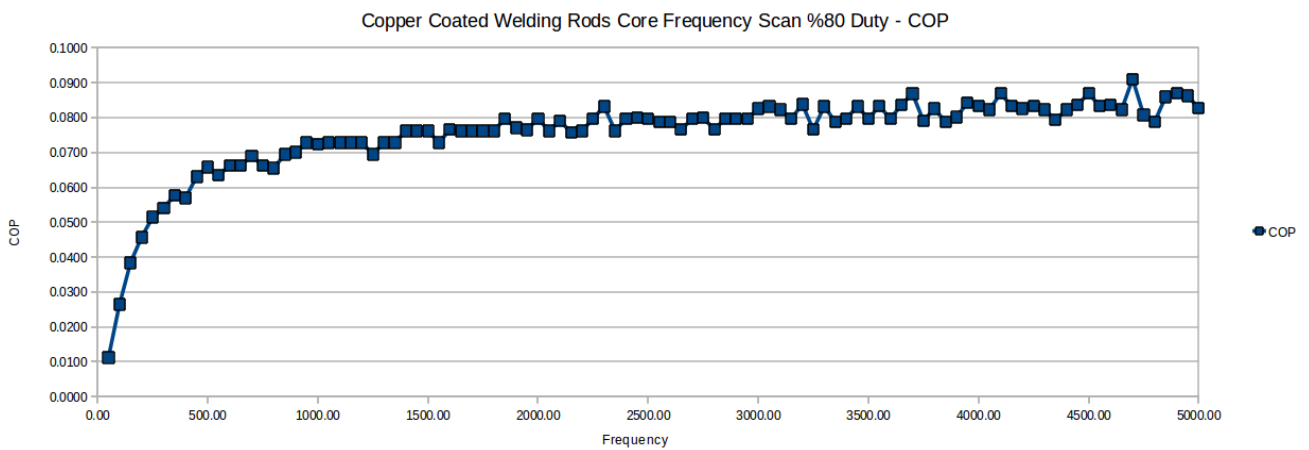
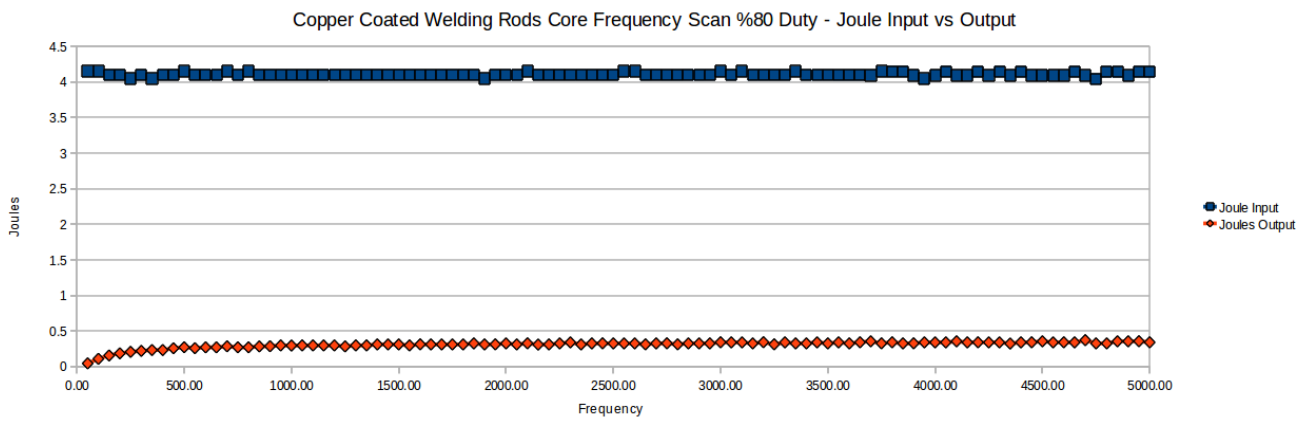
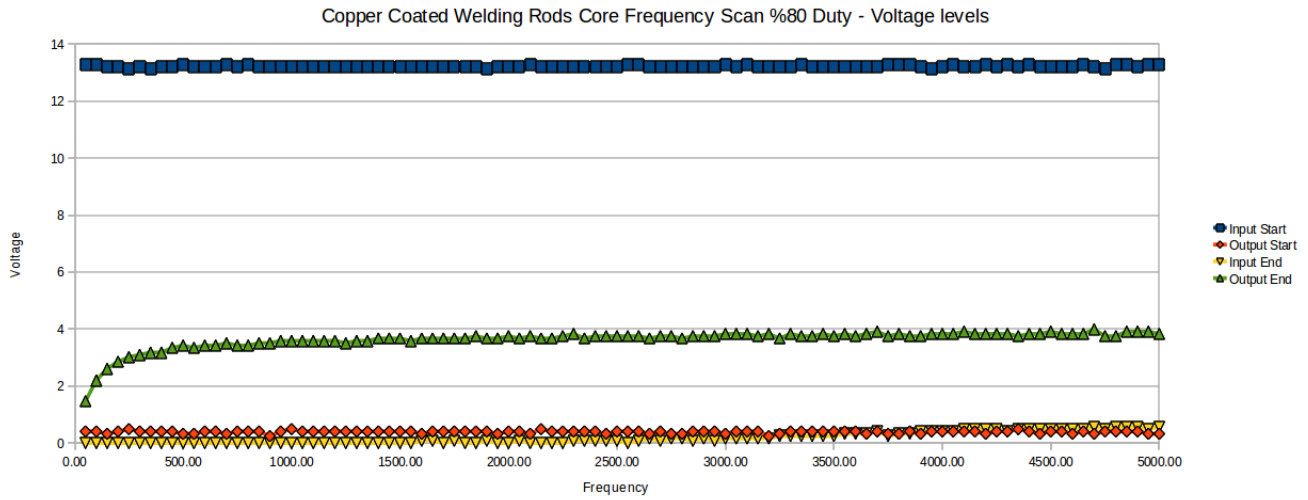




Duty cycle – 80%

Frequency - 50hz - 5000hz

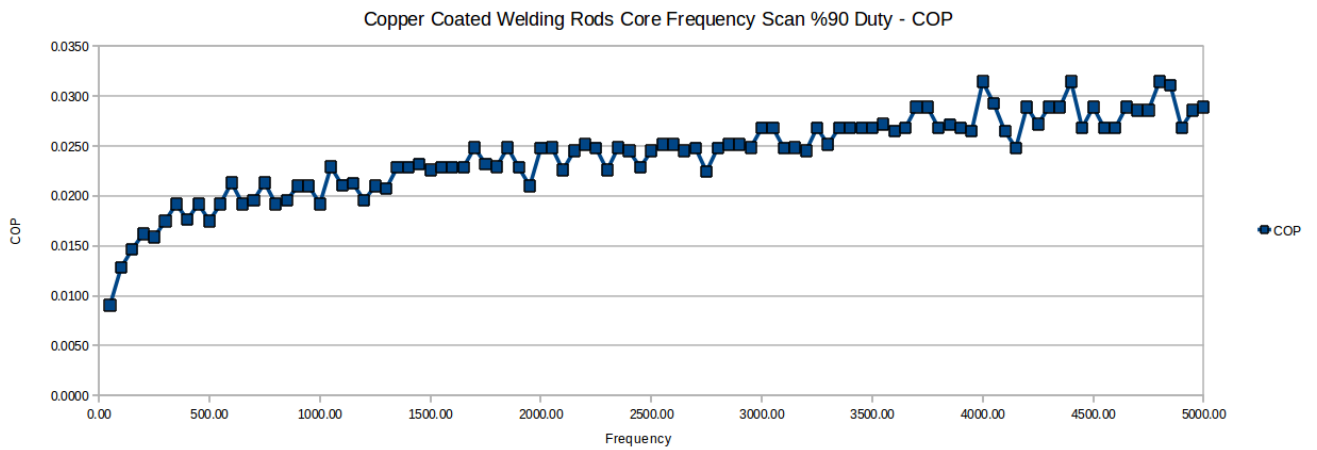
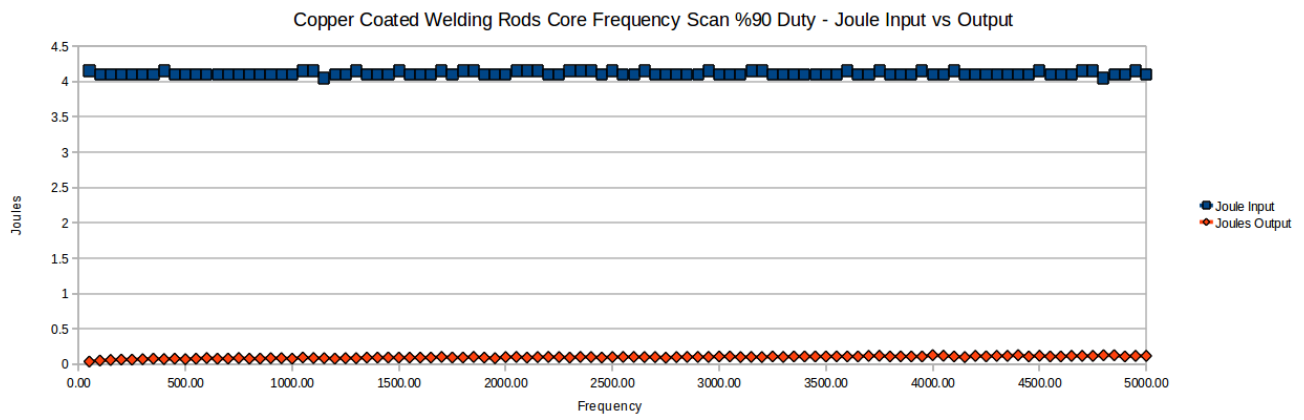
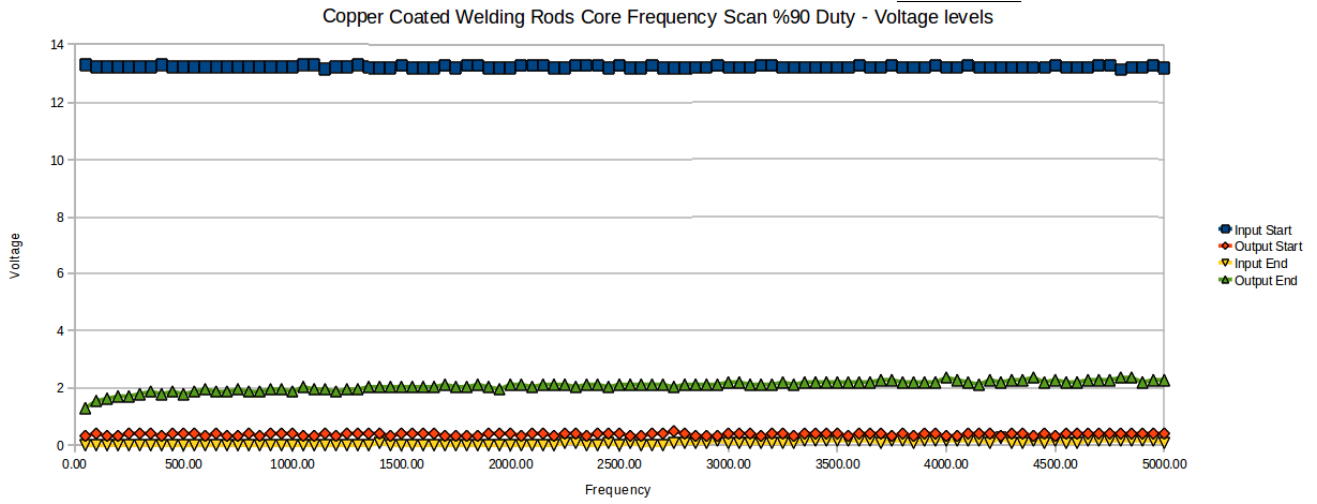
Core – Copper coated welding rods



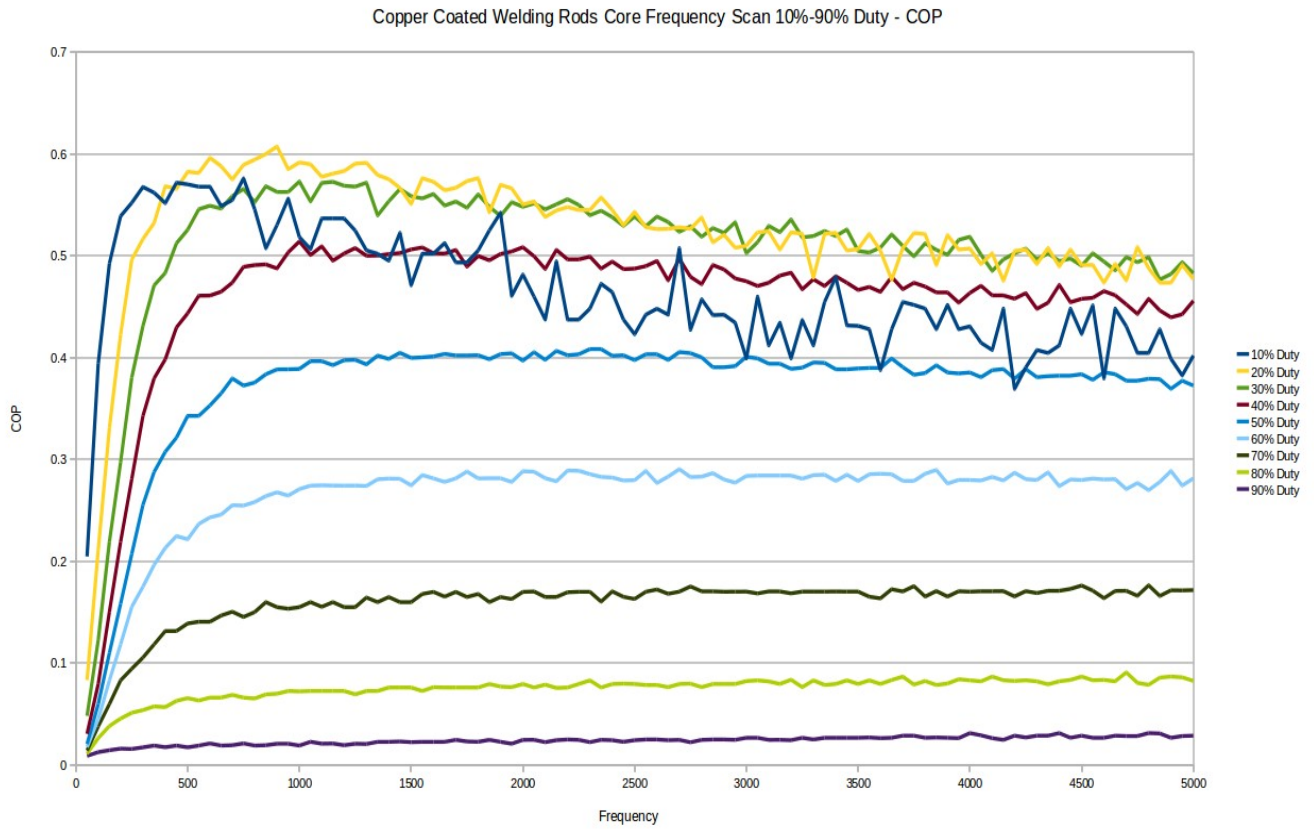
Duty cycle – 90%

Frequency - 50hz - 5000hz

Core – Copper coated welding rods

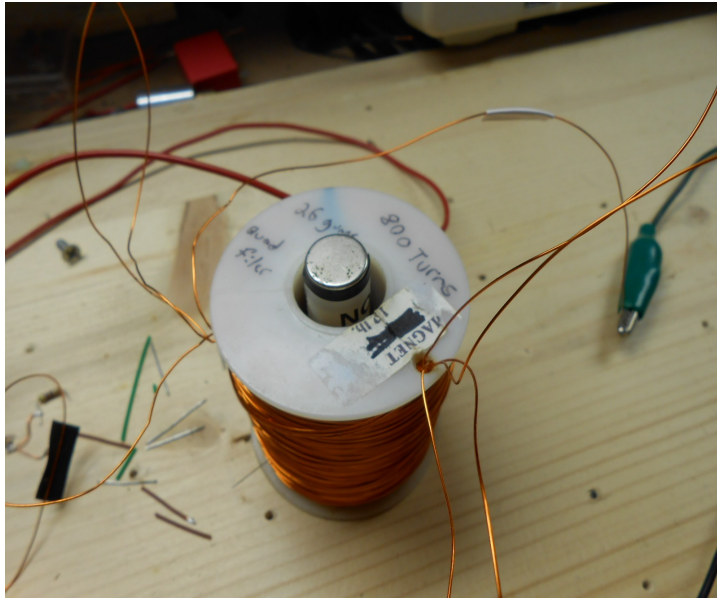


Duty cycle – **10% - 90%** Comparison of COP  
Frequency - 50hz - 5000hz  
Core – **Copper coated welding rods**



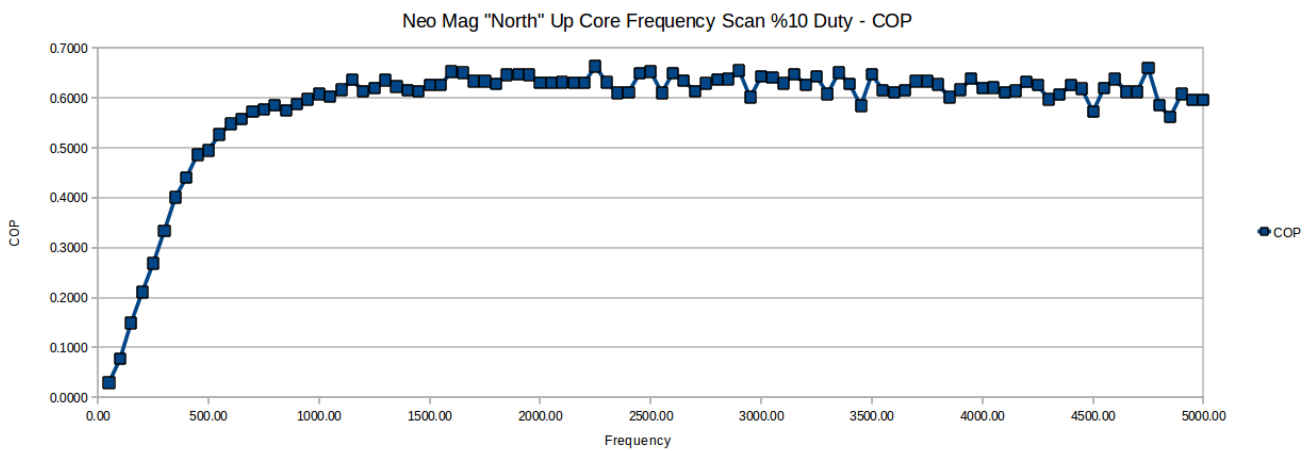
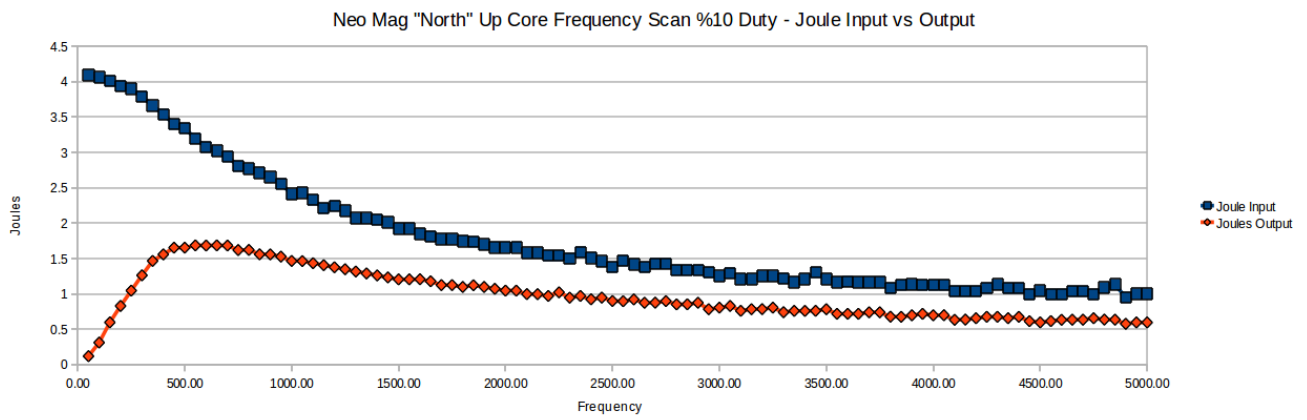
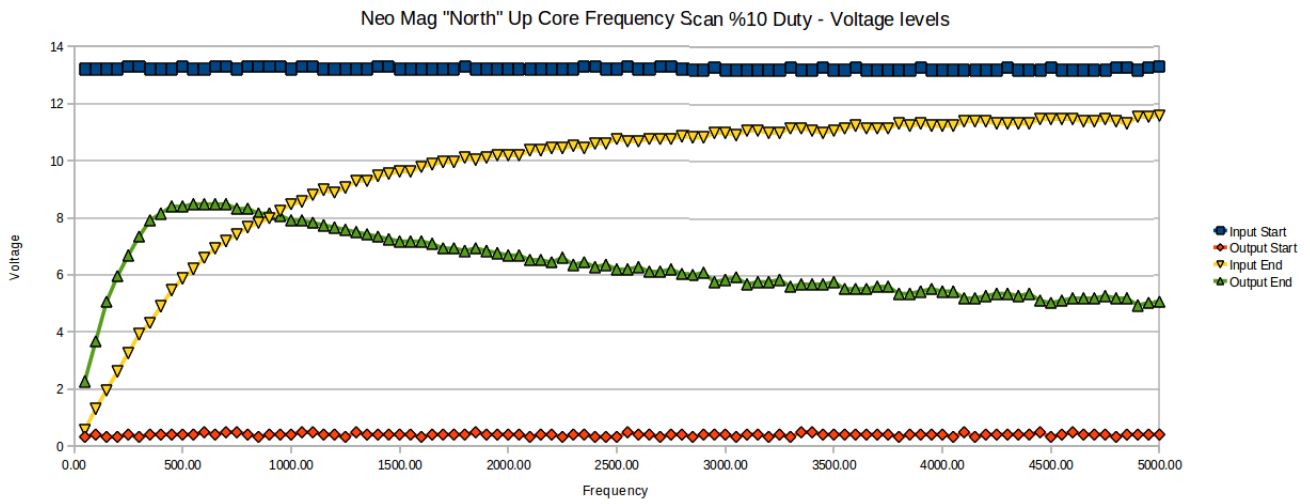
## Neo Magnets "North" up

Rare Earth Magnets 1/2 in x 1/2 in Neodymium N42 Disc



(Actually I don't know which way is north, I just picked a pole and called it north. The next test will be the opposite direction of this one, aka south)

