CLAIMS

What is claimed is:

1. A low pass filter comprising:

a first dominant inductor having a first end and a second end;

a second dominant inductor having a first end and a second end, wherein the second end of the first dominant inductor is electrically connected to the second end of the second dominant inductor;

a first capacitor electrically coupled between the first end of the first dominant inductor and the first end of the second dominant inductor;

a first shunt capacitor electrically coupled between the first end of the first dominant inductor and a ground potential; and

a second shunt capacitor electrically coupled between the first end of the second dominant inductor and the ground potential,

wherein the first dominant inductor and the second dominant inductor are ~~further coupled by one or both of~~ configured for magnetic coupling therebetween~~and parasitic mutual capacitive coupling~~.

2. The low pass filter in accordance with Claim 1 further comprising a second capacitor coupled between a node connecting the second end of the first dominant inductor to the second end of the second dominant inductor and the ground potential for the low pass filter to have a response of an elliptical filter with one or more zero points generated in a stopband of the low pass filter.

3. The low pass filter in accordance with Claim 1 or Claim 2 wherein a value of either or both of the first shunt capacitor and the second shunt capacitor is determined in response to performance of the low pass filter in the stopband.

4. The low pass filter in accordance with any of Claim 1, Claim 2 or Claim 3 further comprising:

an input inductor coupled between an input port and the first end of the first dominant inductor; and

an output inductor coupled between an output port and the first end of the second dominant inductor,

wherein either the input inductor and the output inductor or the input port and the output port are electrically coupled by parasitic mutual capacitance.

5. The low pass filter in accordance with any of the foregoing claims wherein a value of the first dominant inductor is equal to a value of the second dominant inductor.

6. The low pass filter in accordance with any of Claims 1 to 4 wherein a value of the first dominant inductor is not equal to a value of the second dominant inductor.

7. The low pass filter in accordance with Claim 4 further comprising a load coupled between the input port and the output port.

8. The low pass filter in accordance with Claim 7 wherein the input port and the output port coupled to the load selected from the group consisting of a fifty ohm load and other kinds of loads or circuits.

9. The low pass filter in accordance with any of the foregoing claims wherein any of the first dominant inductor, the second dominant inductor, the input inductor, the output inductor, the first capacitor, the second capacitor, the first shunt capacitor or the second shunt capacitor has a form selected from the group consisting of an inductor in series with a resistor, a capacitor in series with a resistor, and any combination of an inductor in series with a resistor and a capacitor in series with a resistor.

10. An integrated circuit low pass filter comprising:

a first dominant inductor having a first end and a second end;

a second dominant inductor having a first end and a second end, wherein the second end of the first dominant inductor is electrically connected to the second end of the second dominant inductor;

a first capacitor electrically coupled between the first end of the first dominant inductor and the first end of the second dominant inductor;

a first shunt capacitor electrically coupled between the first end of the first dominant inductor and a ground potential;

a second shunt capacitor electrically coupled between the first end of the second dominant inductor and the ground potential; and

a second capacitor coupled between a node connecting the second end of the first dominant inductor to the second end of the second dominant inductor and the ground potential,

wherein the first dominant inductor and the second dominant inductor are ~~further coupled by one or both of~~ configured for magnetic coupling therebetween~~and parasitic mutual capacitive coupling~~, and wherein the integrated circuit low pass filter has a response of an elliptical filter with one or more zero points generated in a stopband of the integrated circuit low pass filter.

11. The integrated circuit low pass filter in accordance with Claim 10 wherein the first dominant inductor and the second dominant inductor have substantially similar dimensions.

12. The integrated circuit low pass filter in accordance with Claim 10 wherein the first dominant inductor and the second dominant inductor do not have similar dimensions.

13. The integrated circuit low pass filter in accordance with any of Claims 10 to 12 wherein the first dominant inductor and the second dominant inductor comprise a structure selected from the groups consisting of high impedance transmission lines, on-chip spiral inductors, and differential inductors.

14. The integrated circuit low pass filter in accordance with any of Claims 10 to 13 wherein the first dominant inductor and the second dominant inductor are implemented on one metal layer.

15. The integrated circuit low pass filter in accordance with any of Claims 10 to 13 wherein the first dominant inductor and the second dominant inductor are implemented on two metal layers or multiple metal layers and either overlap or partially-overlap.

16. The integrated circuit low pass filter in accordance with any of Claims 10 to 15 further comprising an input inductor coupled between an input port and the first end of the first dominant inductor, wherein the input inductor and the first dominant inductor are implemented on either the same metal layer, two metal layers or multiple metal layers.

17. The integrated circuit low pass filter in accordance with any of Claims 10 to 16 further comprising an output inductor coupled between an output port and the first end of the second dominant inductor, wherein the output inductor and the second dominant inductor are implemented on either the same metal layer, two metal layers or multiple metal layers.

18. The integrated circuit low pass filter in accordance with Claim 13 wherein the structure of either or both of the first dominant inductor and the second dominant

inductor comprise on-chip spiral inductors comprising spiral metal layers wherein a shape of the spiral metal layers is selected from the group consisting of rectangular, octagonal, circular, hexagonal and any other shape.

19. The integrated circuit low pass filter in accordance with any of Claims 10 to 18 comprising structure implemented in semiconductor technologies selected from the group consisting of CMOS, GaAs, SiGe, InP and ceramic technologies.

20. An integrated circuit low pass filter comprising multiple low pass filter circuit structures, each having an input port and an output port, wherein the multiple low pass filter circuit structures are cascaded up to N stages, where N is an integer equal to or larger than one, by coupling an output port of one structure to an input port of another structure through a device selected from the group consisting of transmission lines and inductors, each multiple low pass filter circuit structure comprising:

a first dominant inductor having a first end and a second end;

a second dominant inductor having a first end and a second end, wherein the second end of the first dominant inductor is electrically connected to the second end of the second dominant inductor;

a first capacitor electrically coupled between the first end of the first dominant inductor and the first end of the second dominant inductor;

a first shunt capacitor electrically coupled between the first end of the first dominant inductor and a ground potential;

a second shunt capacitor electrically coupled between the first end of the second dominant inductor and the ground potential;

an input inductor coupled between the input port and the first end of the first dominant inductor;

an output inductor coupled between the output port and the first end of the second dominant inductor; and

a second capacitor coupled between a node connecting the second end of the first dominant inductor to the second end of the second dominant inductor and the ground potential,

wherein the first dominant inductor and the second dominant inductor are configured for magnetic coupling therebetween, and wherein the low pass filter structure has a response of an elliptical filter with one or more zero points generated in a stopband of the low pass filter structure.

21. The integrated circuit low pass filter in accordance with Claim 20 wherein the multiple low pass filter circuit structures comprise lumped elements including parasitic elements, the parasitic elements comprising frequency dependent lumped element capacitors, resistors and inductors.