

Screen Shot 1 : copy of Excel FEMM v1p28.xlsm

In the spread sheet (copy below) entered following coil parameters of the sample coil delivered with LDC1612EVM:

Capacitor = 330 pf

Coil Dia = 13.9 mm,

No of Turns = 19

Layers = 2

Trace width = 0.15 mm

Trace distance : 0.15mm

Space Between Layer 1 and 2 = 1.6mm

Inductance Inner diameter is automatically set to 8.201 mm

I am not able to change coil fill ratio and Inductance Inner Diameter, as these cells are protected.

Please see error message in the last two rows in the table.

Request to rectify error in the entry , if any.

For full functionality, FEMM should be installed. Get [FEMM](http://www.femm.info) www.femm.info

LC Sensor calculations				
LDC Device		LDC1612/4		
Operating temperature	T	25	°C	Enter operating temperature
Sensor capacitance	C	330.0	pF	Select LC tank capacitance
Layers	M	2	Layers	Number of layers on PCB board (1≤M≤8)
Turns (per layer)	N	19	Turns	Number of turns per layer
Outer diameter of the inductor	d _{out}	13.90	mm	Outer Diameter of the spiral inductor
Sensor Shape		Circular		
Long side of inductor	d _L	20.00	mm	
spacing between traces	S	0.150	mm	Space between traces (mm or mil)
width of trace	w	0.150	mil	Width of the trace (mm or mil)
PCB thickness between 1st layer and 2nd lay	h12	1.600	mm	Space between layer 1 and 2 (mm or mil)
PCB thickness between 2nd layer and 3rd lay	h23	8.000	mm	Space between layer 2 and 3 (mm or mil)
PCB thickness between 3rd layer and 4th lay	h34	8.000	mm	Space between layer 3 and 4 (mm or mil)
PCB thickness between 4th layer and 5th lay	h45	8.000	mm	Space between layer 4 and 5 (mm or mil)
PCB thickness between 5th layer and 6th lay	h56	8.000	mm	Space between layer 5 and 6 (mm or mil)
PCB thickness between 6th layer and 7th lay	h67	8.000	mm	Space between layer 6 and 7 (mm or mil)
PCB thickness between 7th layer and 8th lay	h78	88.000	mm	Space between layer 7 and 8 (mm or mil)
Copper thickness	t	1.000	oz-Cu	Copper layer thickness (mm,oz-Cu, or mil)
Conductor Resistivity (at 20°C)	pr	1.68E-08	Ωm	Use 1.68e-08 for Copper
Conductor Resistivity temperature coef	pr_tc	0.393	%/°C	Use 0.393 for Copper
Conductor relative permeability	μ _r	1.00		Use 1.0 for Copper
Parasitic capacitance	C _{par}	4.0	pF	Estimate - generally in the range of 1 to 5 pf
Copper resistivity at operating temperature	pr_t	1.713E-08	Ωm	
Coil Fill Ratio	d _{in} /d _{out}	0.59		0.2 > 0.8 is recommended
Inductor inner diameter	d _{in}	8.201	mm	Inner diameter of the spiral inductor (mm or mil)
Self inductance per layer	L	5.687	μH	
Total Inductance with no target	L _{TOTAL}	16.936	μH	
Sensor Operating Frequency no tar	f _{RES}	2.116	MHz	
Rp with no Target	R _p	0.21	kΩ	
Q factor	Q	0.92		
Self resonant frequency (estimated)	SRF	19.337	MHz	SRF must be >1.25*F _{sensor}
Target Material		Aluminum, 6061-T6		Select Air for No Target
Other target material - enter here & select above		enter here		Enter exactly as named in FEMM materials library
Target Thickness		2.000	mm	
Target Distance	D	1.000	mm	
Sensor Inductance from Target	L'	12.498	μH	
Sensor Frequency with Target I	f _{RES'}	2.463	MHz	
Rp with Target Iteration	R _{p'}	0.15	kΩ	Sensor Rp is too low - try a lower C or higher L
Q Factor with target	Q'	0.8		Sensor Q is too low