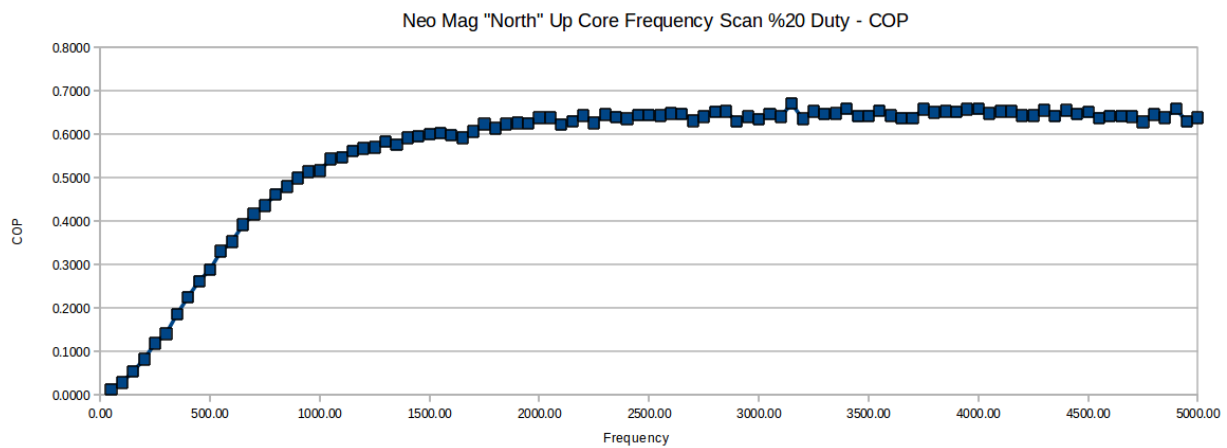
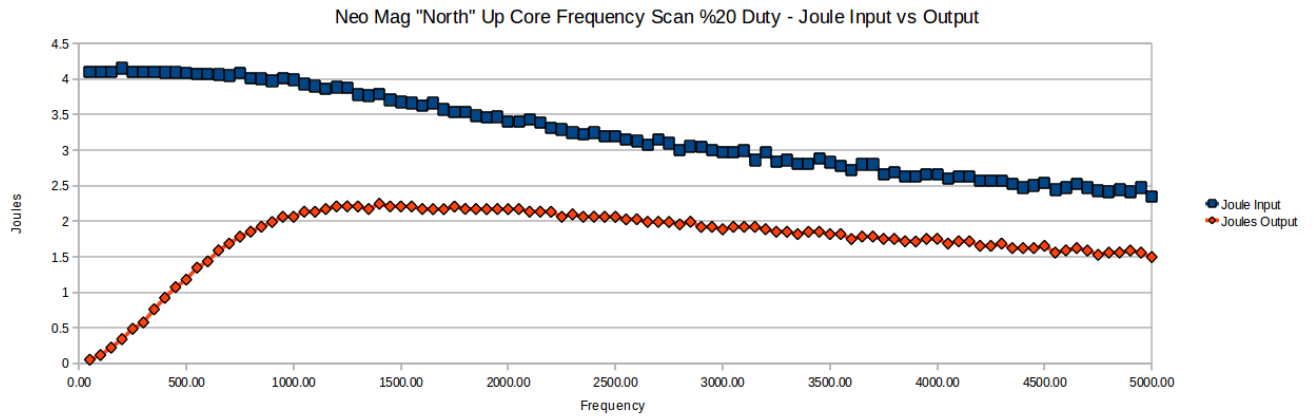
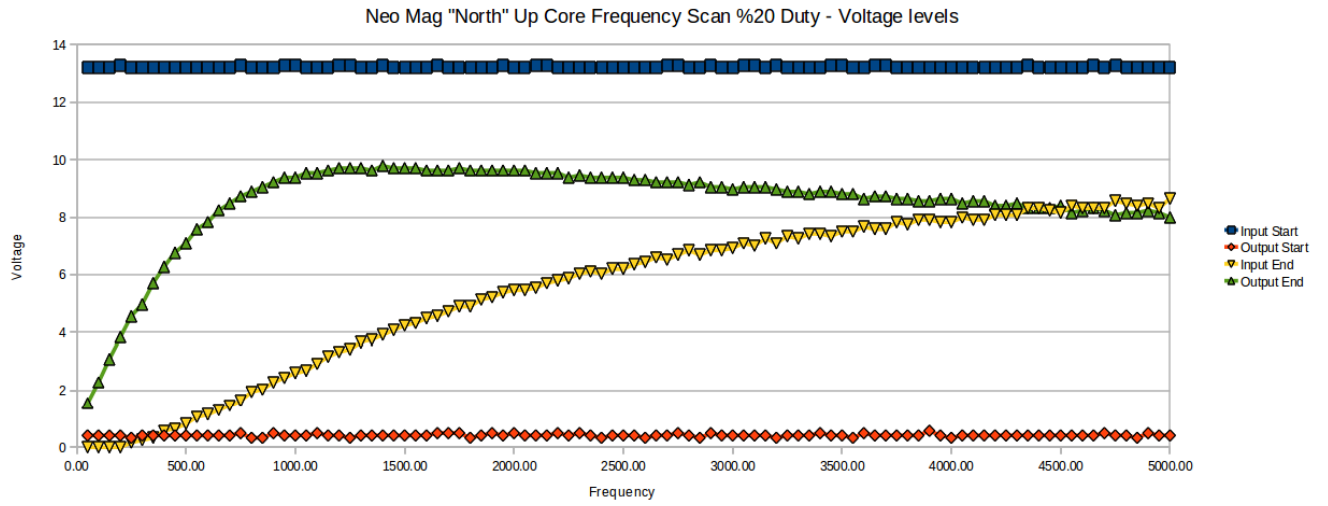
Duty cycle – 10%  
 Frequency - 50hz - 5000hz  
 Core – **Neo Magnets “North” up**



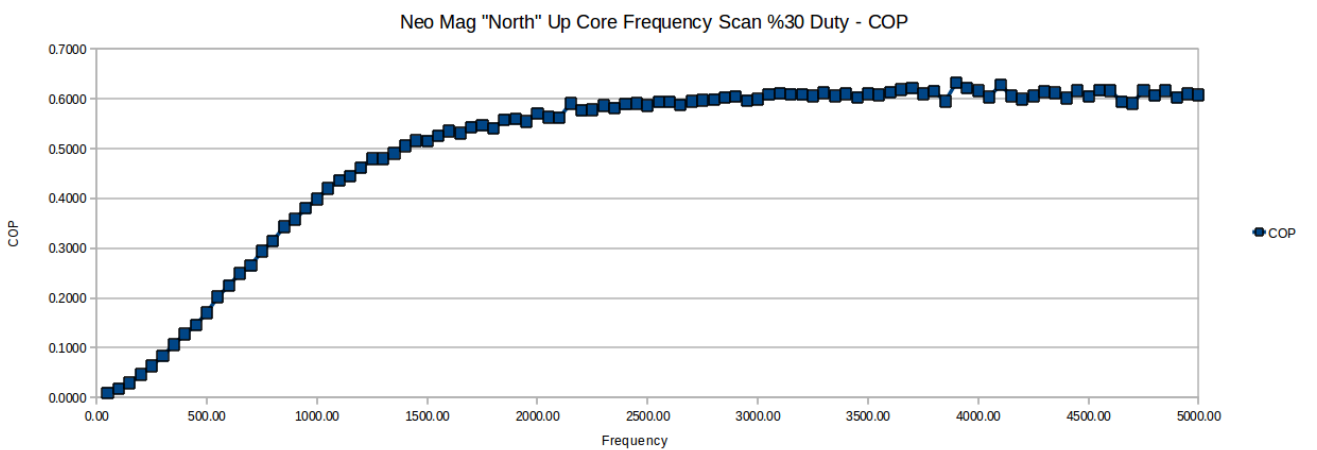
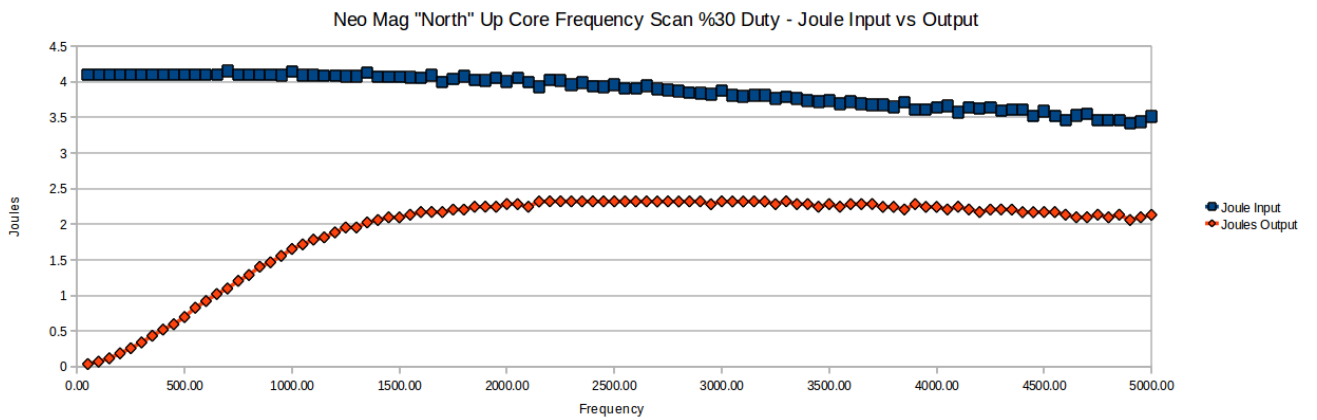
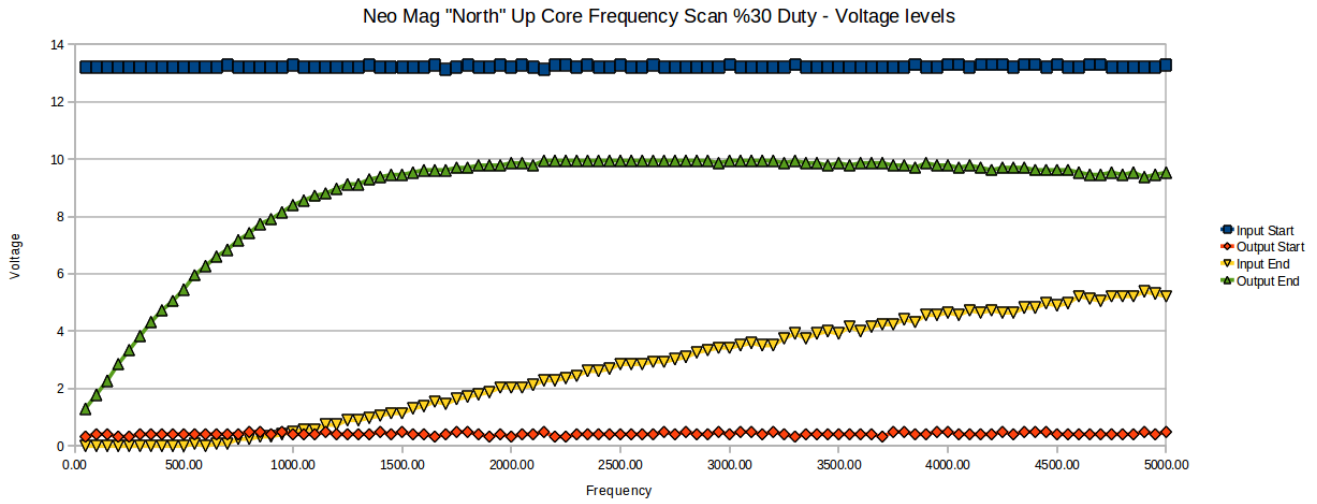
Duty cycle – 20%

Frequency - 50hz - 5000hz

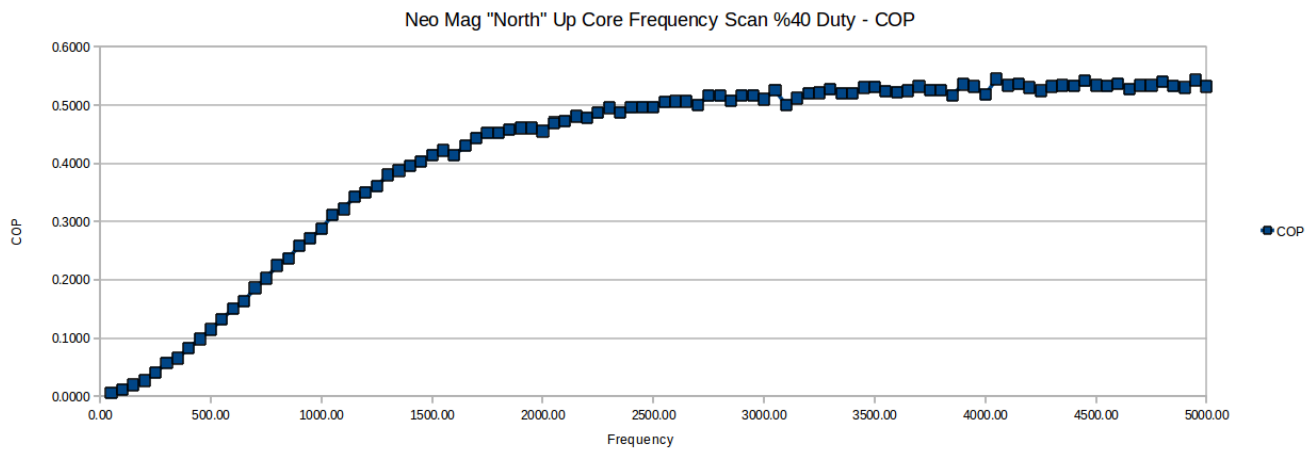
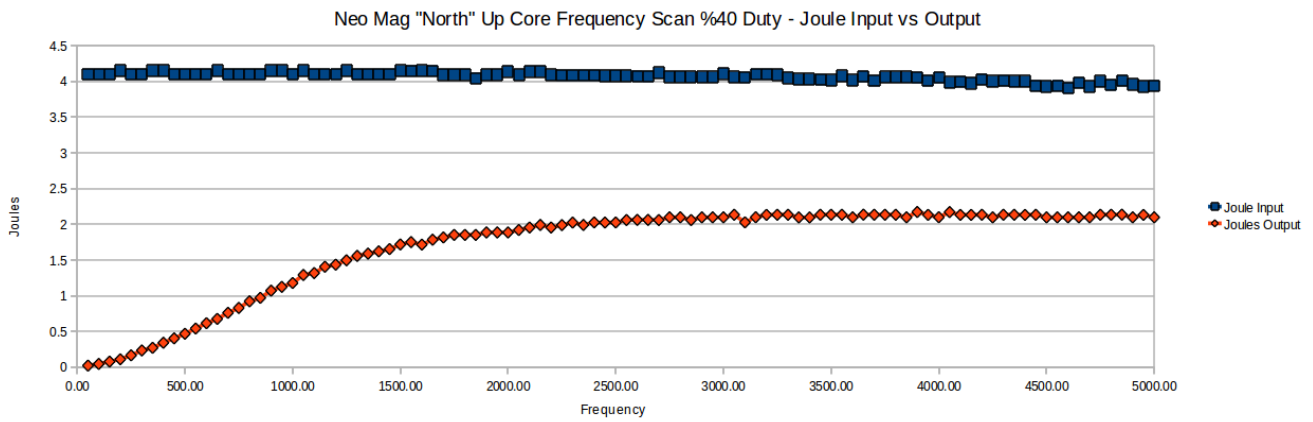
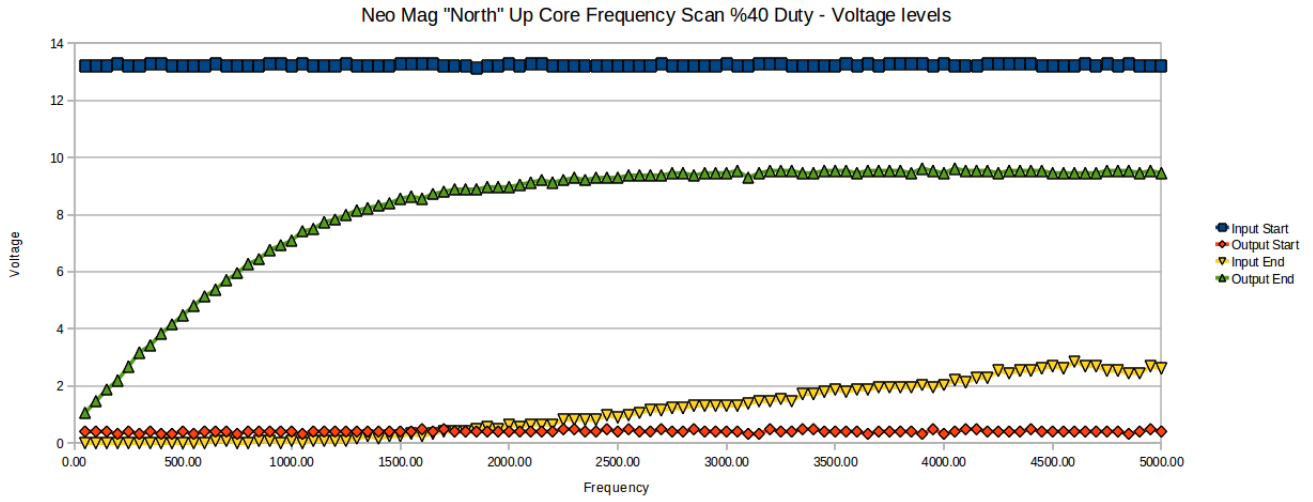
Core – Neo Magnets “North” up



Duty cycle – 30%  
 Frequency - 50hz - 5000hz  
 Core – **Neo Magnets “North” up**



Duty cycle – 40%  
 Frequency - 50hz - 5000hz  
 Core – Neo Magnets “North” up

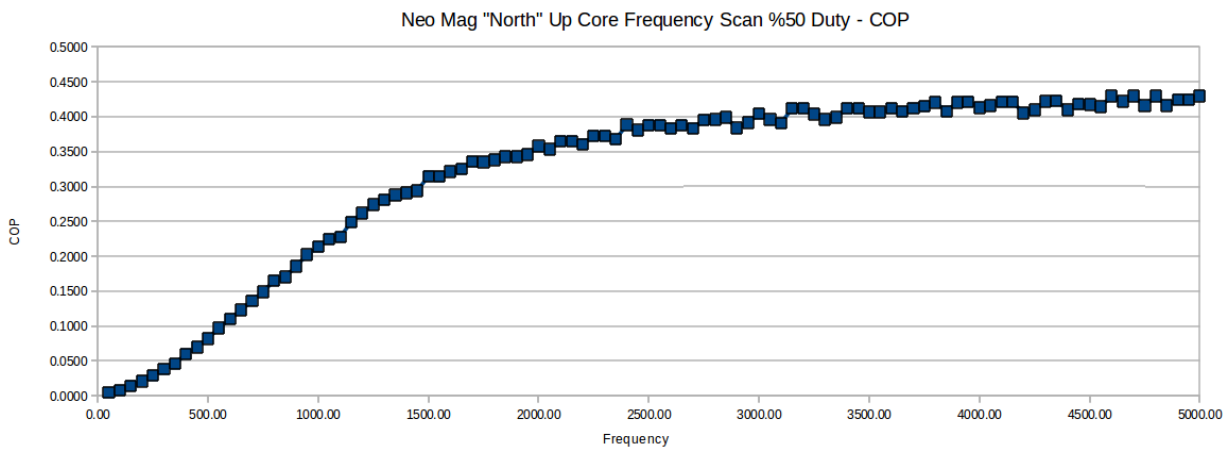
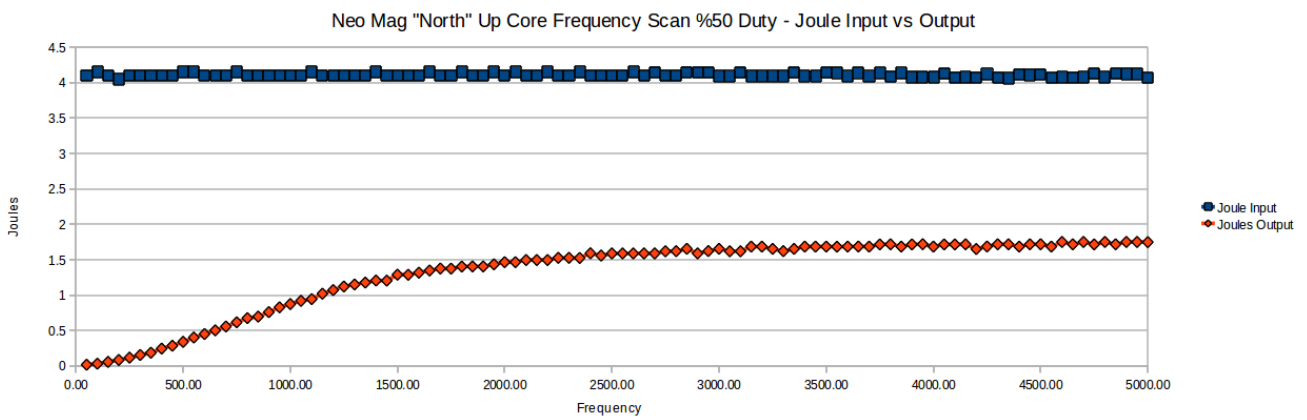
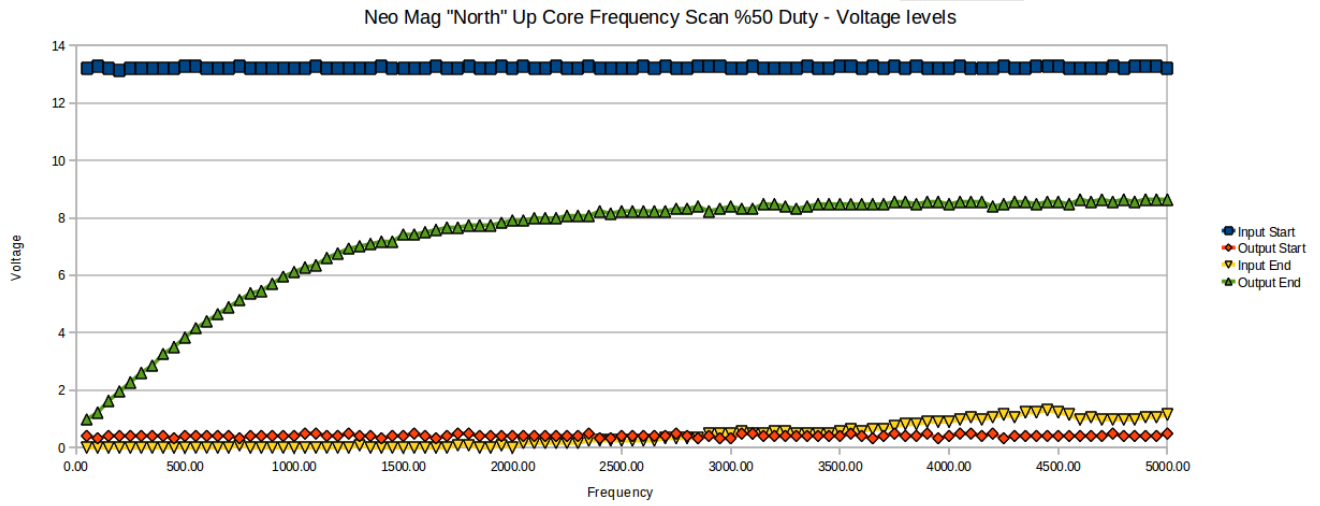




