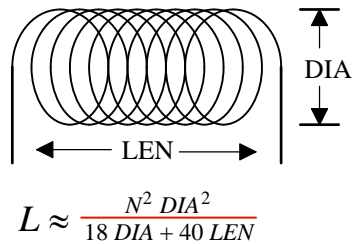


RF Inductors

Recall inductor impedance is given by $Z_L(\omega) = j\omega L = jX_L$ where $X_L = 2\pi fL$

Classic Solenoid (Air Core)

Create inductor by wrapping magnet wire around an appropriate size form (such as a drill bit).



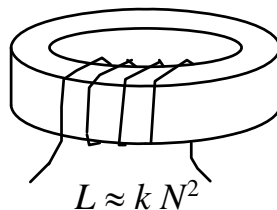
where L is in uH, DIA, LEN are in inches, and N is the number of turns

Example: DIA = 0.2" LEN = 1" N = 10 \Rightarrow L = 0.092uH = 92 nH $X_L = 58\Omega$ @ 100MHz

NOTE: Experience in EECE662 indicates that this formula gives an L that may be in error by up to 30% for small L values (possibly because the user did not account for extra "lead inductance" on the PC board).

Toroid with Magnetic Core

Create inductor with magnet wire wrapped around an appropriate toroid form.



where k is a constant (determined by the core material/size) and N is the number of turns. The constant k is sometimes given in nH/turn², but is often quoted as the inductance for a given number of turns (e.g. uH for 100 turns).

Example: T37-2 core (0.37" outside diameter, number 2 material) with 10 turns.

For this core, $k = 4\text{nH/turn}^2$ ($\pm 10\%$).

Hence, L = 400 nH and $X_L = 250 \text{ Ohms}$ @ 100 MHz.