Single-Layer Helical Round Wire Coil Inductor Calculator

ENTER: http://hamwaves.com/antennas/inductance.html

2 selfs filament GS-35b
VHF ou UHF

28 spires de 12/10 mm émaillé
bobinées jointives
sur diamètre 7.5 mm

~1.23 µH mesuré au LCmetre

D	= 8.7	mm	**Mean diameter** of the air core coil, *measured from wire centre to wire centre* ***(internal diameter + 1 x wire diameter)***
N	= 28		Number of turns
ℓ	= 34	mm	Lenght of the coil, *measured from the connecting wires **centre to centre***
d	= 1.2	mm	Wire or tubing diameter
Cu, annealed			Plating material
ρ	= 17.241	nΩ·m	Plating conductivity
μ_r	= 0.99999044		Plating permeability
f	= 144.2	MHz	Design frequency

Calculate Clear

INTERMEDIATE RESULTS:

p	= 1.2142	mm	Winding pitch
Φ	= 3.99612		Proximity factor according to empirical Medhurst data
D_{eff}	= 8.1002	mm	Effective coil diameter according to Stroobandt (see below)
Correction factors:			
k_L	= 0.905929		Field non-uniformity correction factor according to Lundin
k_s	= 0.545018		Round wire self-inductance correction factor according to Rosa
k_m	= 0.306212		Round wire mutual-inductance correction factor according to Grover and Knight
Wire:			
$\ell_{wire, phys}$	= 766.046	mm	Physical wire length
$\ell_{wire, eff}$	= 713.349	mm	Effective wire length
δ_i	= 5.50326	µm	Skin depth at design frequency
Sheath helix waveguide mode:			
ψ	= 2.73189	°	Effective pitch angle
β	= 29.6826	rad/m	Axial propagation factor of n=0 sheath helix waveguide mode at design frequency
Z_c	= 1331.34	Ω	Characteristic impedance of n=0 sheath helix waveguide mode at design frequency

RESULTS:

$L_{eff,s}$	= 1.99451	µH	Effective series inductance ***at design frequency*** Corum & Corum's helix *waveguide formula*, corrected for field non-uniformity
$X_{eff,s}$	= 1807.10	Ω	Effective series reactance of round wire coil **at design frequency**
$R_{eff,s}$	= 2.29484	Ω	Effective series AC resistance of round wire coil **at design frequency**
$Q_{eff,ul}$	= 787.460		Effective unloaded quality factor of round wire coil **at design frequency**
Lumped circuit equivalent:			
L_s	= 1.23149	µH	*Frequency-independent* series inductance from the current-sheet coil *geometrical formula*, corrected for field non-uniformity
$X_{L,s}$	= 1115.77	Ω	Series reactance of round wire coil
$R_{L,s}$	= 0.87486	Ω	Series AC resistance of round wire coil at design frequency
$Q_{L,ul}$	= 1275.36		Unloaded quality factor of round wire coil at design frequency
$C_{L,p}$	= 0.37842	pF	Parallel stray capacitance at design frequency
Self-resonant frequency:			
$f_{res,L}$	= 204.419	MHz	λ/4 (parallel) self-resonant frequency

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Self accord GS-35b VHF

6 spires de 1.7 mm nu bobinées
sur diamètre 8 mm
longueur hors tout 23.5 mm

~0.12 µH mesuré au LCmetre

D	= 9.7	mm	**Mean diameter** of the air core coil, *measured from wire centre to wire centre* ***(internal diameter + 1 x wire diameter)***
N	= 6		Number of turns
ℓ	= 22	mm	Lenght of the coil, *measured from the connecting wires* ***centre to centre***
d	= 1.7	mm	Wire or tubing diameter
Cu, annealed			Plating material
ρ	= 17.241	nΩ·m	Plating conductivity
μ_r	= 0.99999044		Plating permeability
f	= 144.2	MHz	Design frequency

Calculate Clear

Nota: Le fil diamètre 1.7 mm nu est du fil d'installation électrique monobrin de 2.5 mm2, dont on retire l'isolant.