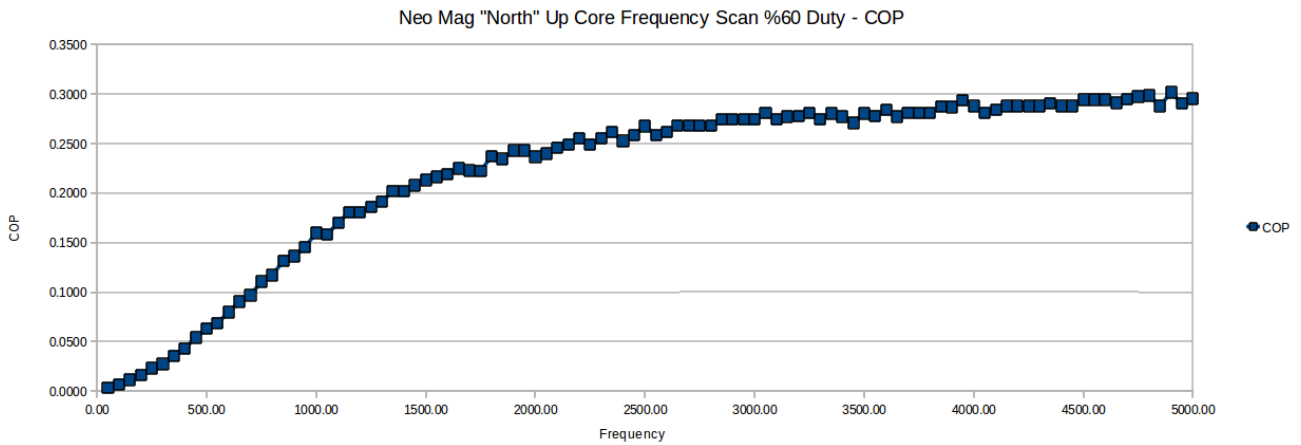
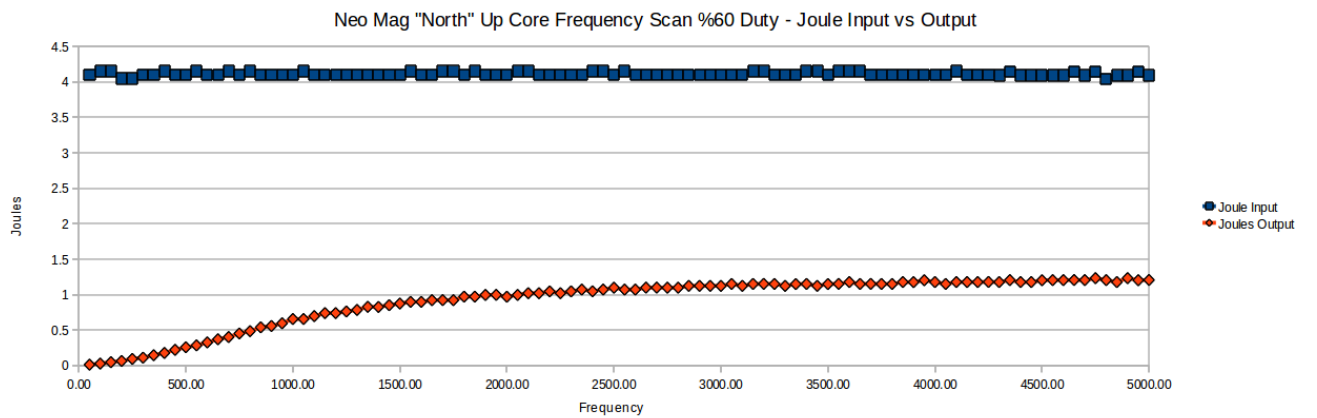
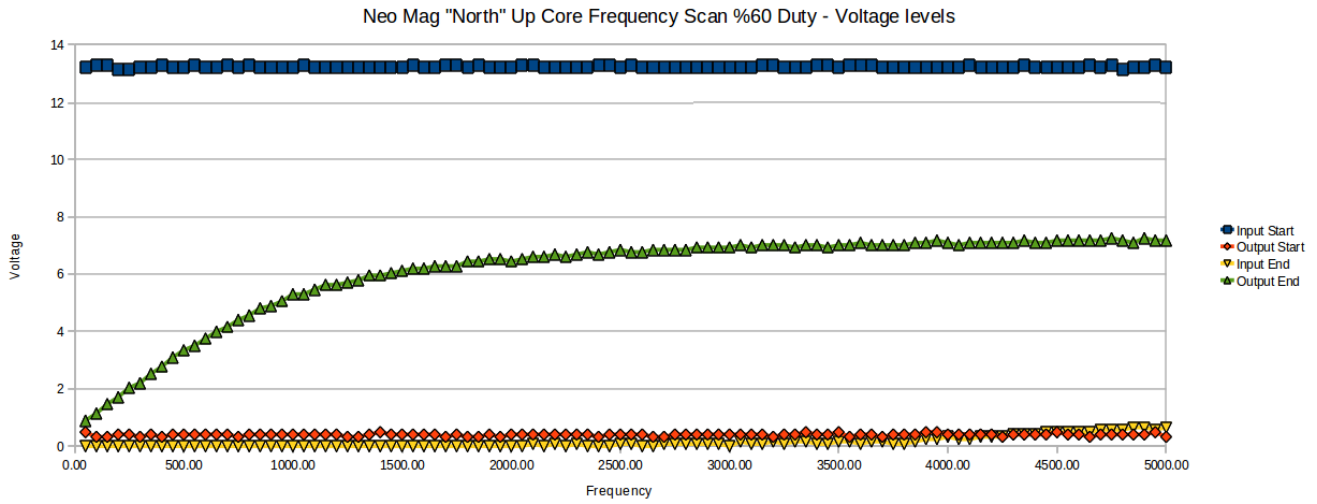
Duty cycle – 50%

Frequency - 50hz - 5000hz

Core – **Neo Magnets “North” up**



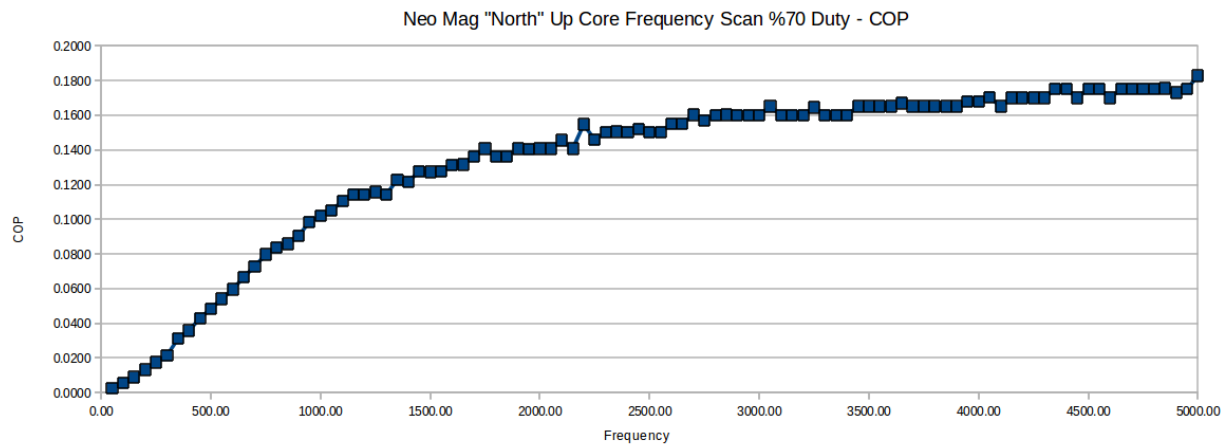
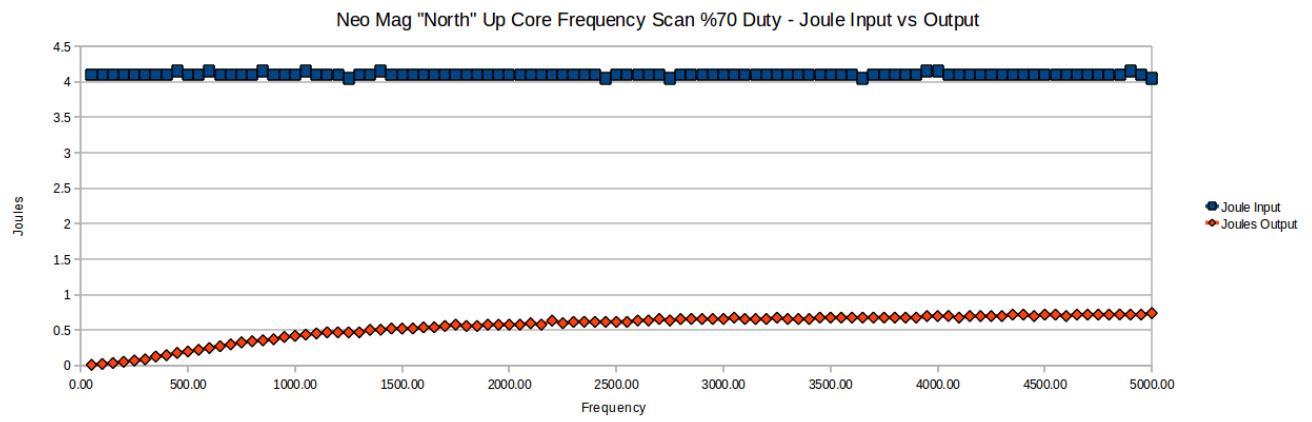
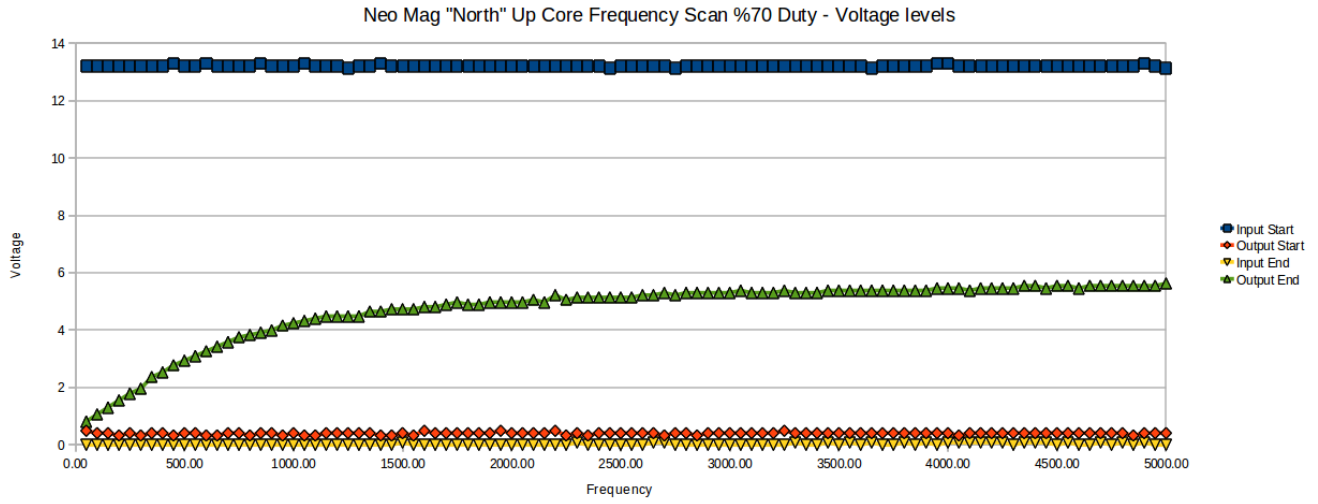
Duty cycle – 60%  
Frequency - 50hz - 5000hz  
Core – Neo Magnets “North” up



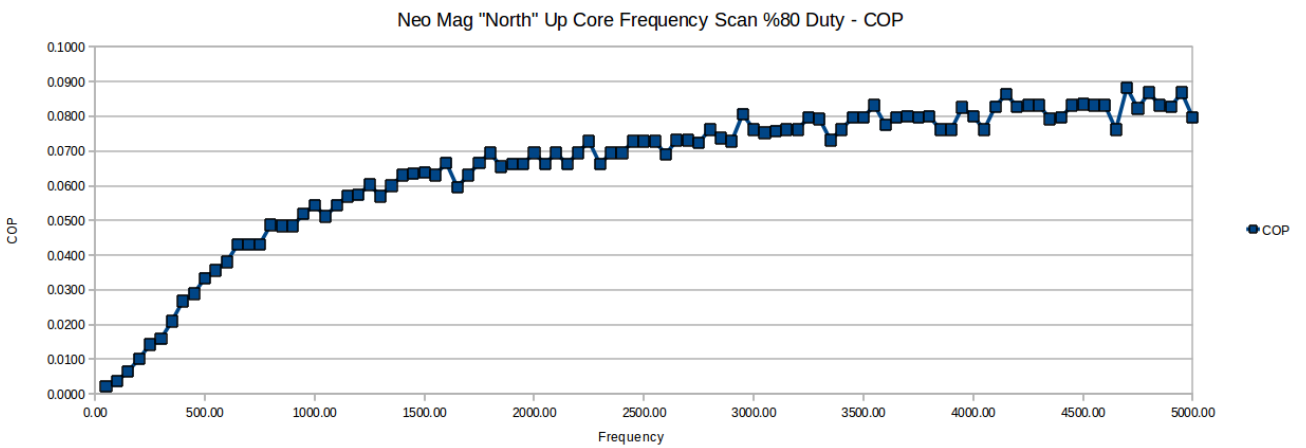
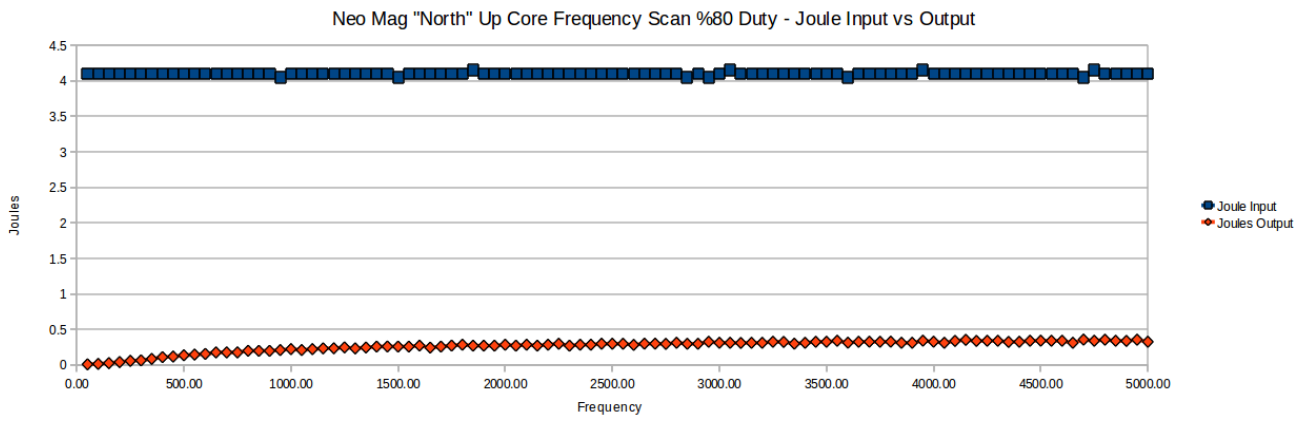
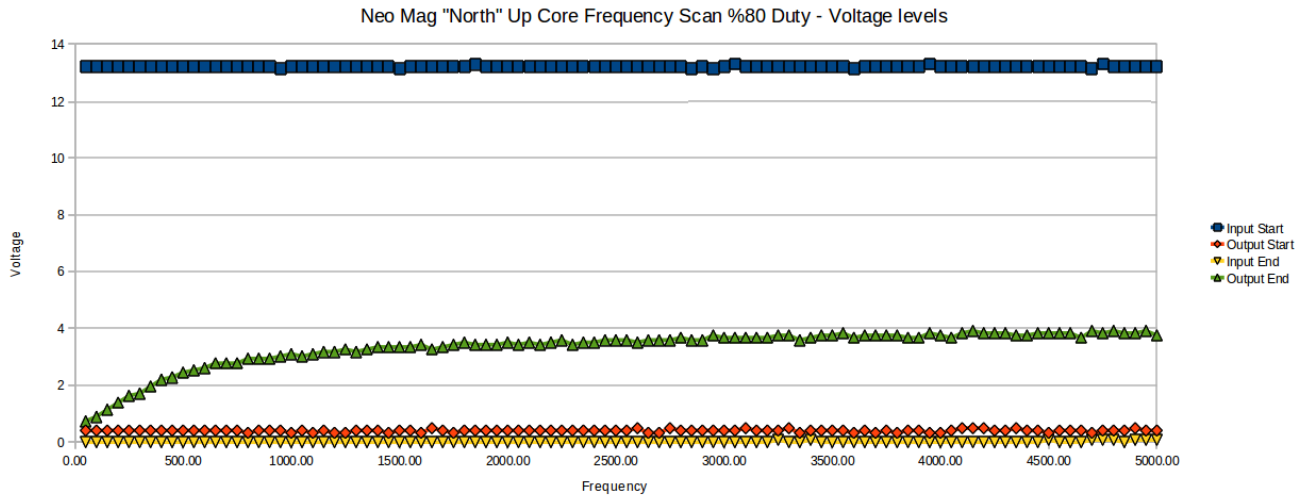
Duty cycle – 70%

Frequency - 50hz - 5000hz

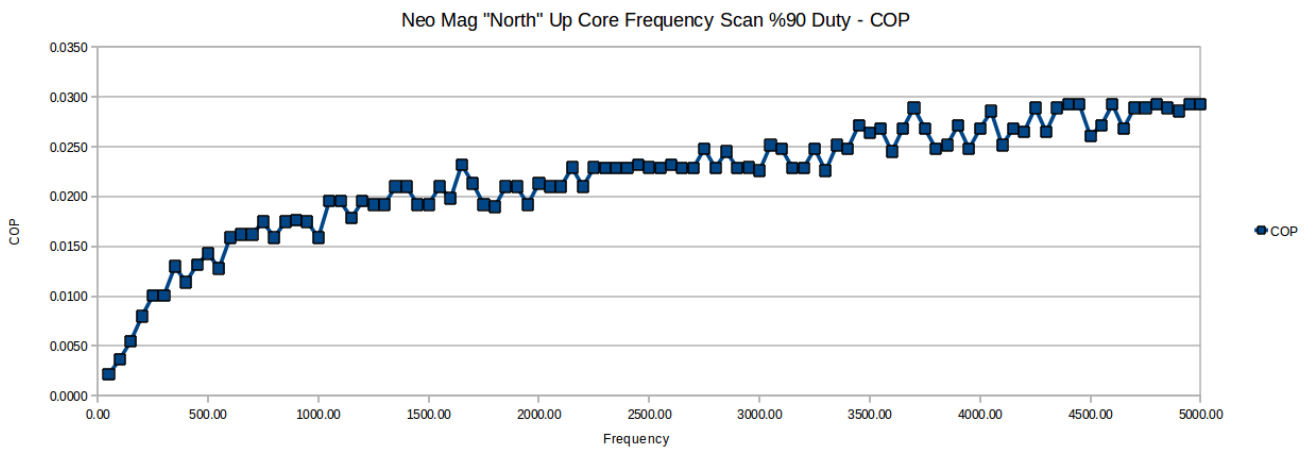
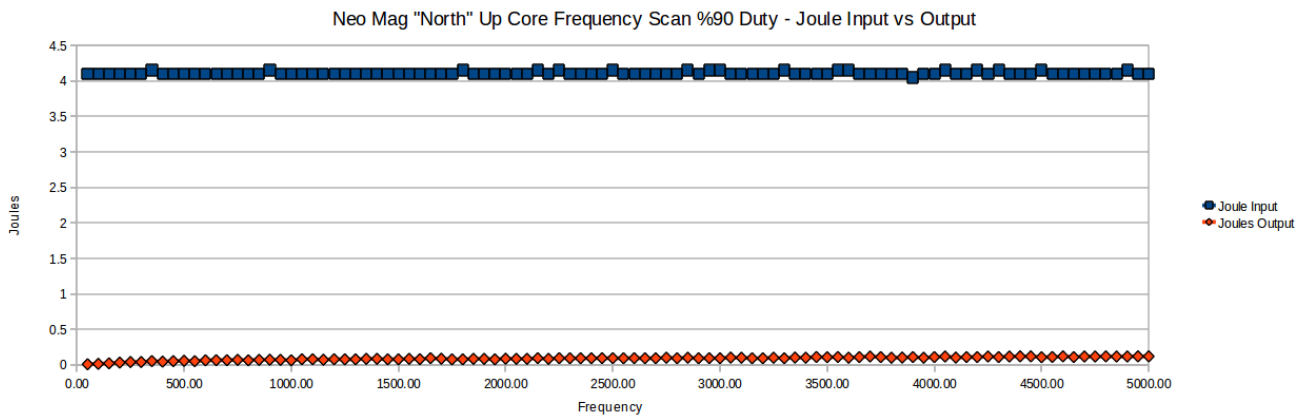
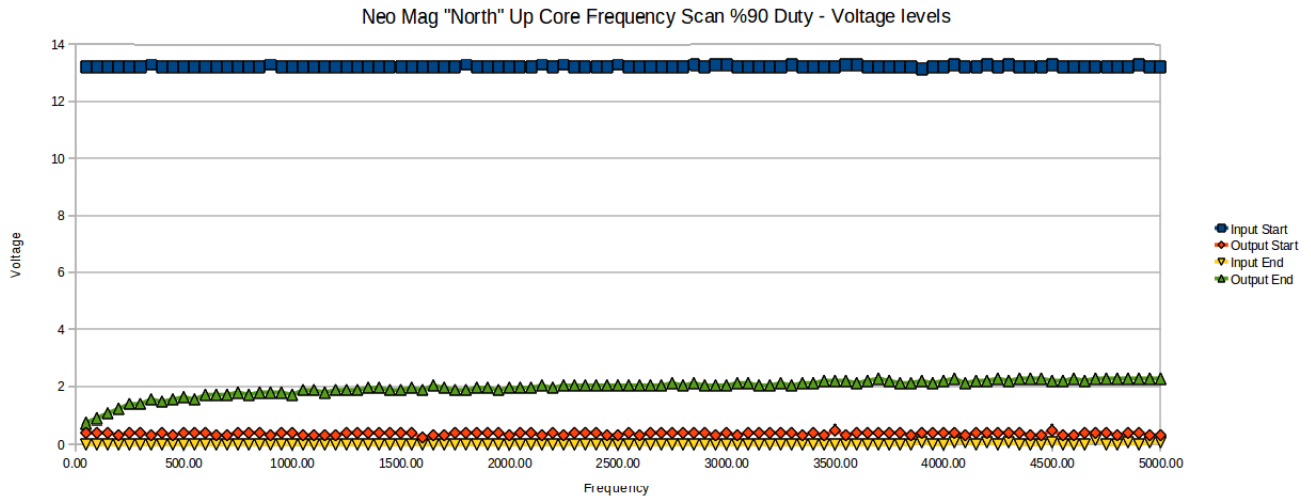
Core – **Neo Magnets “North” up**



