## Claims

What is claimed:

1. A band-pass filter including a plurality of frequency band channels each having ~~a~~ first and second balanced ports and first and second unbalanced ports, each frequency band channel comprising:

a first ~~inductor~~ split-ring resonator having a first end terminal coupled to the first balanced port and a second end terminal coupled to the second balanced port, the first end terminal and the second end terminal of the first split-ring resonator defining a first gap in the first split-ring resonator;

a first capacitor coupled between the first and second terminals of the first ~~inductor~~ split-ring resonator;

a second ~~inductor~~ split-ring resonator having a first end terminal coupled to the first unbalanced port and a second end terminal coupled to the second unbalanced port, the second ~~inductor~~ split-ring resonator being disposed within a first distance of the first ~~inductor~~ split-ring resonator to induce magnetic coupling between the first and second ~~inductors~~ split-ring resonators, the first end terminal and the second end terminal of the second split-ring resonator defining a second gap in the second split-ring resonator;

a second capacitor coupled between the first and second terminals of the second ~~inductor~~ split-ring resonator;

a third ~~inductor~~ split-ring resonator disposed within a second distance of the first ~~inductor~~ split-ring resonator

and within a third distance of the second ~~inductor~~ split-ring resonator to induce magnetic coupling between the first, second, and third ~~inductors~~ split-ring resonators; and

a third capacitor coupled between a first end terminal and a second end terminal~~s~~ of the third ~~inductor~~split-ring resonator, the first end terminal and the second end terminal of the third split-ring resonator defining a third gap in the third split-ring resonator, wherein the third gap is disposed relative to the first and second gaps such that a first vertical plane that passes through both the first and second gaps is substantially perpendicular to a second vertical plane that passes through the third gap, and wherein the first split-ring resonator is substantially symmetric to the second split-ring resonator about the second vertical plane.

2. The band-pass filter of claim 1, wherein the first, second, and third ~~inductors~~ split-ring resonators are thin film conductive material, and the first, second, and third capacitors are thin film dielectric.

3. The band-pass filter of claim 1, wherein the first, second, and third ~~inductors~~ split-ring resonators have rectangular, polygonal, or circular shape.

4. The band-pass filter of claim 1, wherein the first and second ~~inductors~~ split-ring resonators are substantially coplanar and overlay the third ~~inductor~~ split-ring resonator.

5. The band-pass filter of claim 1, wherein the first ~~inductor~~ split-ring resonator is disposed adjacent and non-overlapping with the second ~~inductor~~ split-ring resonator, and the third ~~inductor~~ split-ring resonator is disposed around a perimeter and non-overlapping with the first and second ~~inductors~~ split-ring resonators.

6. The band-pass filter of claim 1, further including a substrate, wherein the first, second, and third ~~inductors~~ split-ring resonators and first, second, and third capacitors are integrated on the substrate.

~~7. The method of claim 1, further including a direct current power bus coupled to the second inductor.~~

~~8~~7. A band-pass filter including a plurality of ~~LC resonators~~ frequency band channels each having a first and second balanced ports and first and second unbalanced ports, each frequency band channel comprising:

a first inductor having a first end terminal coupled to the first balanced port and a second end terminal coupled to

the second balanced port, the first end terminal and second end terminal of the first inductor separated by a first gap;

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

a second inductor having a first portion alongside a first portion of the first inductor, a first end terminal coupled to the first unbalanced port and a second end terminal coupled to the second unbalanced port, the first end terminal and second end terminal of the second inductor separated by a second gap;

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

a third inductor having a first portion alongside a second portion of the first inductor, a second portion alongside a second portion of the second inductor, and a first end terminal and a second end terminal that are separated by a third gap, the third inductor disposed adjacent to the first and second inductors to induce magnetic coupling between the first, second, and third inductors, and wherein the third gap is disposed relative to the first and second gaps such that a first vertical plane that passes through both the first and second gaps is substantially perpendicular to a second vertical plane that passes through the third gap; and

a third capacitor coupled between the first and second end terminals of the third inductor.

9. The band-pass filter of claim 8, wherein the second inductor is disposed within a first distance of the first inductor to induce magnetic coupling between the first and second inductors.

