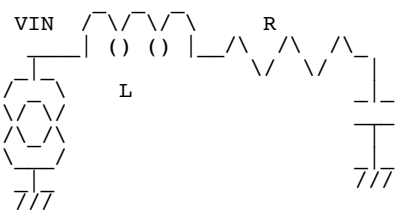
Need_For_Short_Leads

* dsauersanjose@aol.com 8/15/08
* www.idea2ic.com
* http://www.idea2ic.com/PlayWithJavascript/Calc_Inductor_Loop.html
*
*



L_H = Num^2*R*uo*(ln(8*R/a)-2.0)
For a 1mm radius single wire loop

R	Inductance
1cm	30nH
3mm	0.1nH

```
IIN       VIN     0       DC     0 AC 1
L         VIN     VR      30n
R         VR      VC      1m
RP        VIN     0       1MEG
C         VC      0       .1u
```

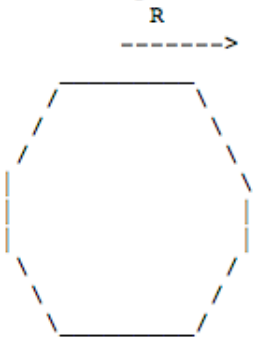
```
.control
ac dec 100 10k 100Meg
plot      mag(vin) loglog title 30nH

alter L  inductance = .1n
ac dec 100 10k 100Meg
plot      mag(vin) loglog title 0.1nH

.endc
.end
```

==========END_OF_SPICE==========

Is that capacitor stabilizing the output of your power amplifier really a capacitor? If your not carefull in your PC board layout, you may actually be stablizing your output stage with and inductor.

1	NumberTurns	
1	Mu_r Air =1	
1	Coil Radius centimeters	
1	Wire Radius millimeters	
29.931593880658113	nanoHenry	Calculate Inductance...

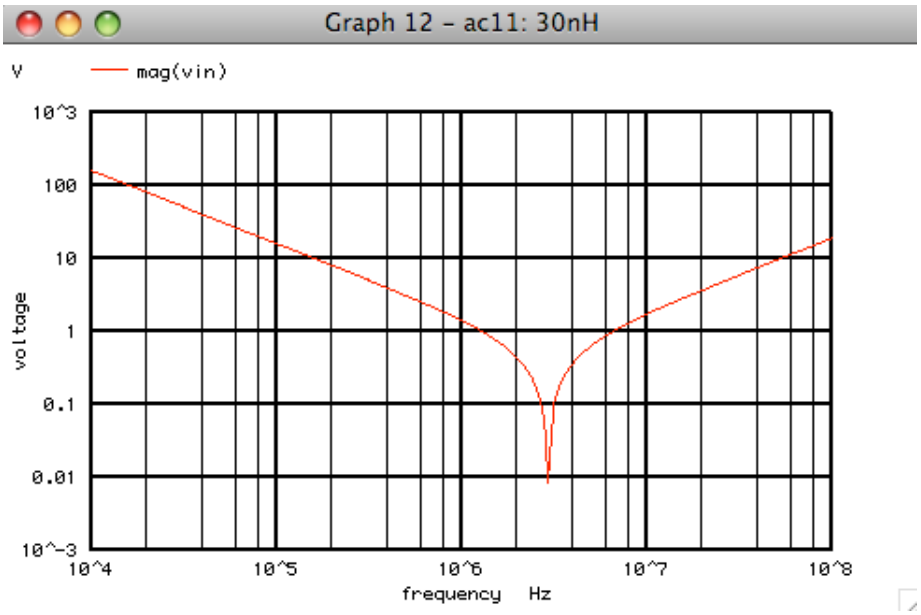
inductance for Loop..



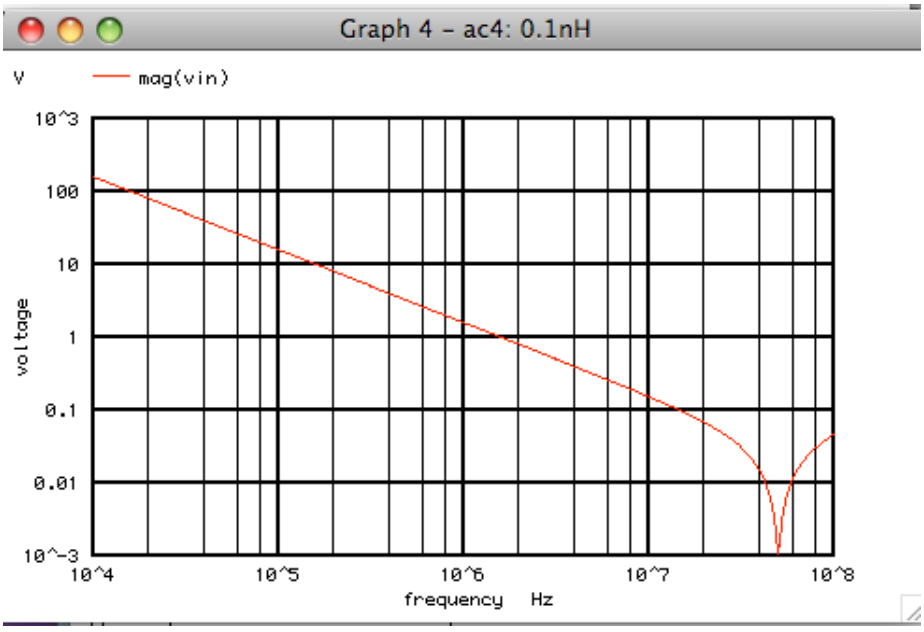
$$L_H = Num^2*R_m*ur*uo*(ln(8*R_m/a_m)-2.0)$$
$$mu_0 = 4*pi*1E-7_H/m$$

The javascript calculator used to find inductance is given below.

http://www.idea2ic.com/PlayWithJavascript/Calc_Inductor_Loop.html



The above javascript will show that if the short lead rule is not applied, it is not a capacitor but rather an inductor above a few MegHz. In the case of the LM383, things start to get unstable at 120nH of stray inductance.



Making leads as small as possible can greatly reduce the stray inductance. Current flows in loops and inductance is just how much of a magnetic field a loop of wire can produce. Above a few hundred megHz, components need now to be understood in terms of maxwell's equations.

***#1=============WinSpiceVersion=================**

```
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*
*             _  _  _
*       VIN  / \/ \/ \     R                L_H = Num^2*R*uo*(ln(8*R/a)-2.0)
*        ____| () () |__/\  /\  /\_         For a 1mm radius single wire loop
*       _|_               \/  \/   |
*      / _ \    L                 _|_       W    L      Inductance
*      \/ \/                      ___       1cm  1cm    30nH
*      /\_/\                       |        3mm  3mm    0.26nH
*      \___/                      _|_
*       _|_                       ///
*       ///


IIN       VIN    0      DC    0 AC 1
L         VIN    VR     30n
R         VR     VC     1m
RP        VIN    0      1MEG
C         VC     0      .1u


.control
ac dec 100 10k 100Meg
plot     mag(vin) loglog title 30nH

alter L  inductance = .26n
ac dec 100 10k 100Meg
plot     mag(vin) loglog title 0.26nH

.endc
.end
```