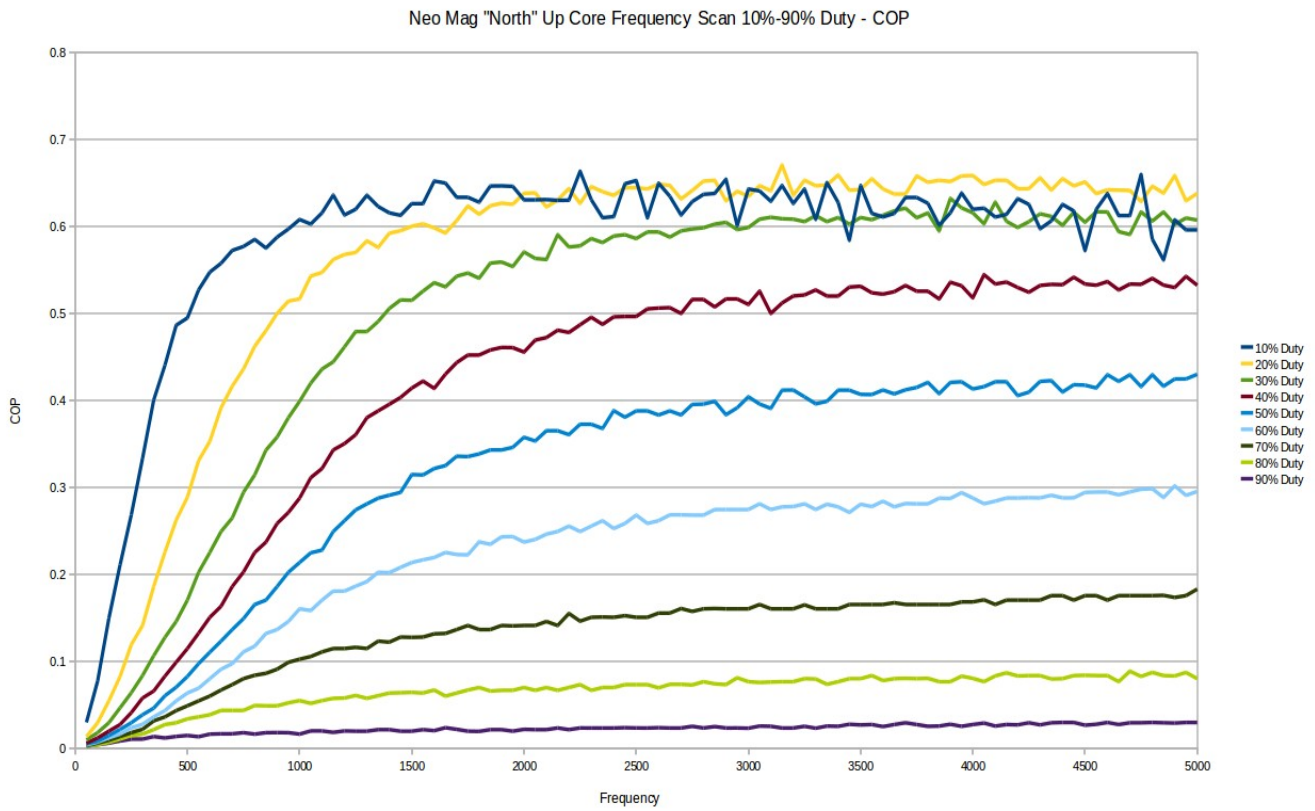
Duty cycle – 80%  
Frequency - 50hz - 5000hz  
Core – Neo Magnets “North” up



Duty cycle – 90%  
Frequency - 50hz - 5000hz  
Core – Neo Magnets “North” up

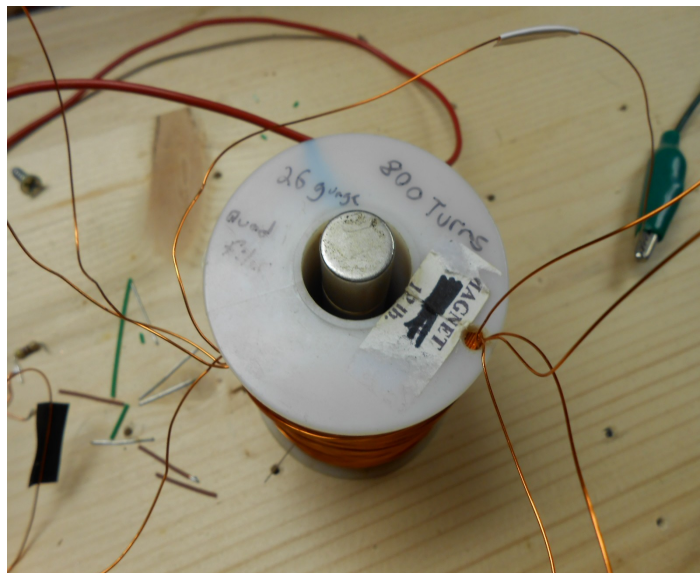


Duty cycle – 10% - 90% Comparison of COP  
Frequency - 50hz - 5000hz  
Core – **Neo Magnets “North” Up**

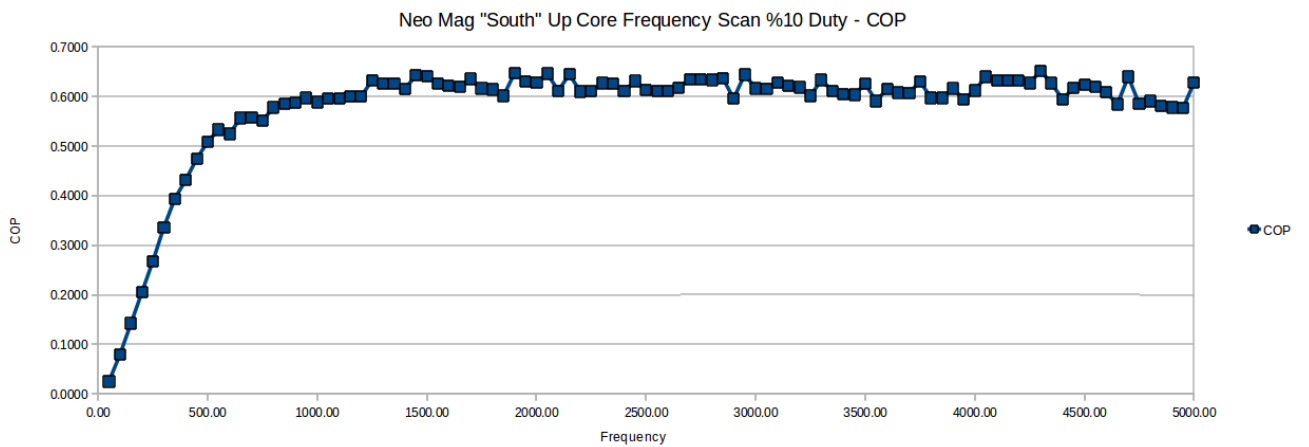
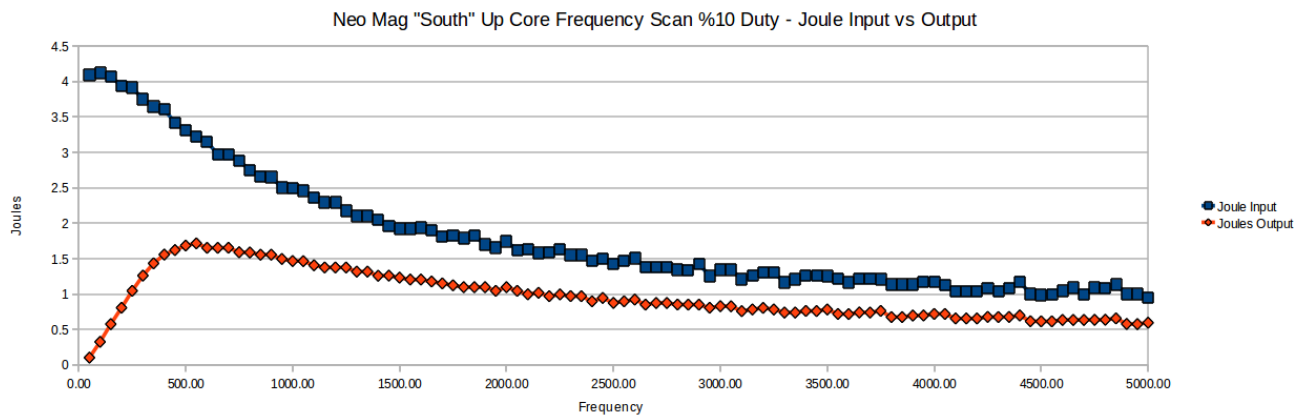
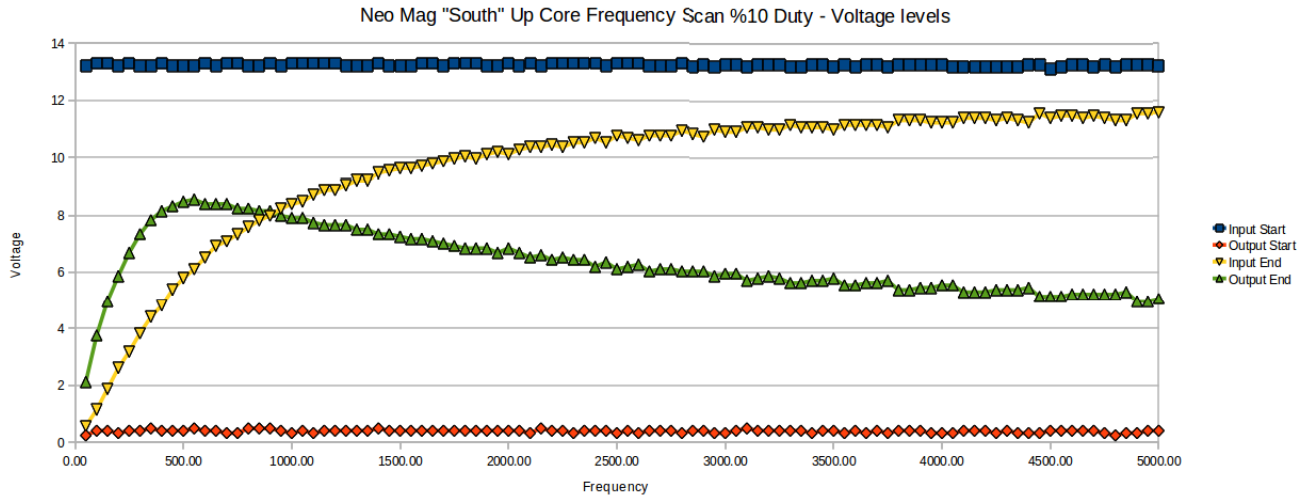


Neo Magnets "South" up

Rare Earth Magnets 1/2 in x 1/2 in Neodymium N42 Disc

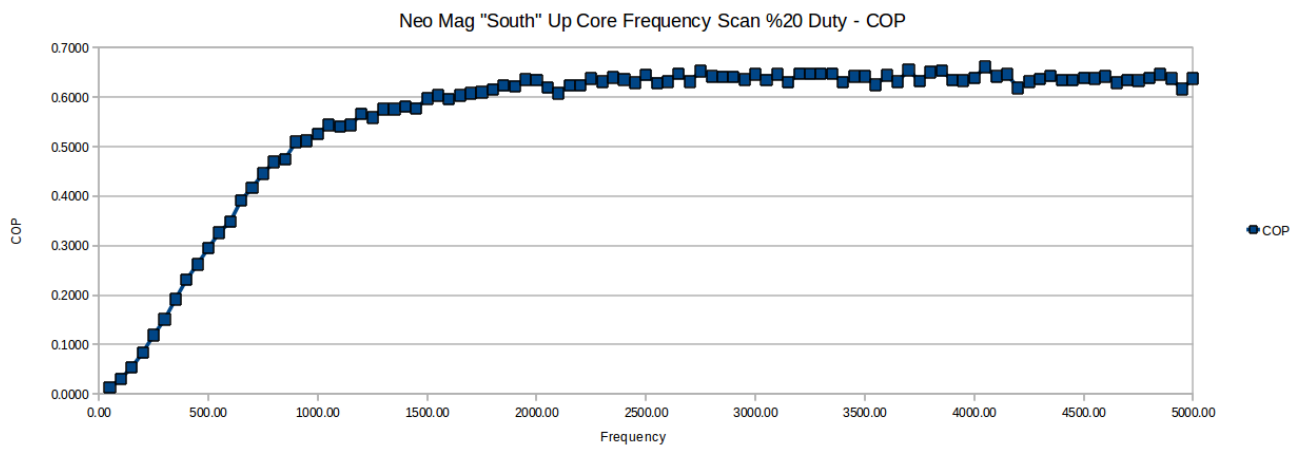
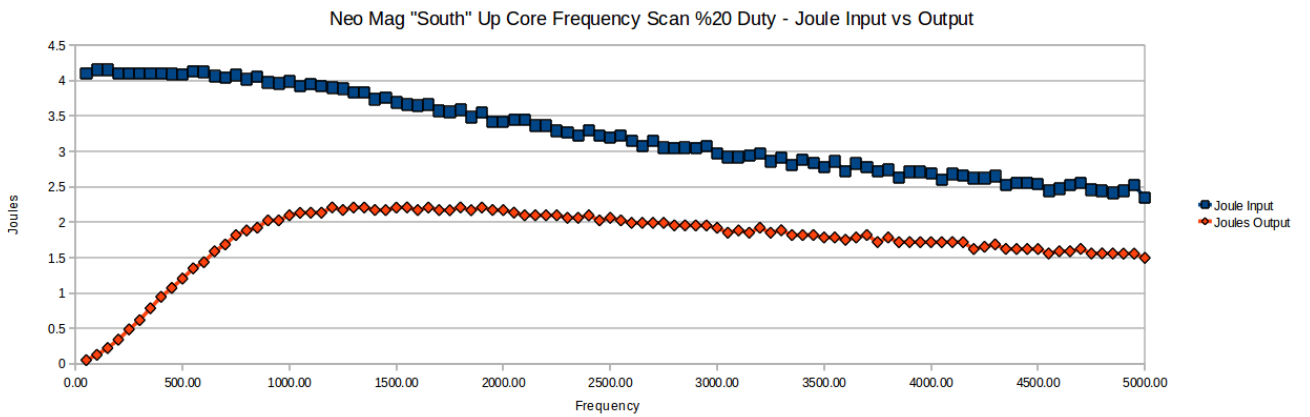
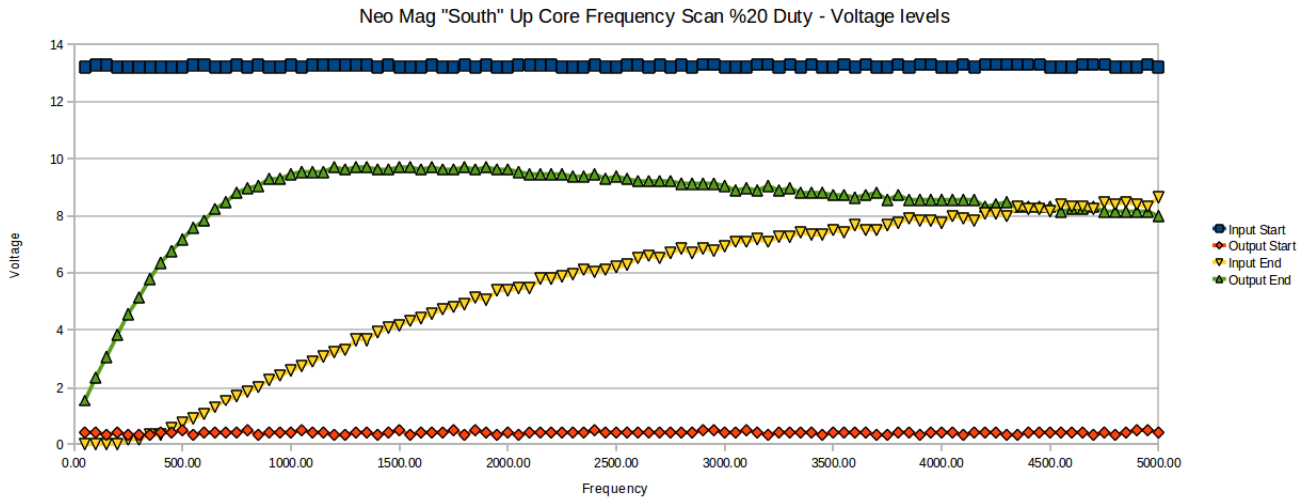


Duty cycle – 10%  
Frequency - 50hz - 5000hz  
Core – **Neo Magnets “South” up**

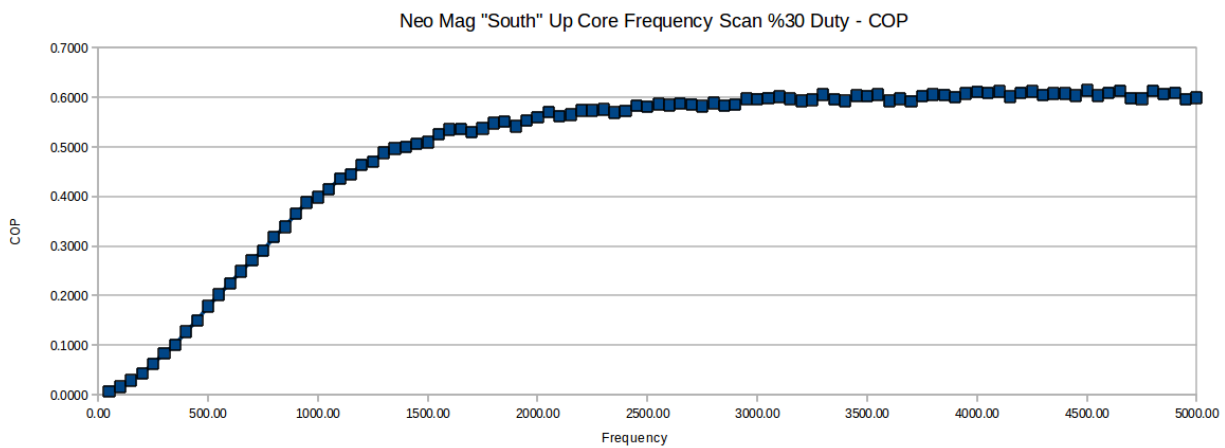
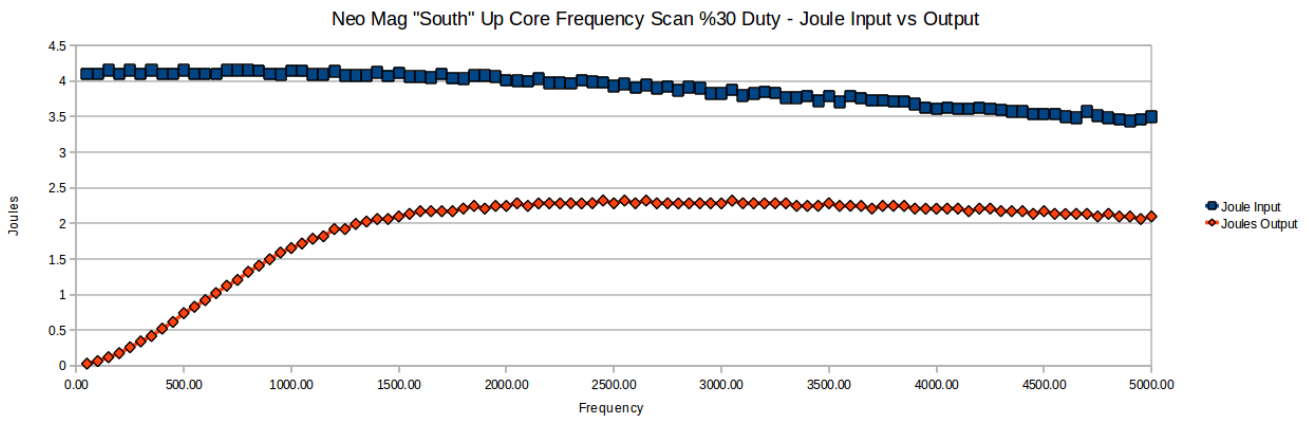
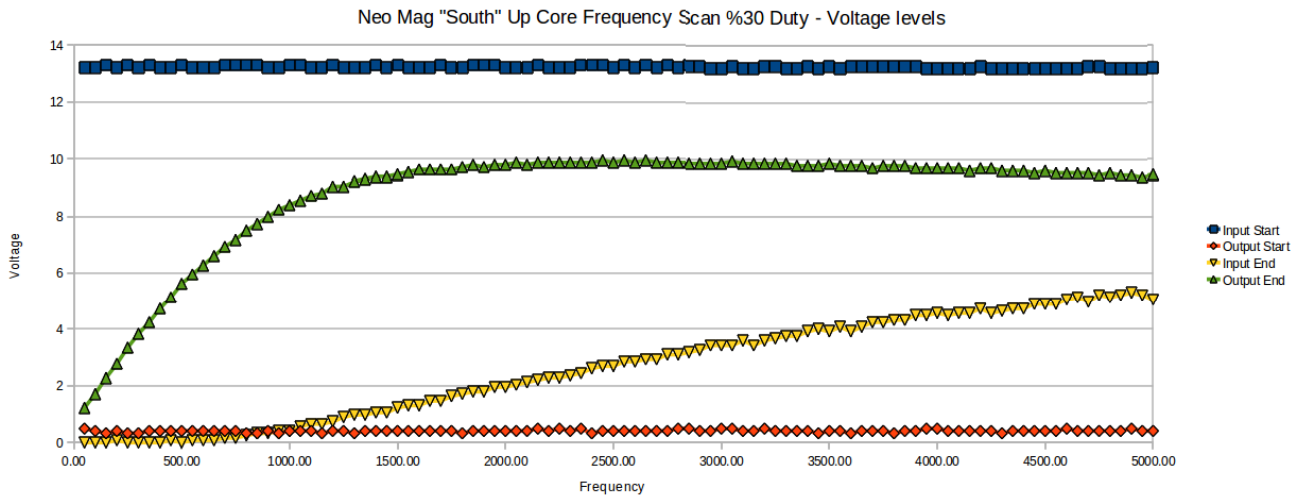




Duty cycle – 20%  
 Frequency - 50hz - 5000hz  
 Core – **Neo Magnets “South” up**