INTERMEDIATE RESULTS:

p	= 3.6666	mm	Winding pitch
Φ	= 1.69934		Proximity factor according to empirical Medhurst data
D_{eff}	= 9.3040	mm	Effective coil diameter according to Stroobandt (see below)
Correction factors:			
k_L	= 0.842391		Field non-uniformity correction factor according to Lundin
k_s	= -0.211801		Round wire self-inductance correction factor according to Rosa
k_m	= 0.232947		Round wire mutual-inductance correction factor according to Grover and Knight
Wire:			
$\ell_{wire, phys}$	= 184.159	mm	Physical wire length
$\ell_{wire, eff}$	= 176.752	mm	Effective wire length
δ_i	= 5.50326	µm	Skin depth at design frequency
Sheath helix waveguide mode:			
ψ	= 7.15002	°	Effective pitch angle
β	= 9.91313	rad/m	Axial propagation factor of n=0 sheath helix waveguide mode at design frequency
Z_c	= 638.616	Ω	Characteristic impedance of n=0 sheath helix waveguide mode at design frequency

RESULTS:

$L_{eff,s}$	= 0.13084	µH	Effective series inductance ***at design frequency*** Corum & Corum's helix *waveguide formula*, corrected for field non-uniformity
$X_{eff,s}$	= 118.548	Ω	Effective series reactance of round wire coil **at design frequency**
$R_{eff,s}$	= 0.14730	Ω	Effective series AC resistance of round wire coil **at design frequency**
$Q_{eff,ul}$	= 804.783		Effective unloaded quality factor of round wire coil **at design frequency**
Lumped circuit equivalent:			
L_s	= 0.11703	µH	*Frequency-independent* series inductance from the current-sheet coil *geometrical formula*, corrected for field non-uniformity
$X_{L,s}$	= 106.033	Ω	Series reactance of round wire coil
$R_{L,s}$	= 0.11784	Ω	Series AC resistance of round wire coil at design frequency
$Q_{L,ul}$	= 899.771		Unloaded quality factor of round wire coil at design frequency
$C_{L,p}$	= 1.09887	pF	Parallel stray capacitance at design frequency
Self-resonant frequency:			
$f_{res,L}$	= 712.403	MHz	λ/4 (parallel) self-resonant frequency

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D	= 8.7	mm	**Mean diameter** of the air core coil, *measured from wire centre to wire centre* ***(internal diameter + 1 x wire diameter)***
N	= 28		Number of turns
ℓ	= 34	mm	Lenght of the coil, *measured from the connecting wires* ***centre to centre***
d	= 1.2	mm	Wire or tubing diameter
Cu, annealed			Plating material
ρ	= 17.241	nΩ·m	Plating conductivity
μ_r	= 0.99999044		Plating permeability
f	= 432.5	MHz	Design frequency

Calculate | Clear

INTERMEDIATE RESULTS:

p	= 1.2142	mm	Winding pitch
Φ	= 3.99612		Proximity factor according to empirical Medhurst data
D_{eff}	= 8.1002	mm	Effective coil diameter according to Stroobandt (see below)
Correction factors:			
k_L	= 0.905929		Field non-uniformity correction factor according to Lundin
k_s	= 0.545018		Round wire self-inductance correction factor according to Rosa
k_m	= 0.306212		Round wire mutual-inductance correction factor according to Grover and Knight
Wire:			
$\ell_{wire, phys}$	= 766.046	mm	Physical wire length
$\ell_{wire, eff}$	= 713.349	mm	Effective wire length
δ_i	= 3.17768	µm	Skin depth at design frequency
Sheath helix waveguide mode:			
ψ	= 2.73189	°	Effective pitch angle
β	= 126.240	rad/m	Axial propagation factor of n=0 sheath helix waveguide mode at design frequency
Z_c	= 808.971	Ω	Characteristic impedance of n=0 sheath helix waveguide mode at design frequency

RESULTS:

$L_{eff,s}$	= 0.48227	µH	Effective series inductance ***at design frequency*** Corum & Corum's helix *waveguide formula*, corrected for field non-uniformity
$X_{eff,s}$	= 1310.56	Ω	Effective series reactance of round wire coil **at design frequency**
$R_{eff,s}$	= 3.96660	Ω	Effective series AC resistance of round wire coil **at design frequency**
$Q_{eff,ul}$	= 330.400		Effective unloaded quality factor of round wire coil **at design frequency**
Lumped circuit equivalent:			
L_s	= 1.23149	µH	*Frequency-independent* series inductance from the current-sheet coil *geometrical formula*, corrected for field non-uniformity
$X_{L,s}$	= 3346.54	Ω	Series reactance of round wire coil
$R_{L,s}$	= 25.8652	Ω	Series AC resistance of round wire coil at design frequency
$Q_{L,ul}$	= 129.384		Unloaded quality factor of round wire coil at design frequency
$C_{L,p}$	= -0.1708	pF	Parallel stray capacitance at design frequency
Self-resonant frequency:			
$f_{res,L}$	= 204.419	MHz	λ/4 (parallel) self-resonant frequency