

Screen Shot 2 copy of Excel FEMM v1p28.xlsm

In the spread sheet 1 (copy below), I have 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 2.5mm. (This happened next day I opened the sheet again)

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

Now there is no error message. Please verify, whether following calculated parameters tally with the Sample coil supplied with the LSC1612 EVM?

Sensor Frequency with no Target = 3.712 MHz, Total Inductance with no target = 7.535 μ H, R_p with no target = 4.58 K Ω , Q= 30.13

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	17.40	mm	
spacing between traces	S	0.150	mm	Space between traces (mm or mil)
width of trace	w	0.150	mm	Width of the trace (mm or mil)
PCB thickness between 1st layer and 2nd layer	h12	1.600	mm	Space between layer 1 and 2 (mm or mil)
PCB thickness between 2nd layer and 3rd layer	h23	0.533	mm	Space between layer 2 and 3 (mm or mil)
PCB thickness between 3rd layer and 4th layer	h34	0.533	mm	Space between layer 3 and 4 (mm or mil)
PCB thickness between 4th layer and 5th layer	h45	8.000	mm	Space between layer 4 and 5 (mm or mil)
PCB thickness between 5th layer and 6th layer	h56	8.000	mm	Space between layer 5 and 6 (mm or mil)
PCB thickness between 6th layer and 7th layer	h67	8.000	mm	Space between layer 6 and 7 (mm or mil)
PCB thickness between 7th layer and 8th layer	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	Ω m	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 rage of 1 to 5 pf
Copper resistivity at operating temperature	pr_t	1.713E-08	Ω m	
Coil Fill Ratio	d _{in} /d _{out}	0.18		0.2> >0.8 is recommended
Inductor inner diameter	d _{in}	2.500	mm	Inner diameter of the spiral inductor (mm or mil)
Self inductance per layer	L	2.530	μ H	
Total Inductance with no target	L _{TOTAL}	7.535	μ H	
Sensor Operating Frequency no target	f _{RES}	3.172	MHz	
R_p with no Target	R _p	4.58	k Ω	
Q factor	Q	30.13		
Self resonant frequency (estimated)	SRF	28.989	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		1.000	mm	
Target Distance	D	1.000	mm	
Sensor Inductance from Target Interaction	L'	5.561	μ H	
Sensor Frequency with Target Interaction	f' _{RES}	3.693	MHz	
R_p with Target Interaction	R' _p	3.28	k Ω	
Q Factor with target	Q'	25.2		