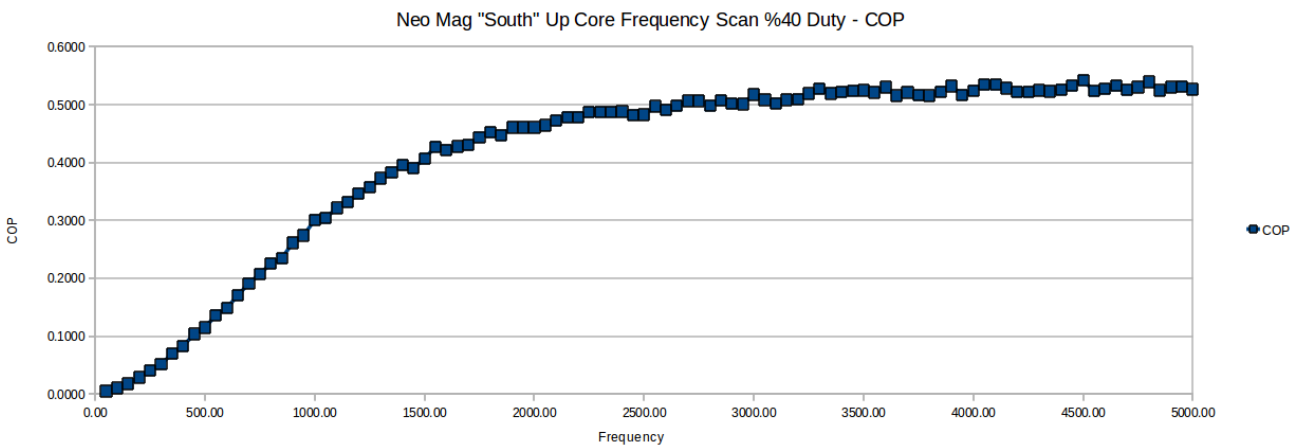
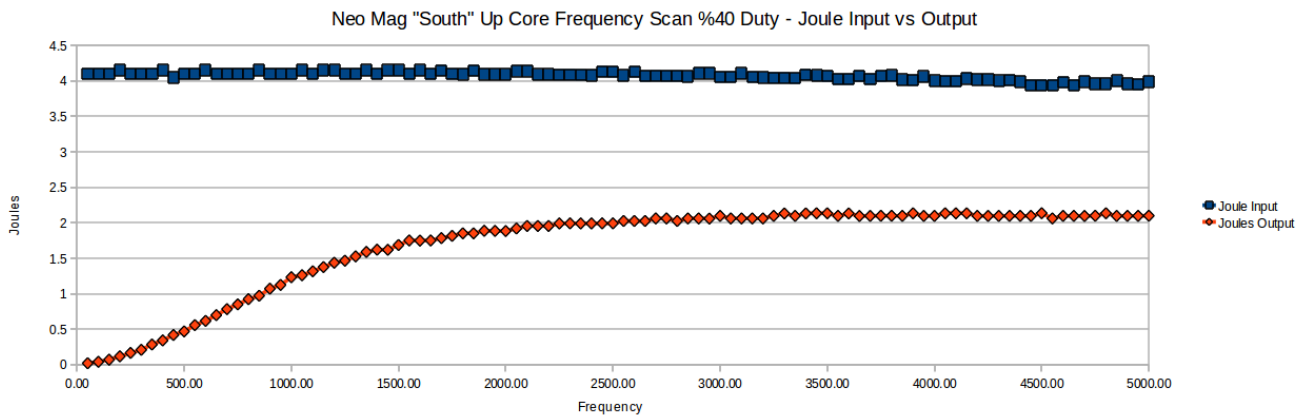
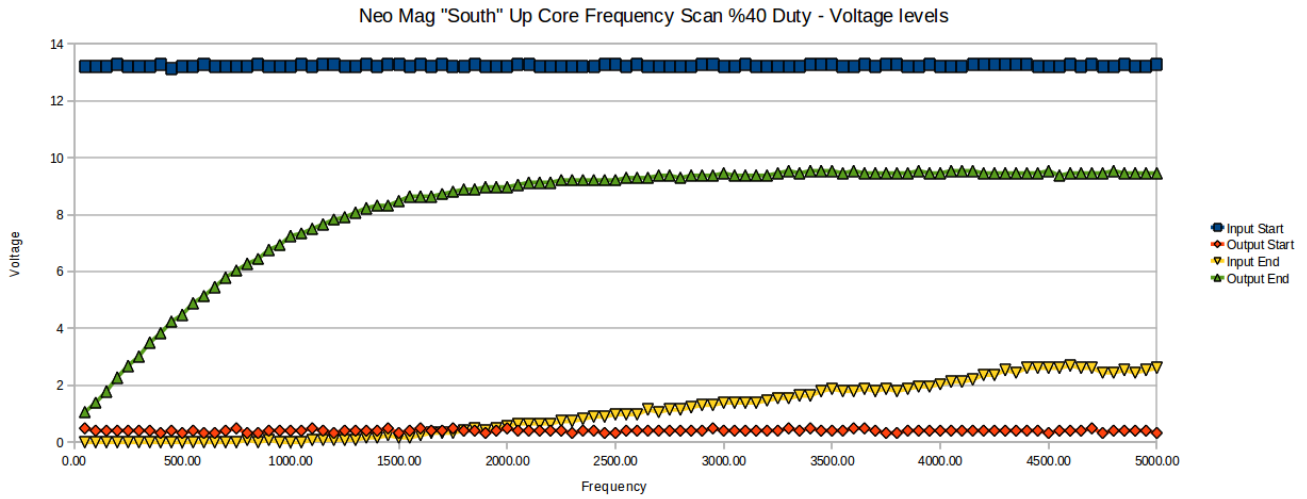
Duty cycle – 30%  
 Frequency - 50hz - 5000hz  
 Core – **Neo Magnets “South” up**



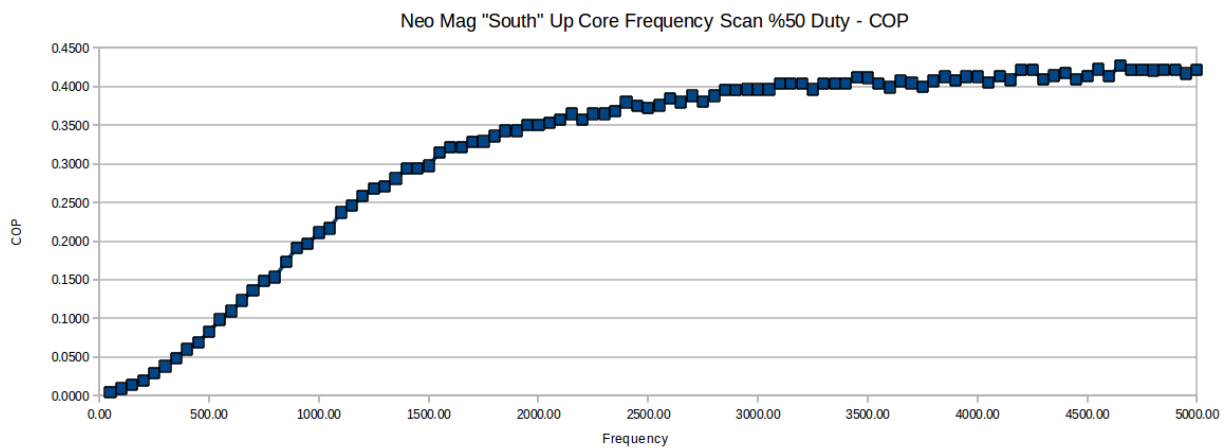
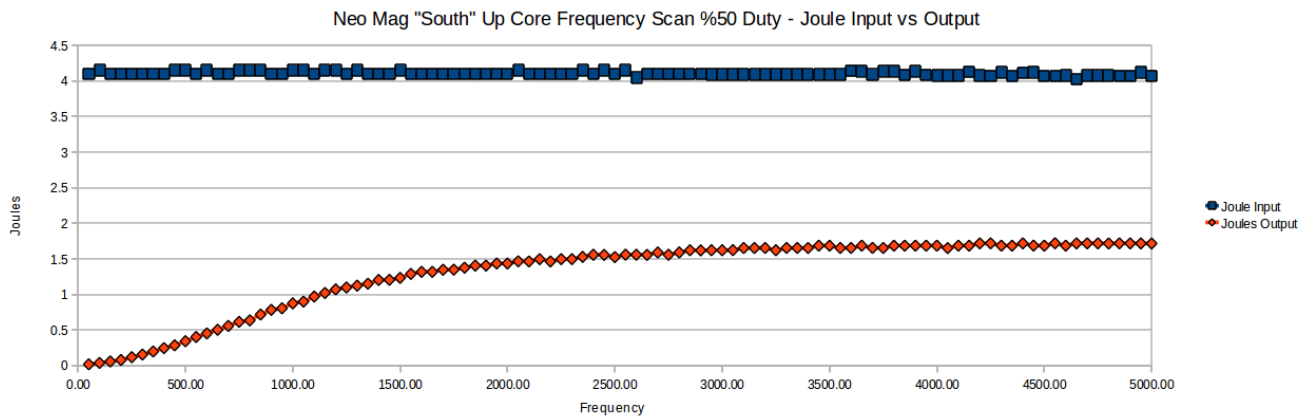
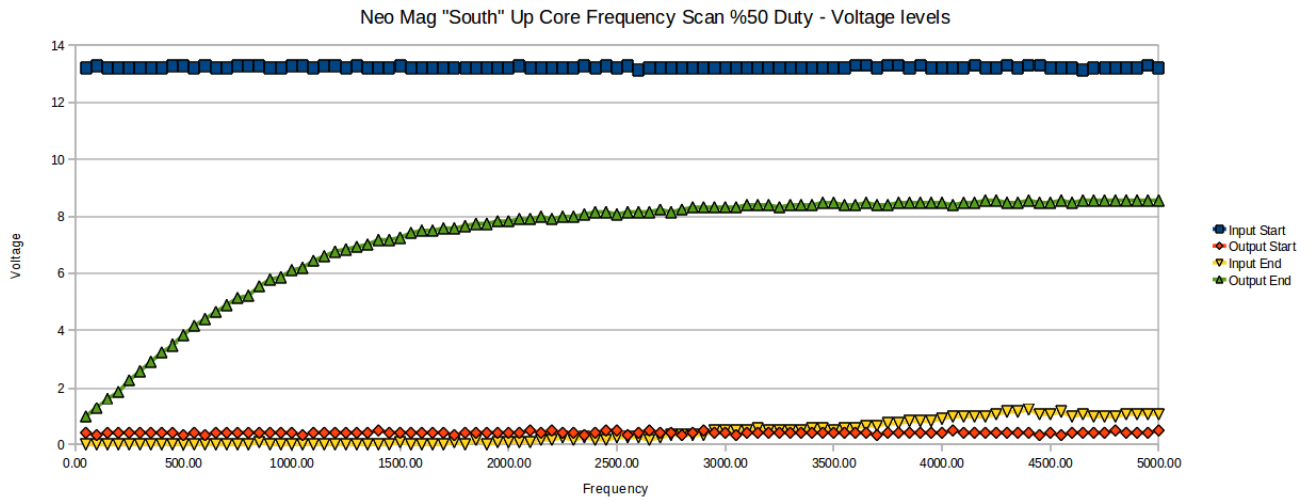
Duty cycle – 40%

Frequency - 50hz - 5000hz

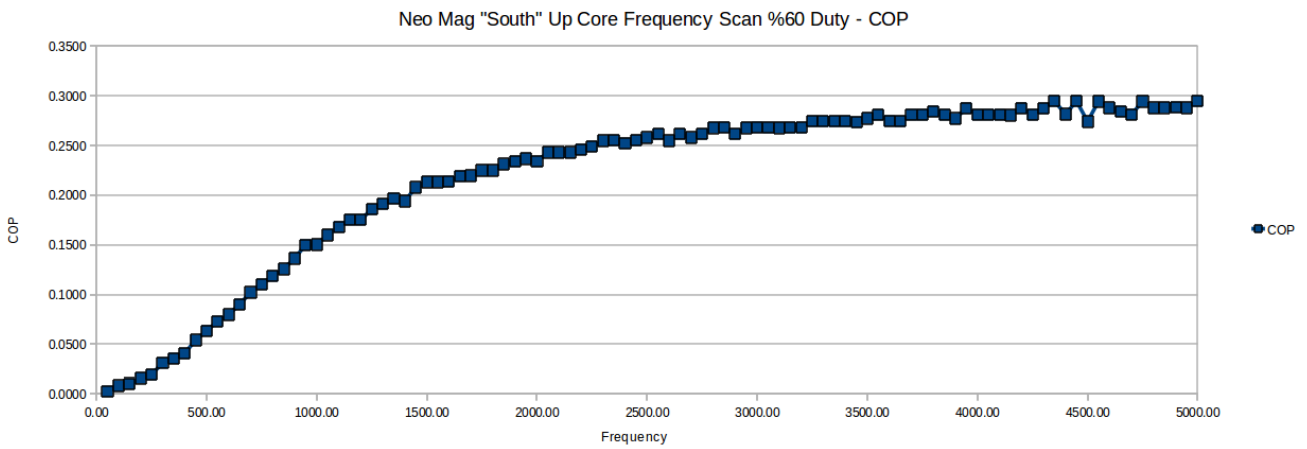
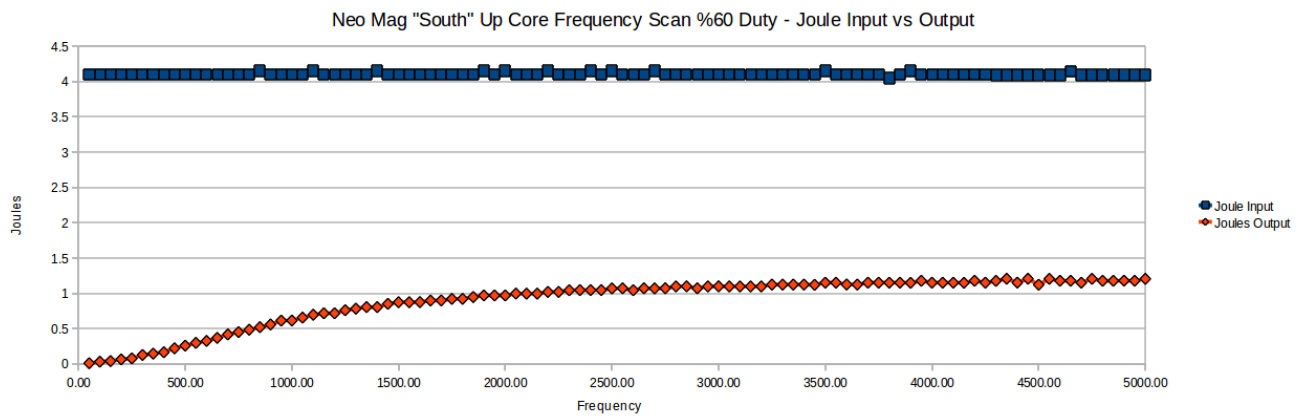
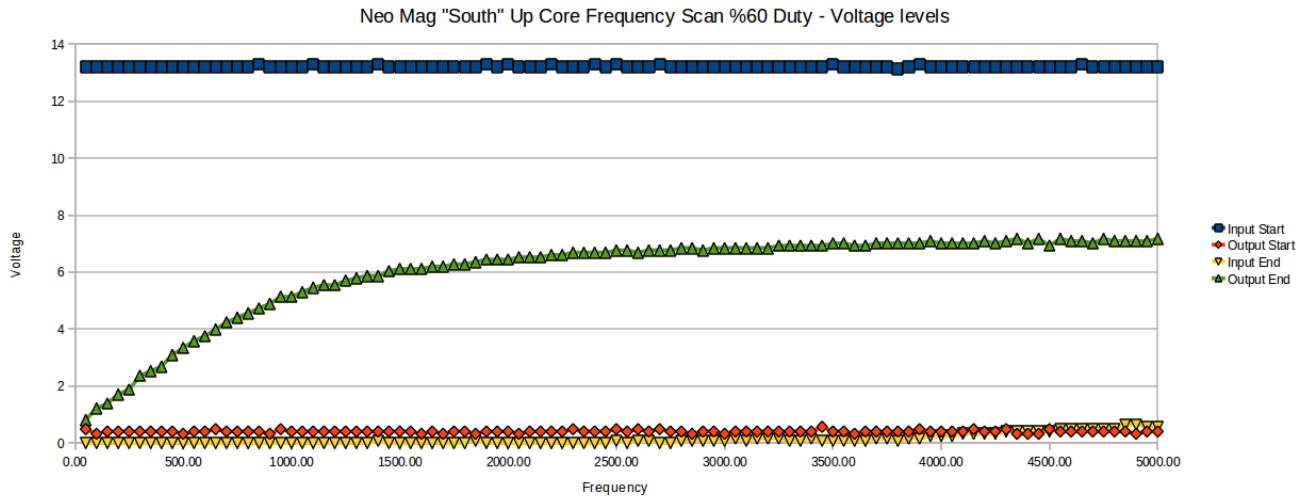
Core – Neo Magnets “South” up



Duty cycle – 50%  
Frequency - 50hz - 5000hz  
Core – Neo Magnets “South” up



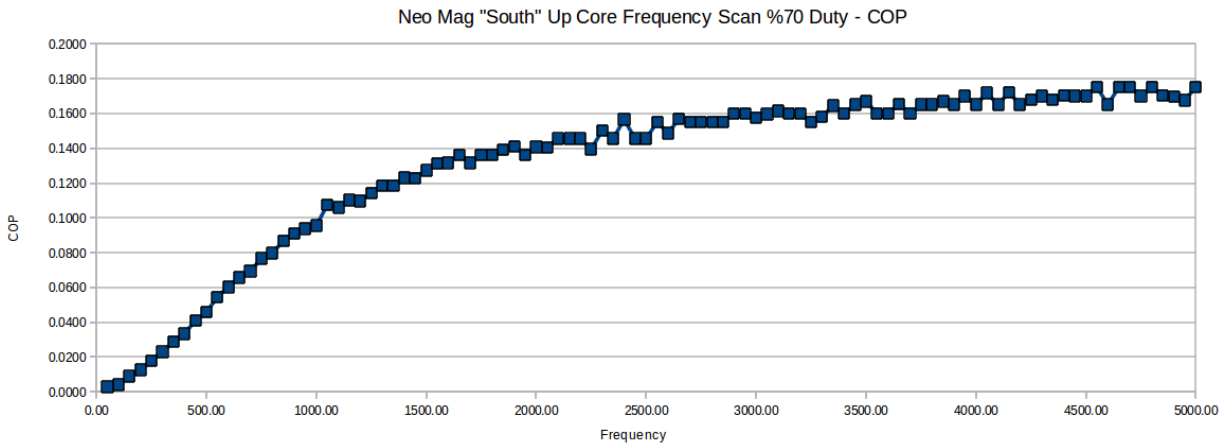
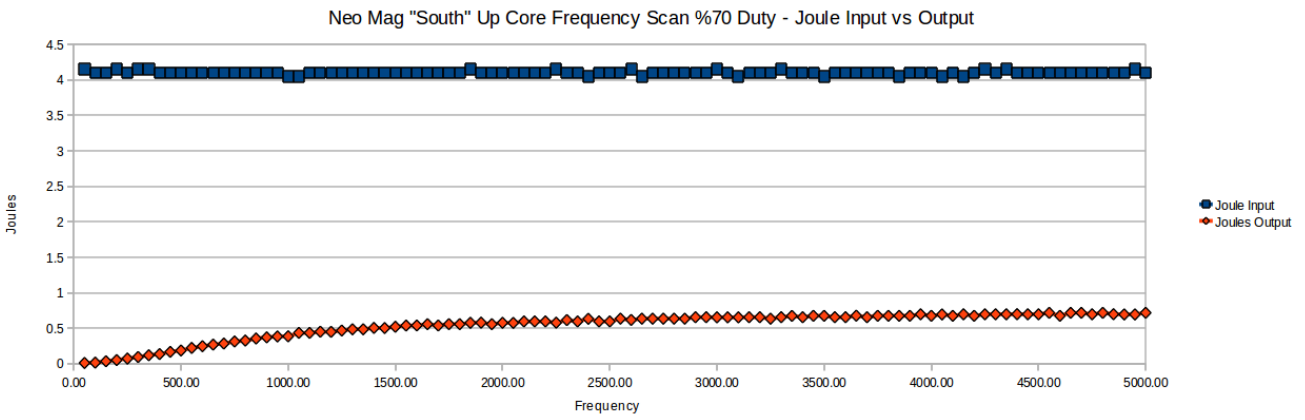
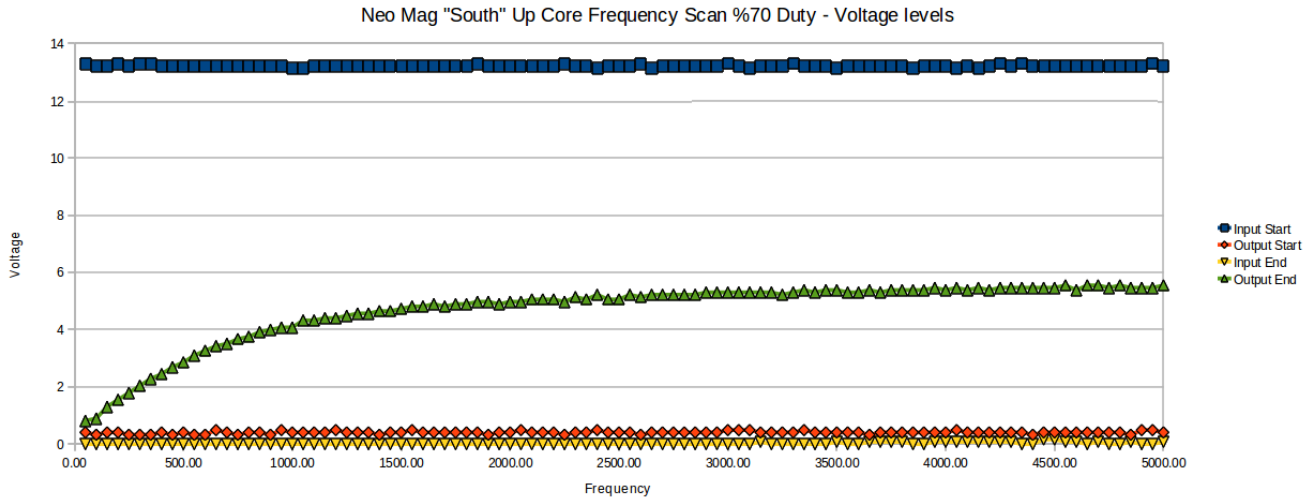
Duty cycle – 60%  
Frequency - 50hz - 5000hz  
Core – Neo Magnets “South” up



