

First video is about testing gradient coil and selecting proper push pull frequency
<https://www.youtube.com/watch?v=ObQFTTJimuI&t=1978s>

1. short coil and use current sensor (coil will be in $\frac{1}{2}$ wave mode)
2. signal generator connected to inductor, sine, 10vpp
3. max found on 910Khz
4. push pull will work on sub harmonic e.g. 91khz
5. use hand too check amplitude, it grow in range 830-1100khz
6. second maximum 4.62-4.63Mhz
7. use hand too check amplitude, it decrease
8. some more maximums on HF, but we will not use them
9. use FFT to check first range
10. to see sub-harmonics change SG to meander
11. we are looking now for frequency in range 83-110khz which gives max amplitude in 4.62-4.63Mhz
12. first 84.2khz, some extra peaks
13. second 87.4khz, some extra peaks
14. third 90.8khz, very clear
15. forth 94.5khz, also good (no strong sub harmonics)
16. 3 more matches but also with strong sub harmonics
17. so we have two good candidates 90.8 and 94.5
18. now check first range 830-1100khz
19. 90.8 - cause 1Mhz also
20. 94.5 – also some but not so good, so choosing 90.8khz
21. check with beatings 91khz, 910khz, 4.63mhz (all meander)
all give similar pictures
22. 4.63Mhz with sine – smaller amplitude but same “fish” like pictures
23. we can find frequency of modulation signal 32.47hz
24. I tried this with push pull, coil gets quite hot 45C without load
25. push pull frequency should be sub harmonic of 91khz
to avoid transistors damage by Tesla coil pulses
26. e.g. 45khz or 30khz
27. push pull consumption 3a 24v without Tesla coil
1a 24v with Tesla coil on

Looking for Tesla coil frequency

<https://www.youtube.com/watch?v=v6FrGTF731o&t=1646s>

1. we need test gradient coil under load (small lamp)
2. special Tesla coil with leads every 1cm about 20
3. Tesla wound CCW
4. using kacher
5. need ability to move inductor
6. use grounding, same as later for system run
here 20m grounding cable
7. scope probe 20cm distance
8. PSU 24v
9. connect 0.1-1uf capacitor to inductor to avoid interference
or just short it
10. ground to gradient coil
11. notice E field amplitude change with ground connected (range became smaller)
12. find length of Tesla where amplitude is maximum

13. frequency around 1.35Mhz, lead 15-16 gives maximum
14. use inductor position for fine tuning
15. power consumption decrease
16. can use diode bridge and use voltmeter for better tuning
17. for verification connect shorter antenna and recheck
should be same frequency
18. how Tesla coil length depends on gradient coil ?
 - use same length or half if higher frequency needed
 - length of antenna should be matched to Tesla coil frequency
(wave resonance, max E field)
19. for this coil I use push pull frequency 18.1 khz (90.8/5)
20. some people use interferenc on TL494 for modulation, not very good idea