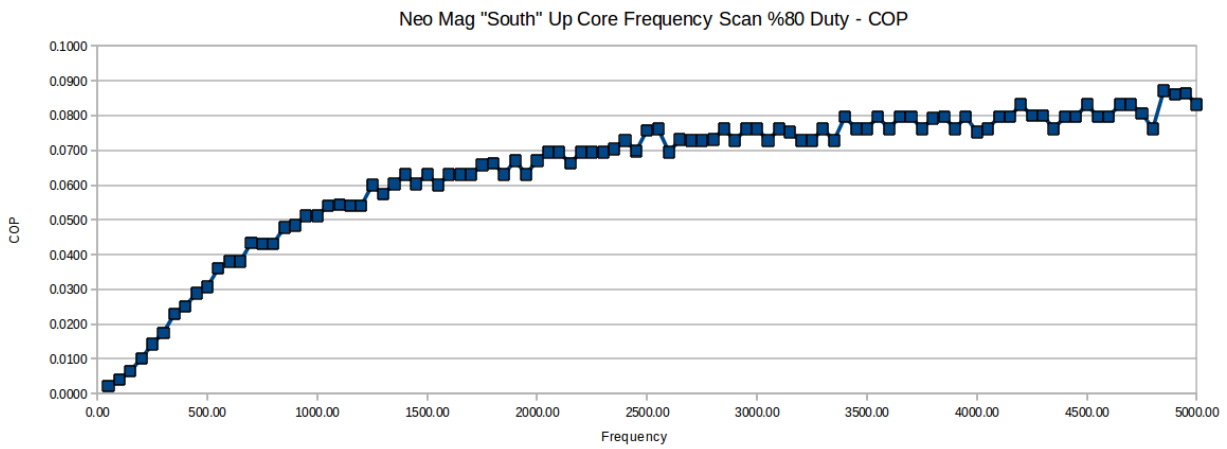
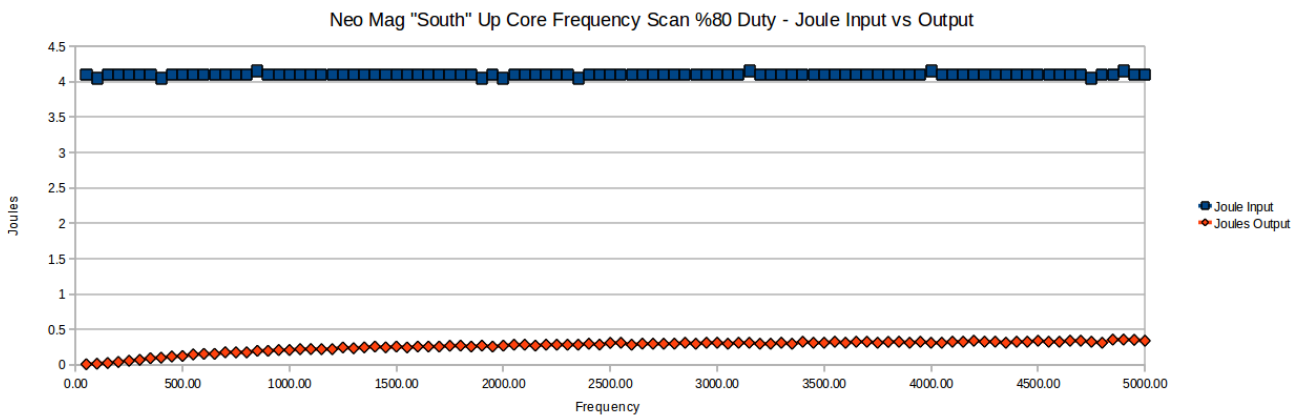
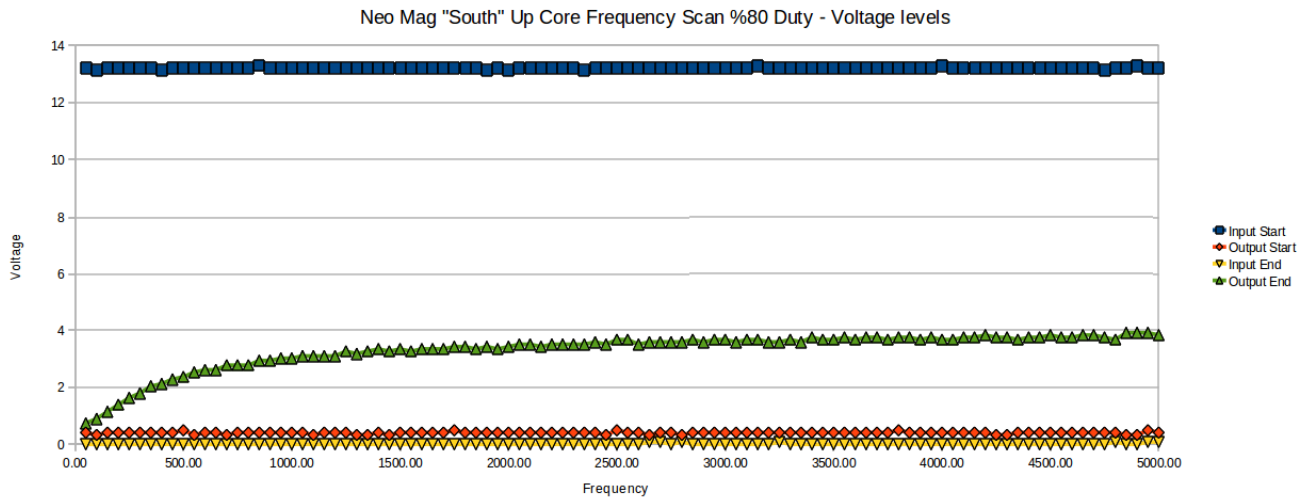
Duty cycle – 70%

Frequency - 50hz - 5000hz

Core – **Neo Magnets “South” up**



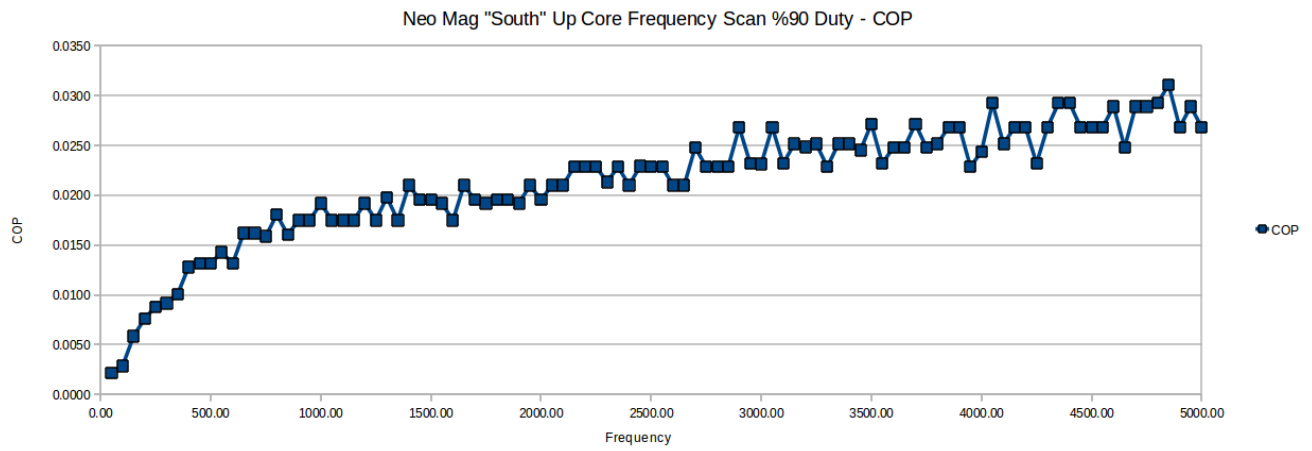
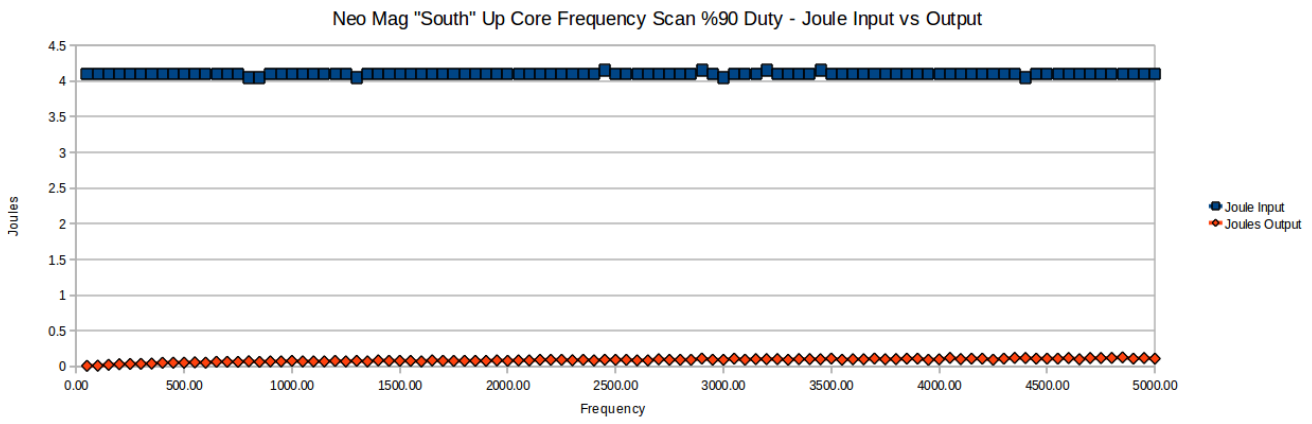
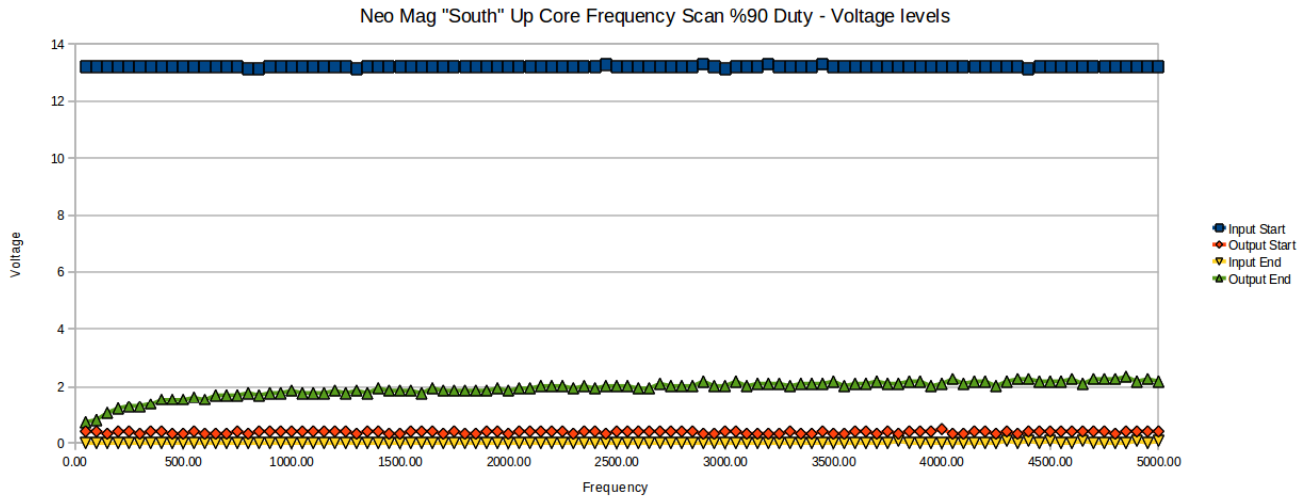
Duty cycle – 80%  
Frequency - 50hz - 5000hz  
Core – Neo Magnets “South” up



Duty cycle – 90%

Frequency - 50hz - 5000hz

Core – **Neo Magnets “South” up**

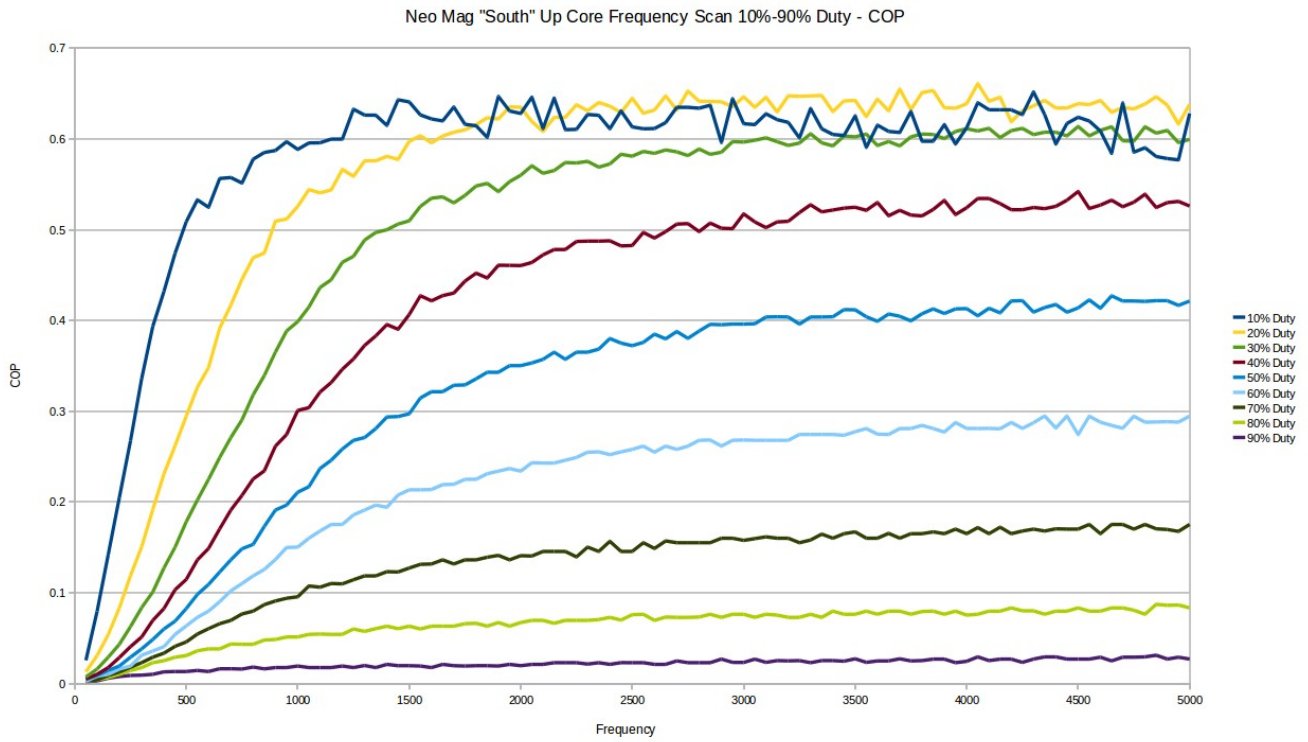




# Duty cycle – 10% - 90% Comparison of COP

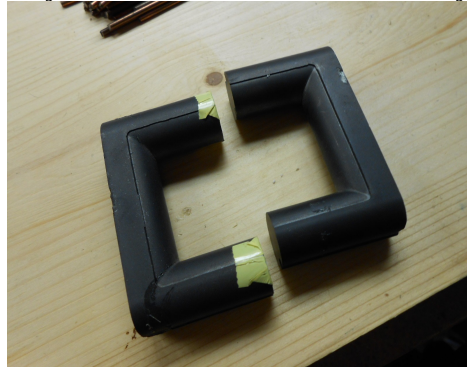
Frequency - 50hz - 5000hz

Core – **Neo Magnets “South” Up**



## Ferrite

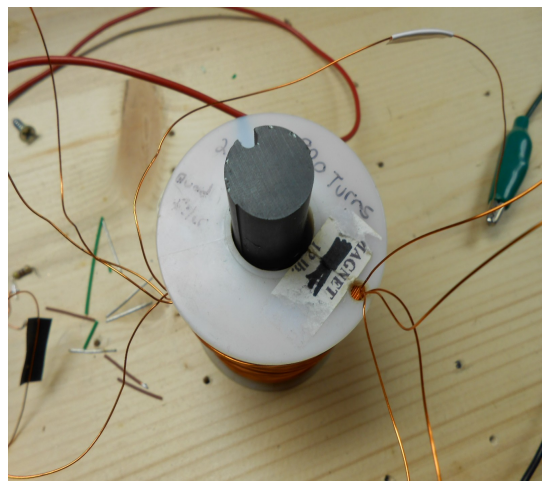
The only ferrite I could find to mostly fit the core was from from a flyback core.



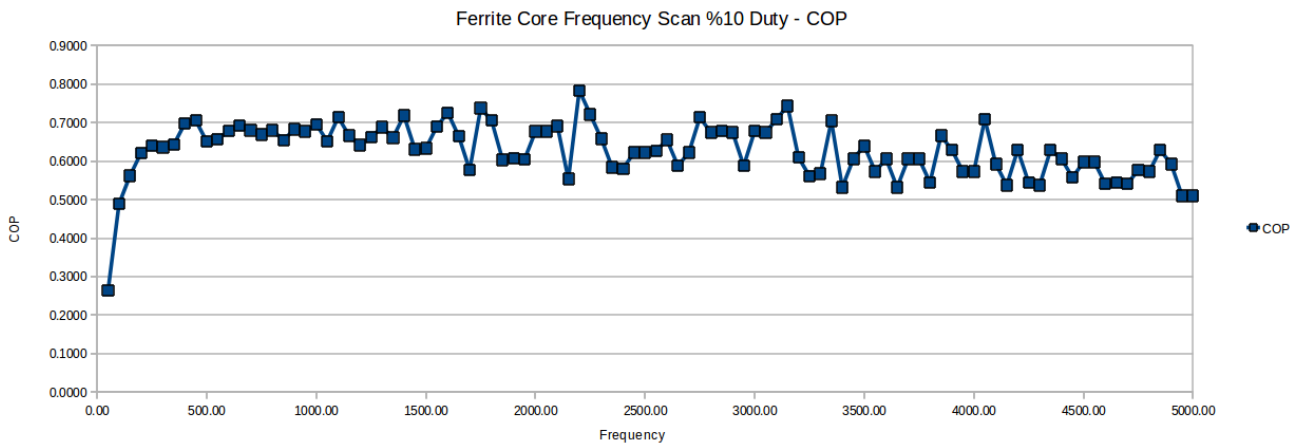
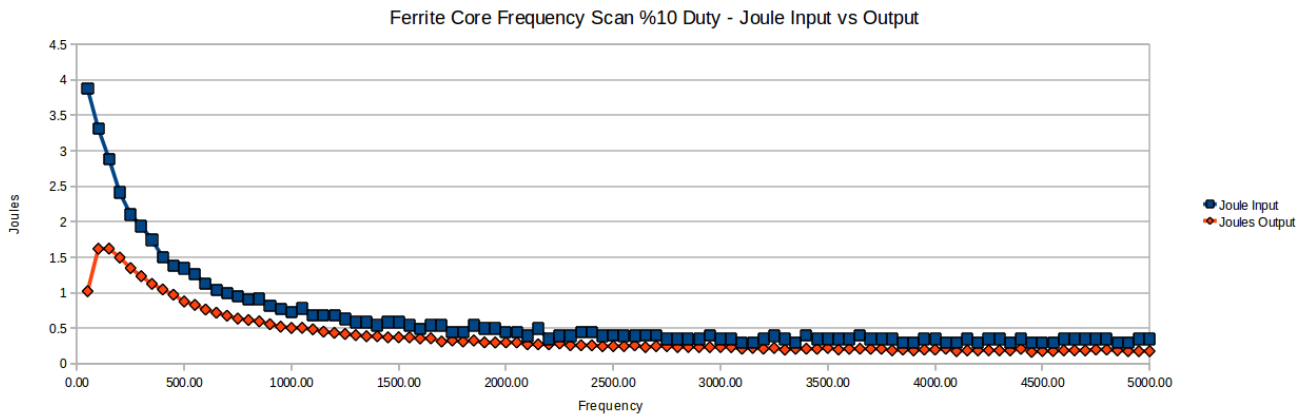
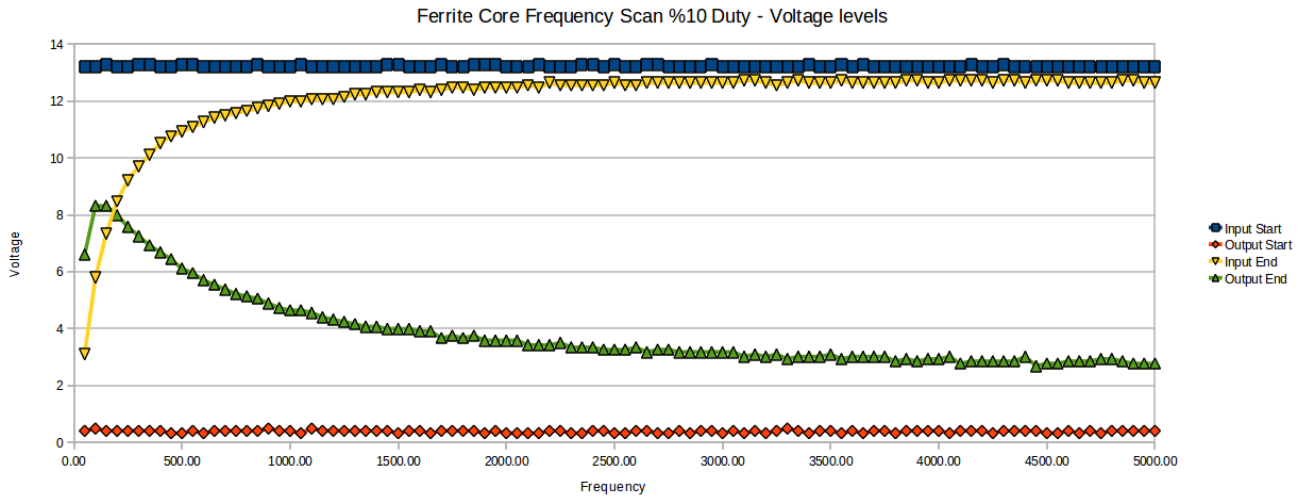
So I used a dremel to cut the ends off.



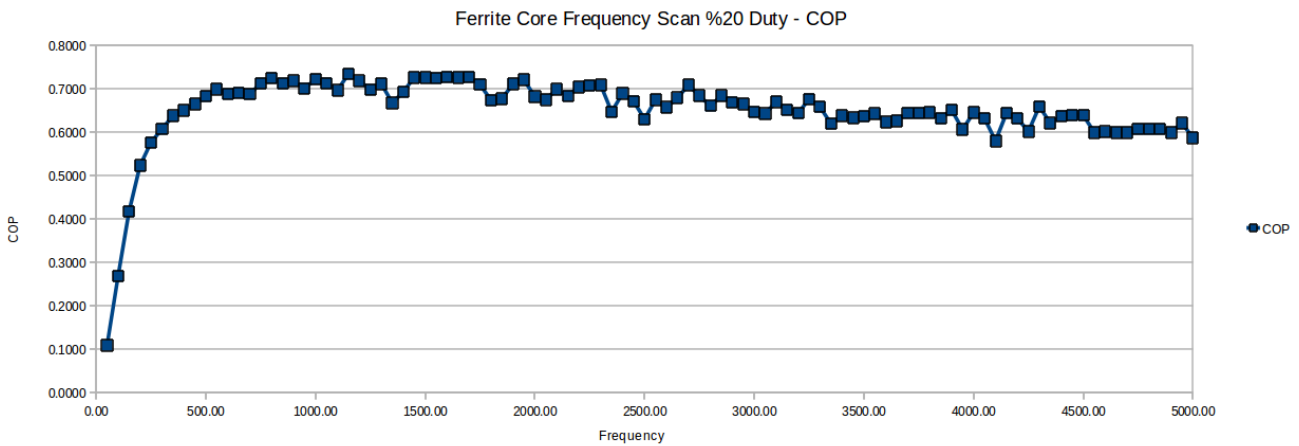
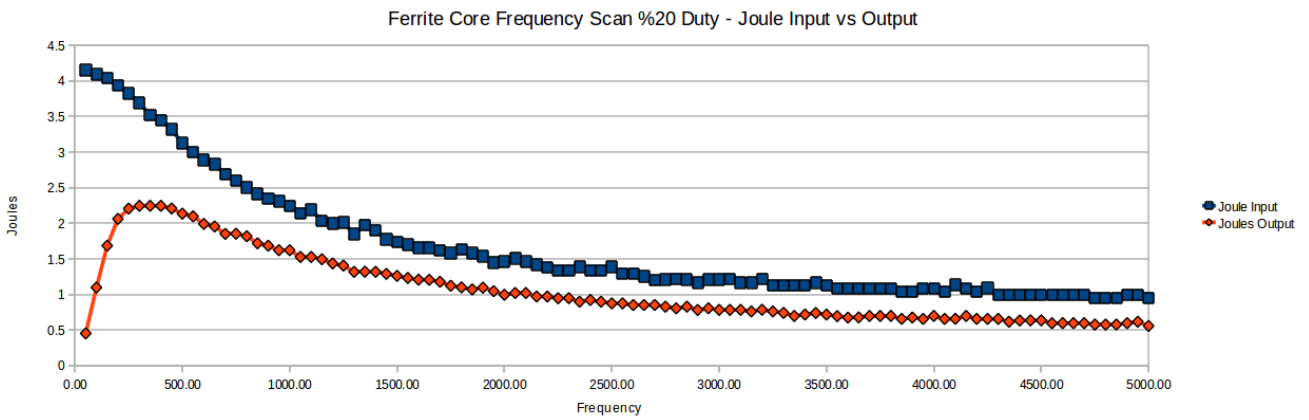
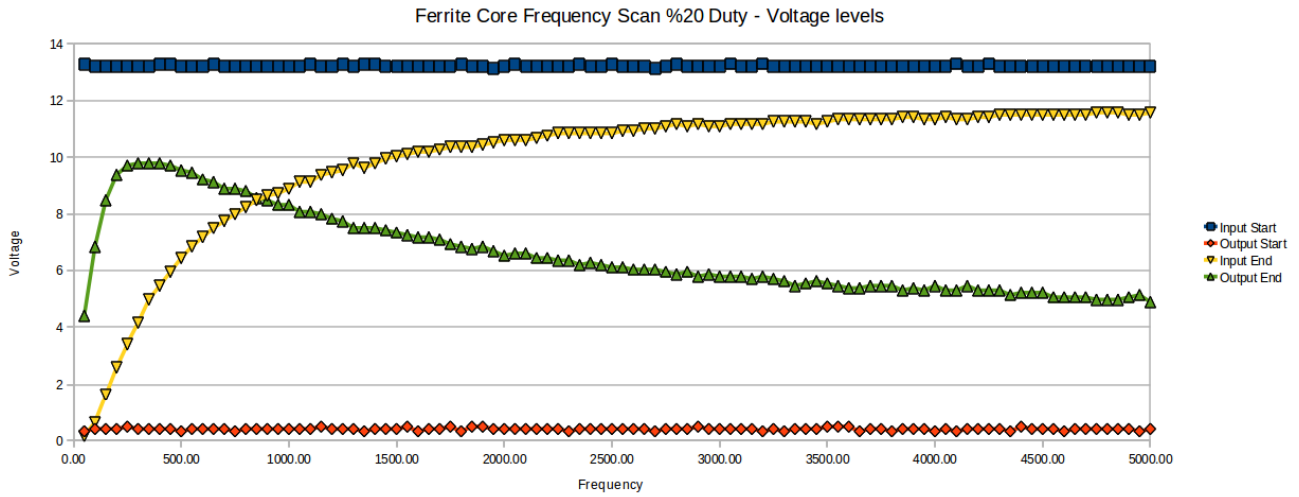
It kinda broke evenly after I cut a groove around it.



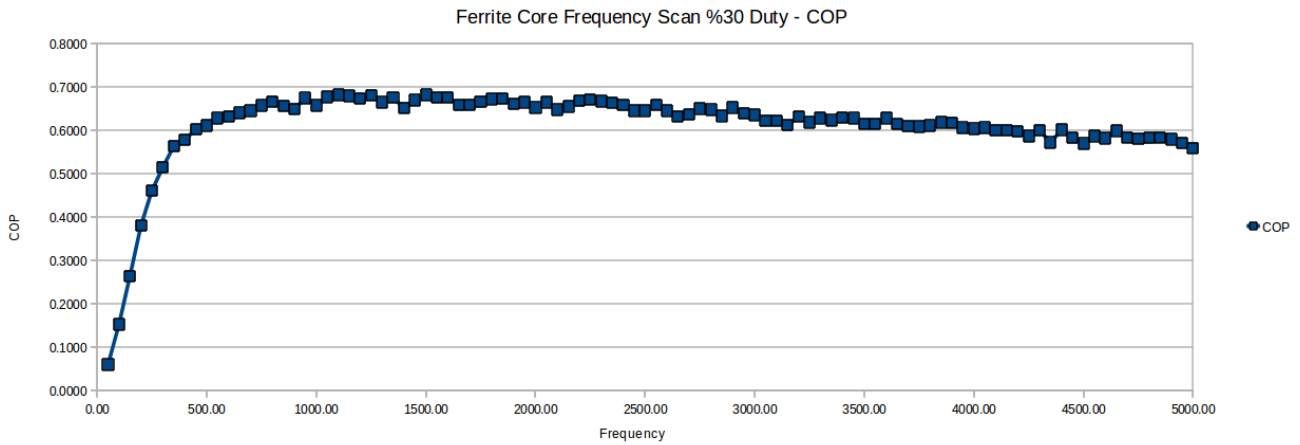
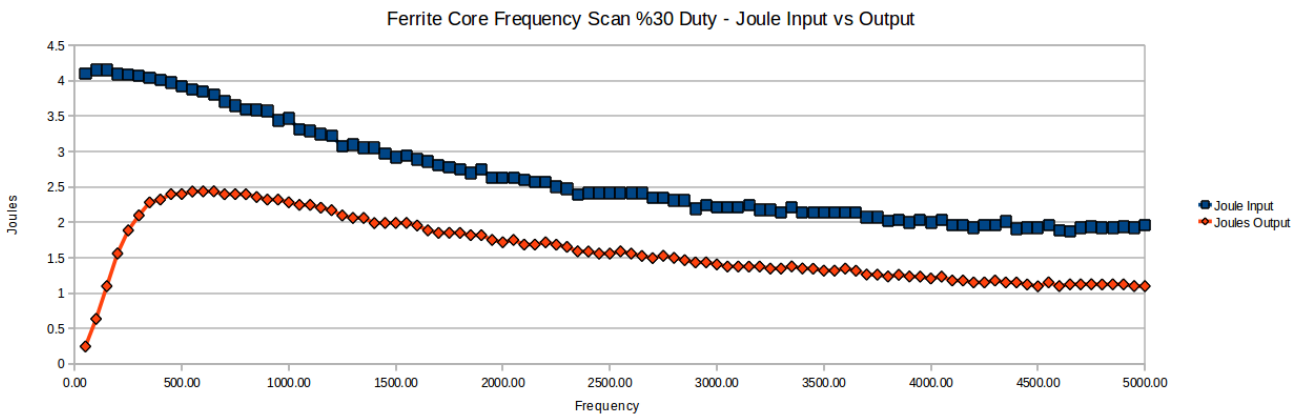
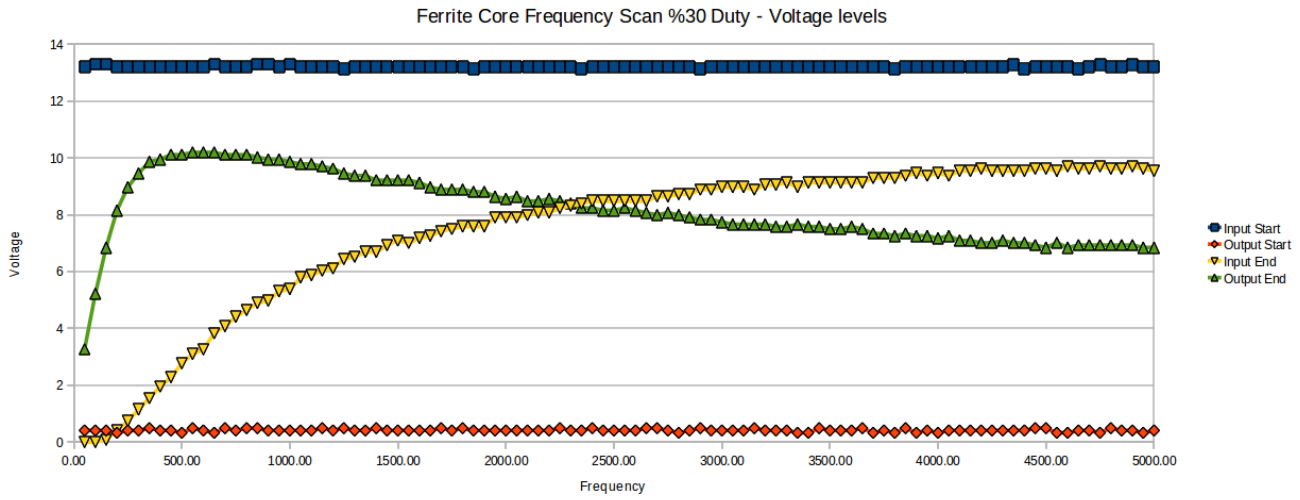
Duty cycle – 10%  
Frequency - 50hz - 5000hz  
Core – Ferrite



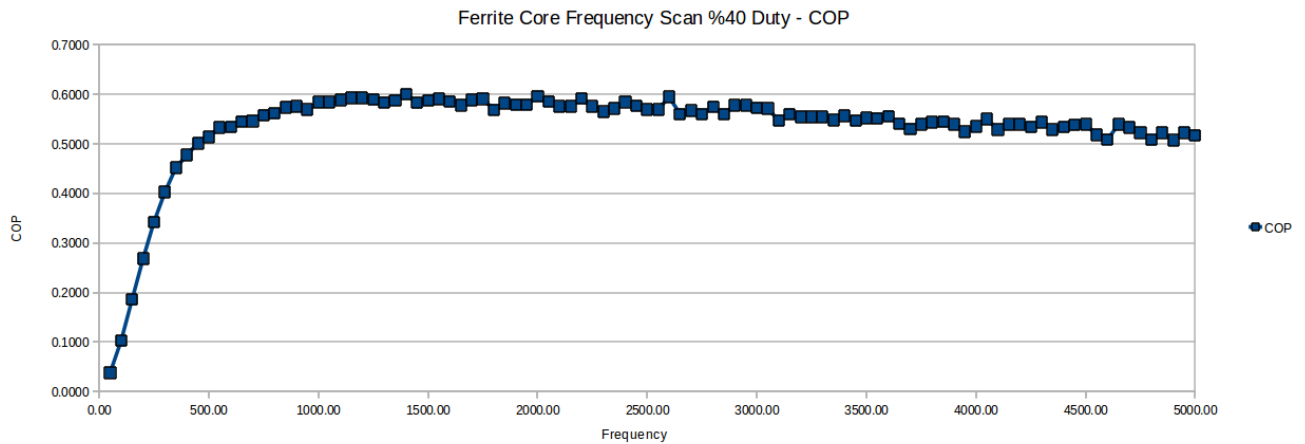
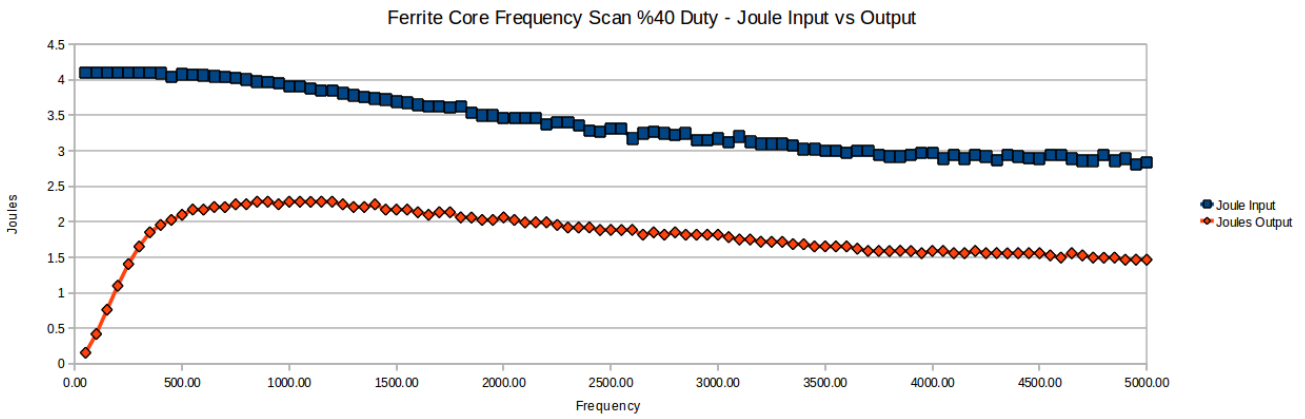
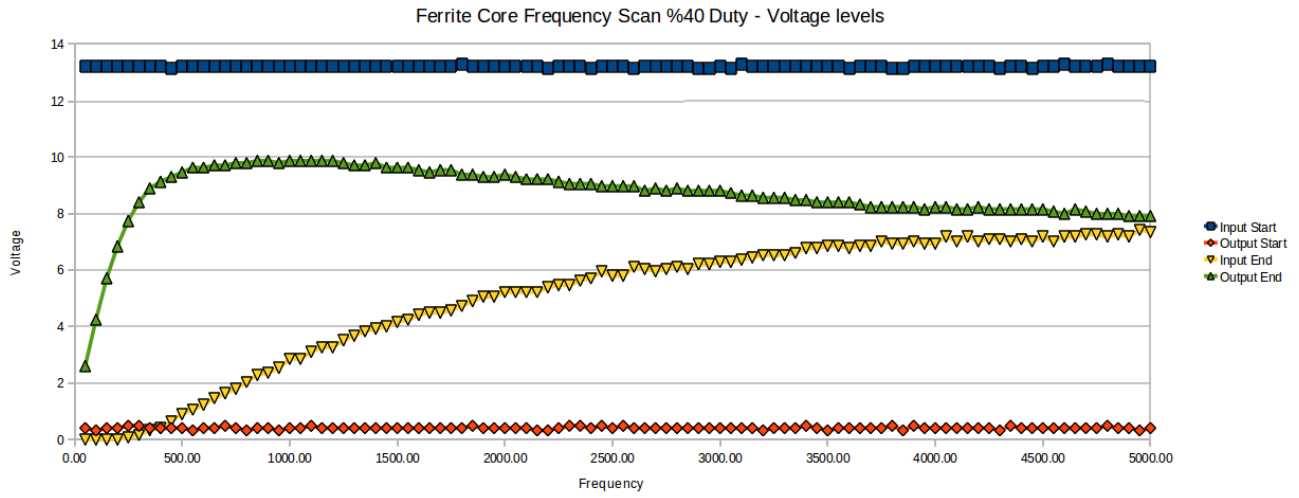
Duty cycle – 20%  
Frequency - 50hz - 5000hz  
Core – Ferrite



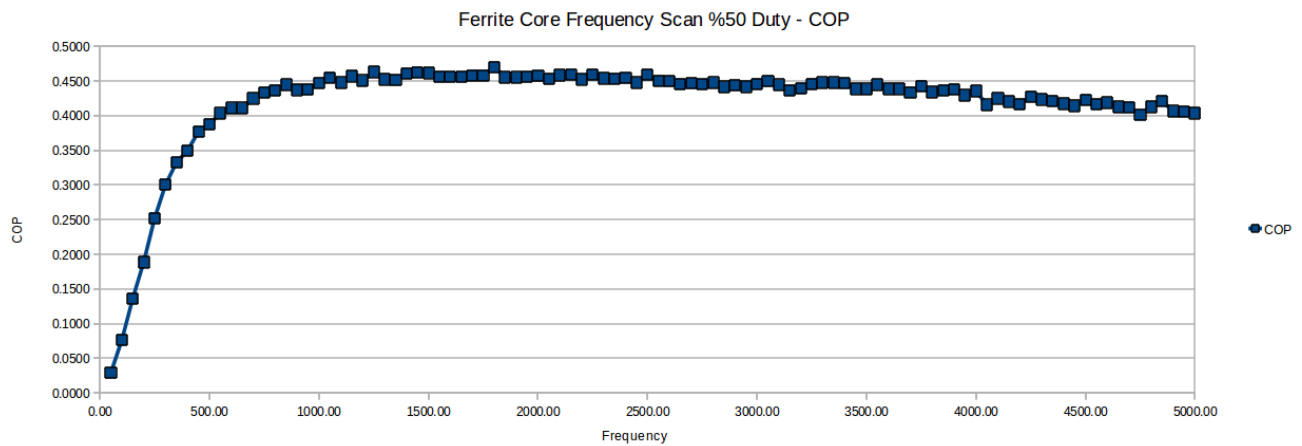
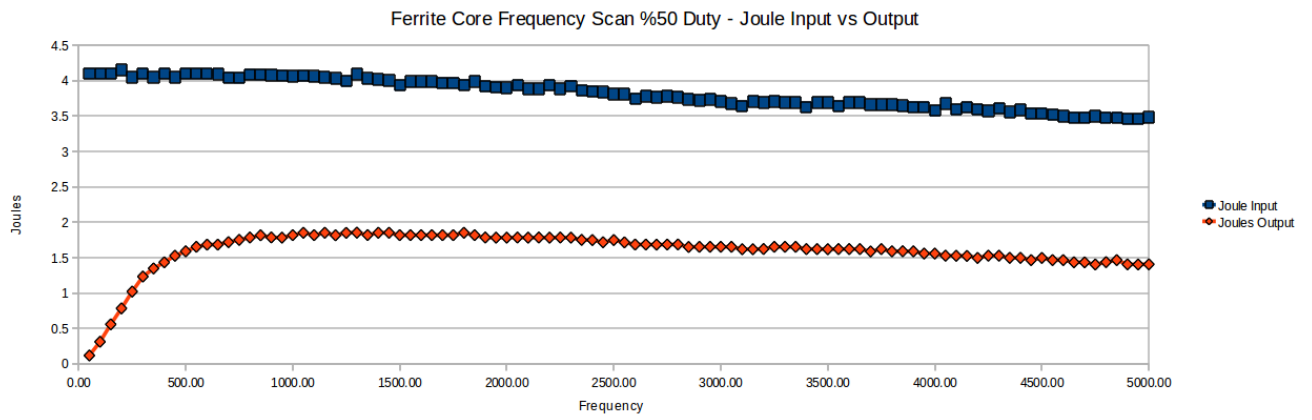
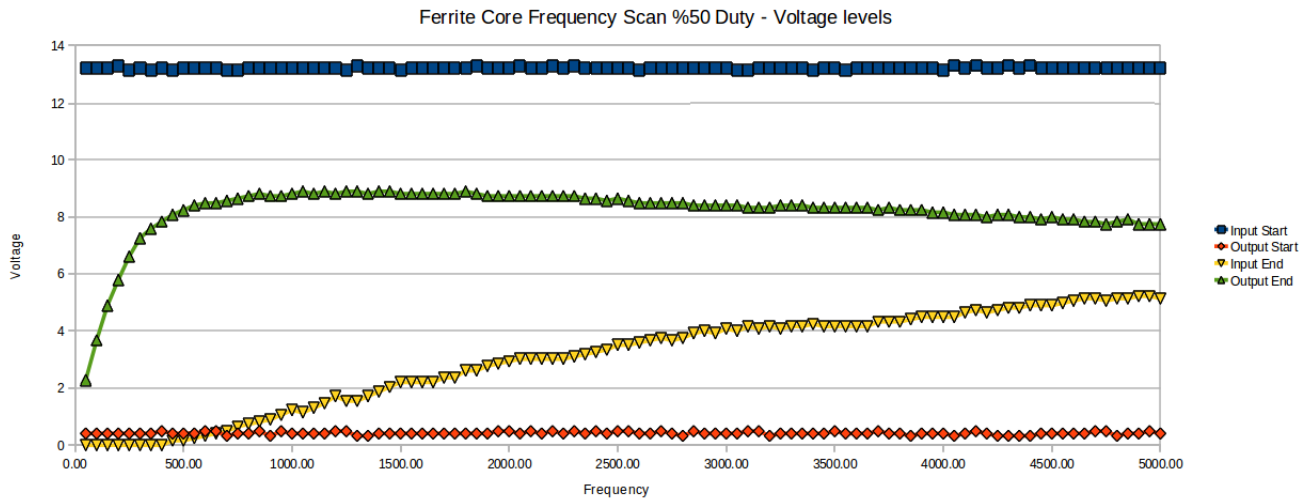
Duty cycle – 30%  
 Frequency - 50hz - 5000hz  
 Core – **Ferrite**



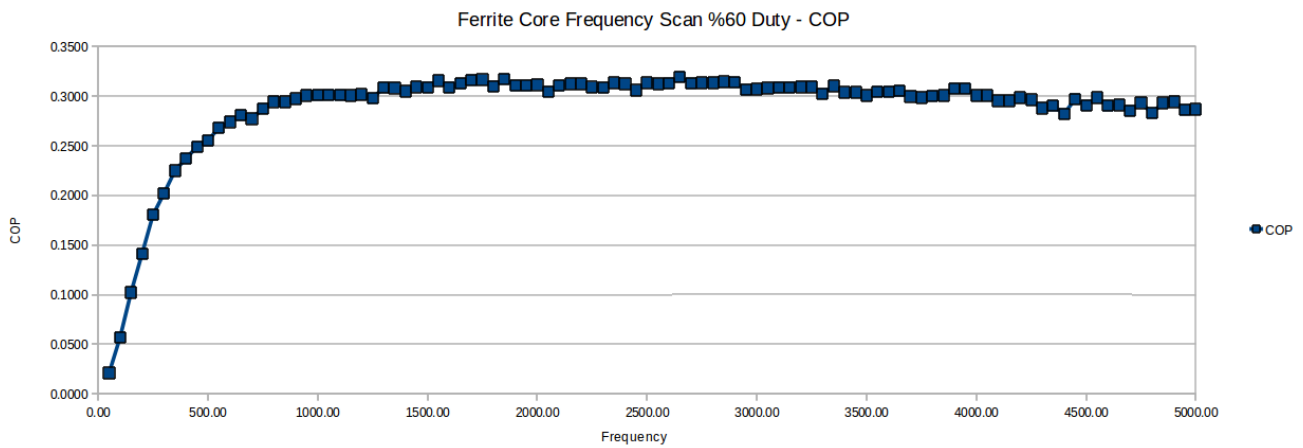
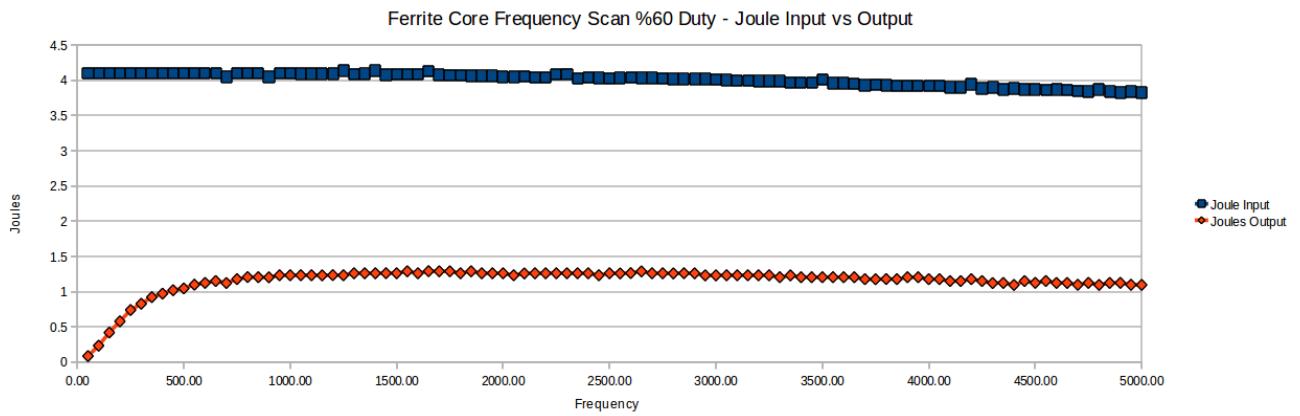
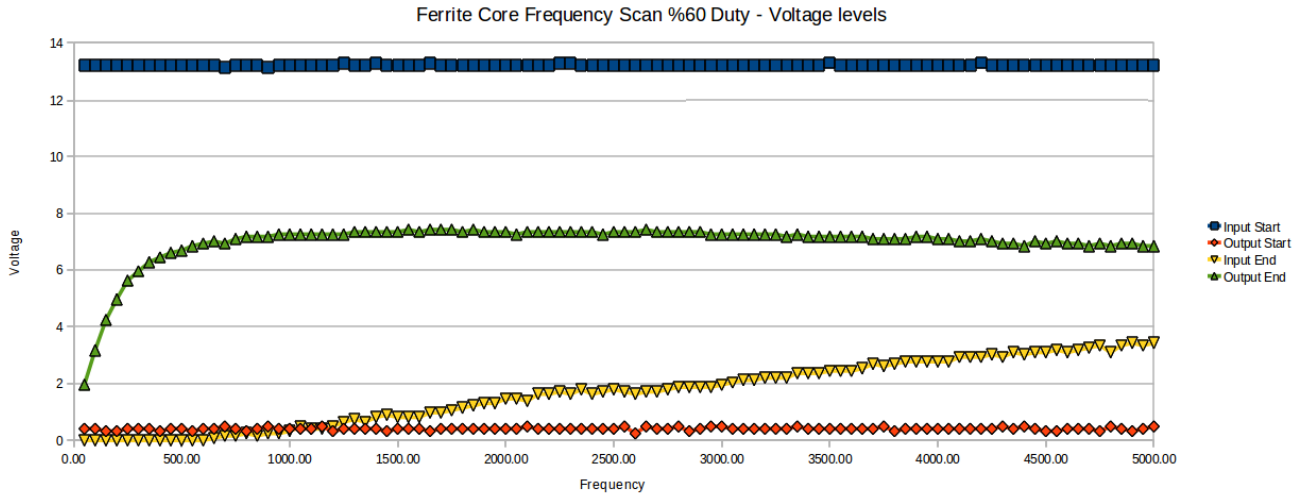
Duty cycle – 40%  
Frequency - 50hz - 5000hz  
Core – Ferrite



Duty cycle – 50%  
Frequency - 50hz - 5000hz  
Core – **Ferrite**

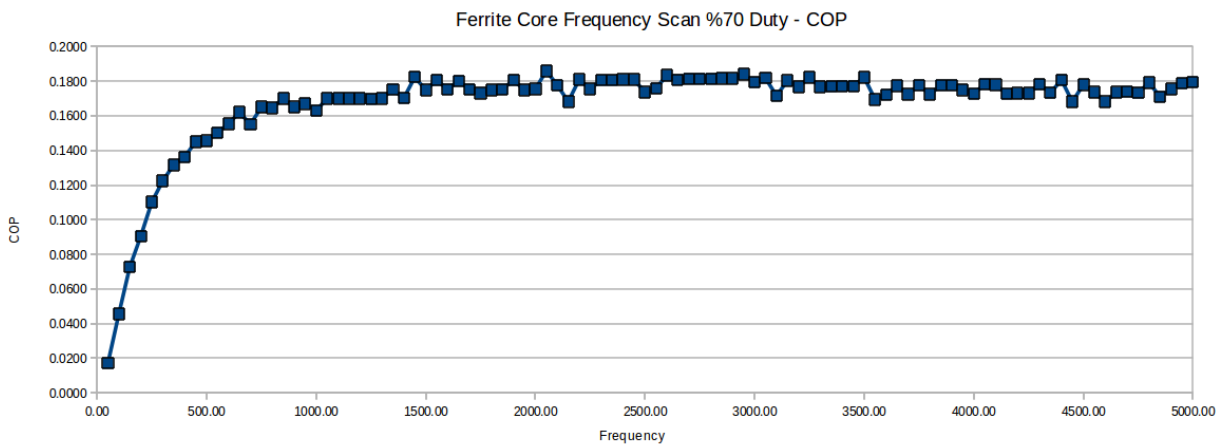
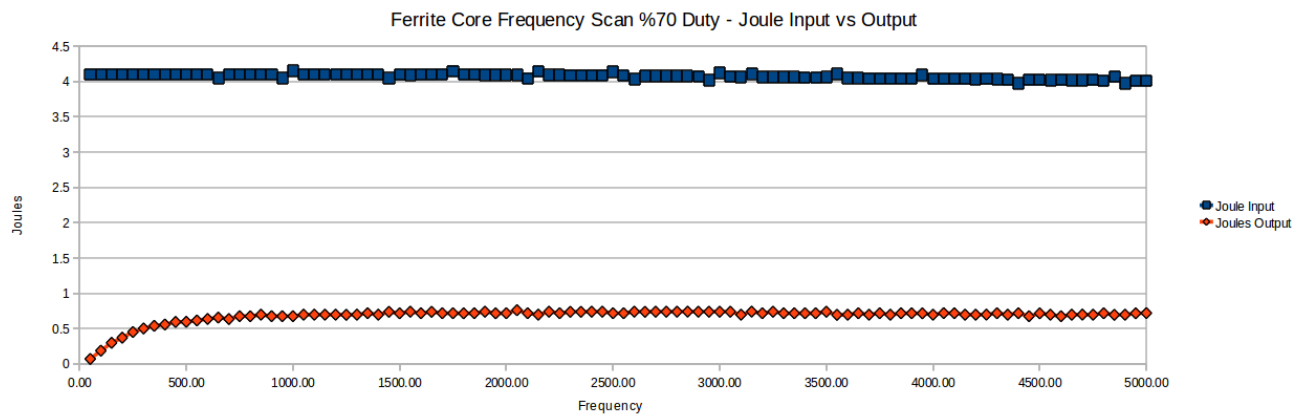
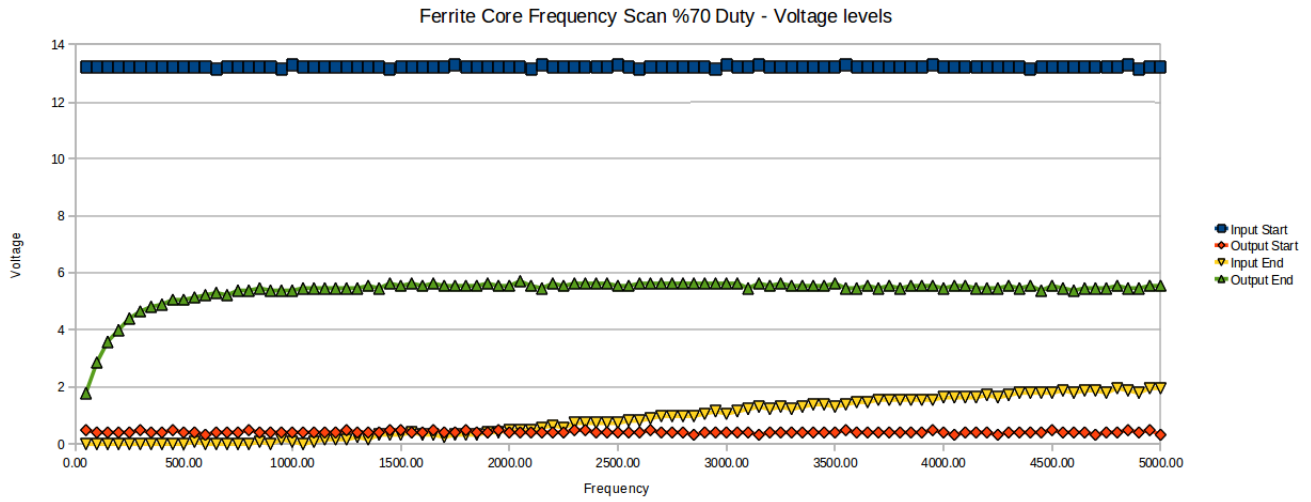


Duty cycle – 60%  
Frequency - 50hz - 5000hz  
Core – Ferrite

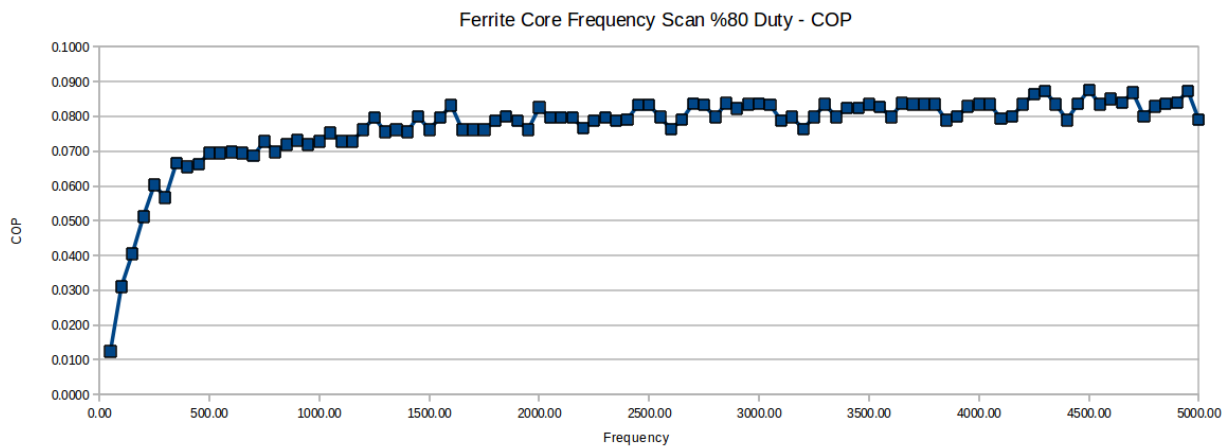
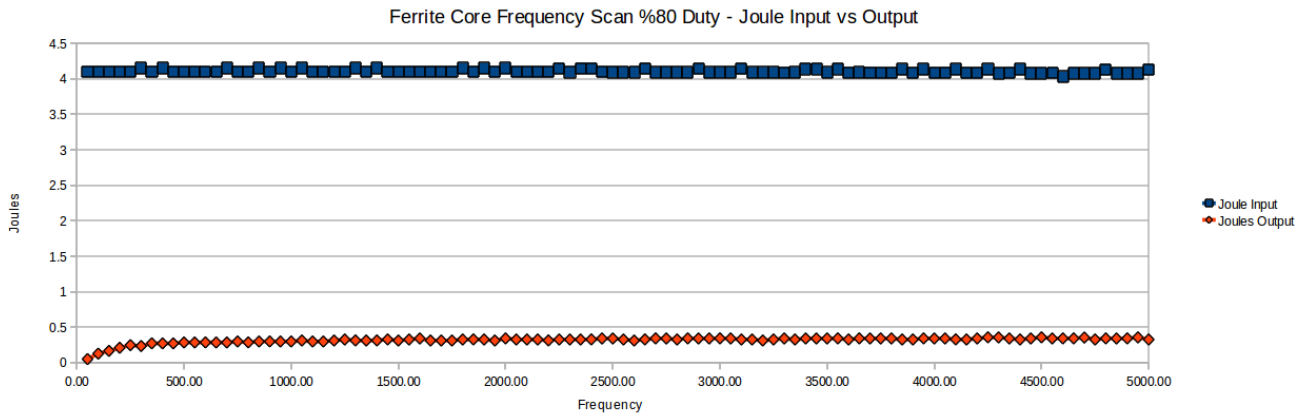
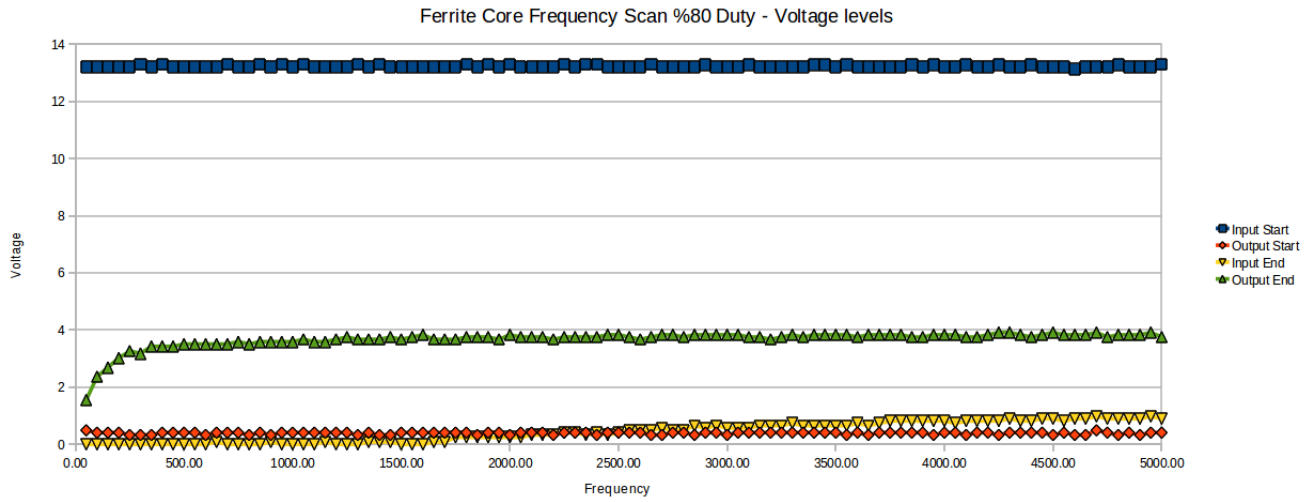




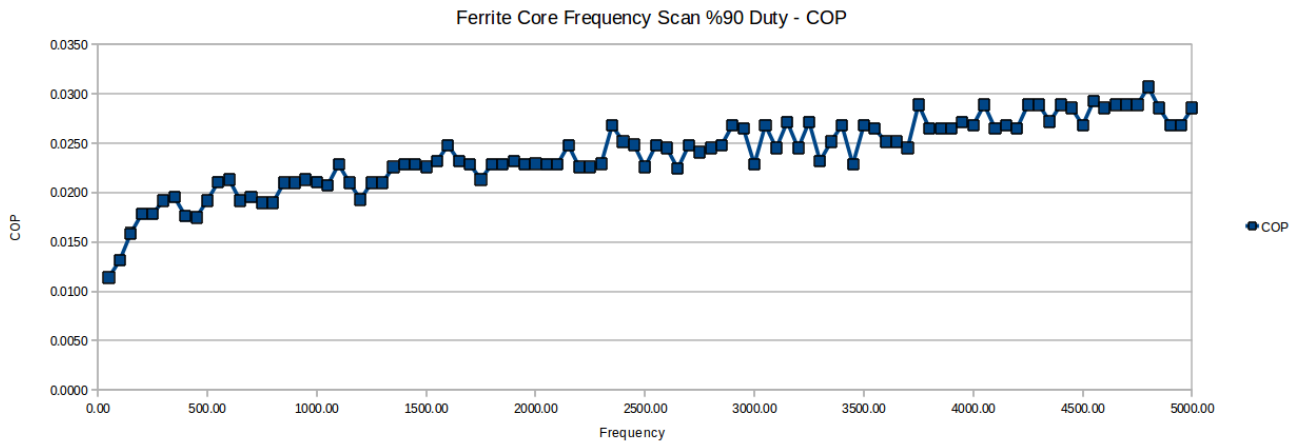
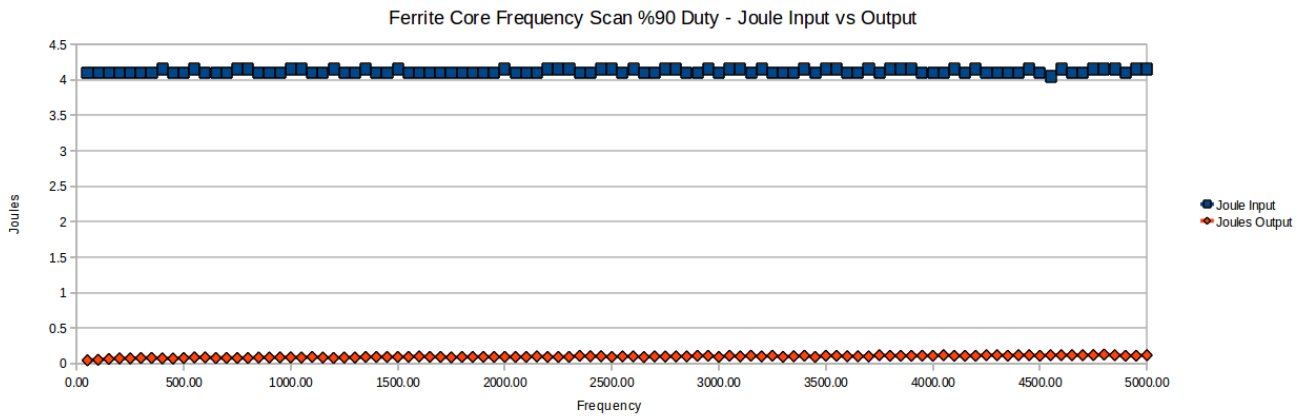
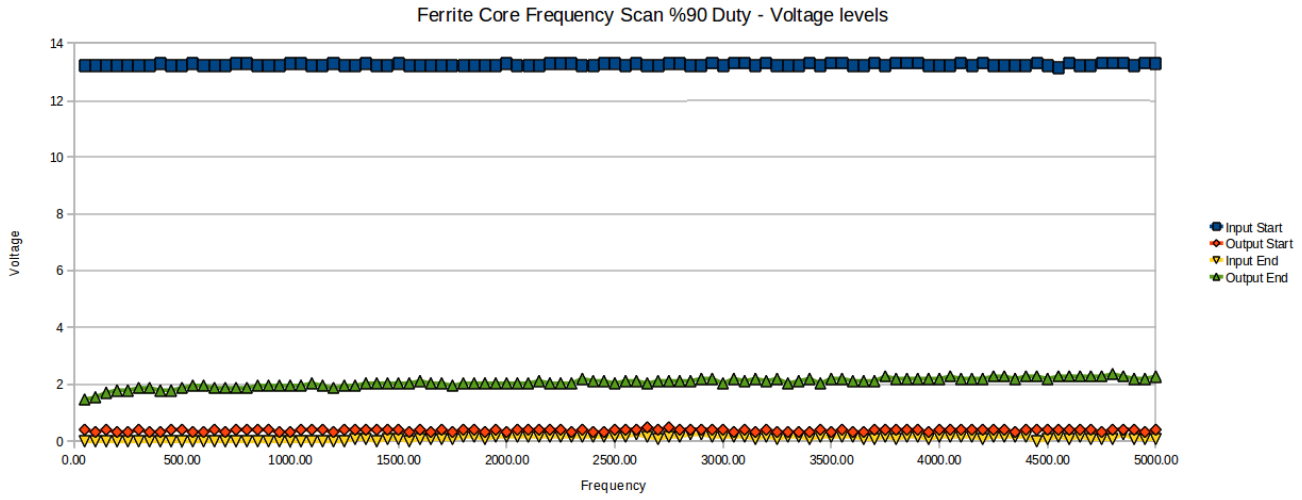
Duty cycle – 70%  
Frequency - 50hz - 5000hz  
Core – **Ferrite**



Duty cycle – 80%  
Frequency - 50hz - 5000hz  
Core – **Ferrite**



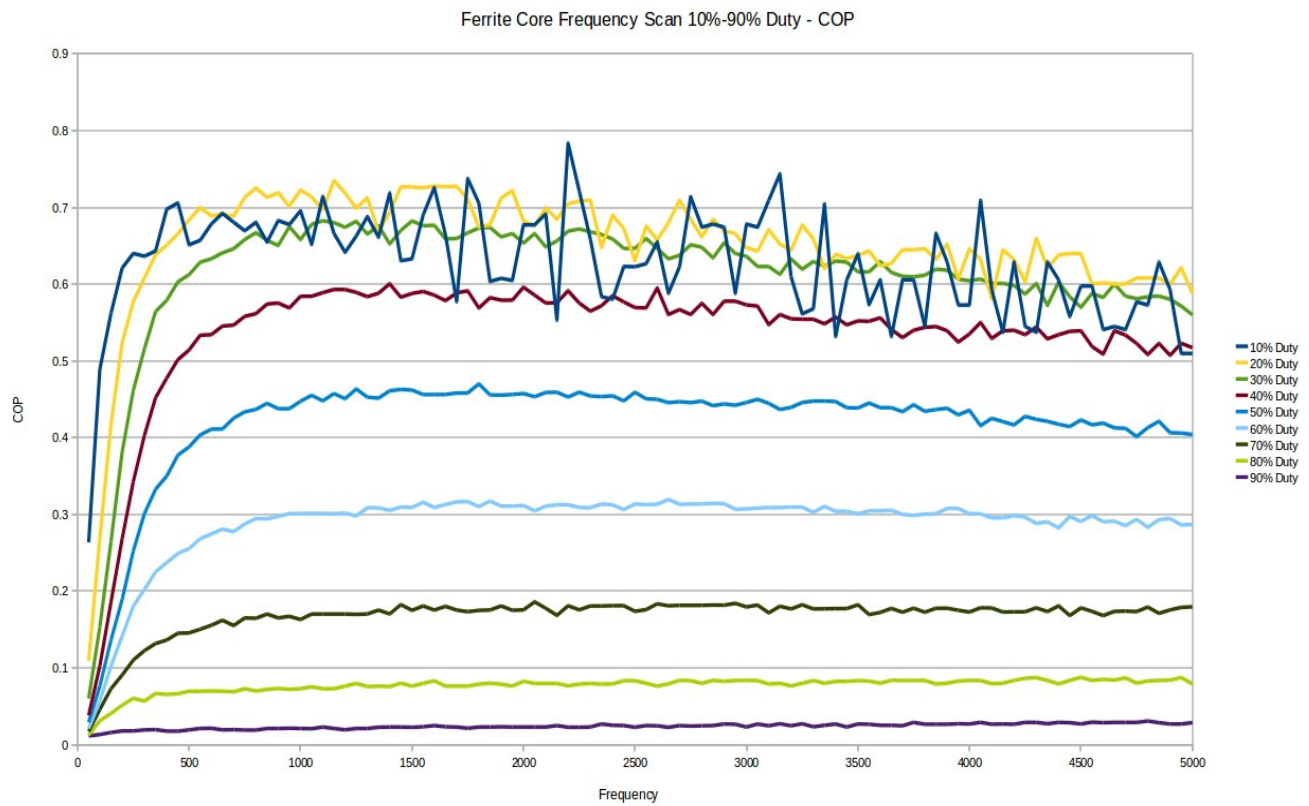
Duty cycle – 90%  
Frequency - 50hz - 5000hz  
Core – **Ferrite**



# Duty cycle – 10% - 90% Comparison of COP

Frequency - 50hz - 5000hz

Core – **Ferrite**



# Core comparisons

Taking the best results of each core.

Air: 10%

Welding Rods: 20%

Neo North up: 20%

Neo South up: 20%

Ferrite: 10%

Ferrite: 20%

(I put both 10% and 20% in Ferrite because of the sporadic nature of the 10% run)