10. The band-pass filter of claim 8, wherein the third inductor is disposed within a second distance of the first

inductor and within a third distance of the second inductor to induce magnetic coupling between the first, second, and third inductors.

11. The band-pass filter of claim 8, wherein the first, second, and third inductors are thin film conductive material, and the first, second, and third capacitors are thin film dielectric.

12. The band-pass filter of claim ~~8~~7, wherein the first and second inductors are substantially coplanar and overlay the third inductor.

13. The band-pass filter of claim ~~8~~7, wherein the first inductor is disposed adjacent and non-overlapping with the second inductor, and the third inductor is disposed around a perimeter and non-overlapping with the first and second inductors.

~~14~~8. The band-pass filter of claim ~~8~~7, further including a substrate, wherein the first, second, and third inductors and first, second, and third capacitors are integrated on the substrate.

1~~5~~4. An LC resonator circuit having first, second, third, and fourth interconnect terminals, the LC resonator circuit, comprising:

a first inductor having first and second end terminals, the first and second end terminals of the first inductor coupled to the first and second interconnect terminals, respectively;

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

a second inductor having first and second end terminals and a first portion alongside a first portion of the first inductor, the first and second end terminals of the second inductor coupled to the third and fourth interconnect terminals, respectively;

a second capacitor coupled between the first and second terminals of the second inductor;

a third inductor having first and second end terminals, a first portion alongside a second portion of the first inductor, and a second portion alongside a

second portion of the second inductor, the third inductor disposed adjacent to the first and second inductors to induce magnetic coupling between the first, second, and third inductors; and

a third capacitor coupled between the first and second end terminals of the third inductor.

16~~8~~. The LC resonator circuit of claim 15~~6~~, wherein the second inductor is disposed within a first distance of the first inductor to induce magnetic coupling between the first and second inductors.

17. The LC resonator circuit of claim 15~~6~~, wherein the third inductor is disposed within a second distance of the first

inductor and within a third distance of the second inductor to induce magnetic coupling between the first, second, and third inductors.

186. ~~The LC resonator circuit of claim 15, wherein the first and second inductors overlay the third inductor~~ An LC resonator circuit having first, second, third, and fourth interconnect terminals, the LC resonator circuit, comprising:

a first inductor having first and second end terminals, the first and second end terminals of the first inductor coupled to the first and second interconnect terminals, respectively;

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

a second inductor having first and second end terminals, the first and second end terminals of the second inductor coupled to the third and fourth interconnect terminals, respectively;

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

a third inductor having first and second end terminals, the third inductor disposed adjacent to the first and second inductors to induce magnetic coupling between the first, second, and third inductors; and

a third capacitor coupled between the first and second end terminals of the third inductor;

wherein the first and second inductors are substantially coplanar and overlay the third inductor.

19~~5~~. The LC resonator circuit of claim 15~~4~~, wherein the first inductor is disposed adjacent and non-overlapping with the second inductor, and the third inductor is disposed around a perimeter and non-overlapping with the first and second inductors.

20~~19~~. The LC resonator circuit of claim 15~~6~~, further including a substrate, wherein the first, second, and third inductors and first, second, and third capacitors are integrated on the substrate.

21~~0~~. An integrated circuit package housing a plurality of LC resonators and having first, second, third, and fourth interconnect terminals, comprising:

a first inductor having a first end terminal coupled to the first interconnect terminal and a second end terminal coupled to the second interconnect terminal, the first and second end terminals of the first inductor separated by a first gap;

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

a second inductor having a first portion alongside a first portion of the first inductor, a first end terminal coupled to the ~~first~~third interconnect terminal, and a second end terminal coupled to the ~~second~~fourth interconnect terminal, the first and second end terminals of the second inductor separated by a second gap;

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

a third inductor disposed adjacent to the first and second inductors to induce magnetic coupling between the first, second, and third inductors and having a first portion alongside a second portion of the first inductor and second portion alongside a second portion of the second inductor; and

a third capacitor coupled between first and second end terminals of the third inductor, the first and second end terminals of the third inductor separated by a third gap.

2~~2~~4. The integrated circuit of claim 2~~1~~2, wherein the second inductor is disposed within a first distance of the first inductor to induce magnetic coupling between the first and second inductors.

23. The integrated circuit of claim 2~~1~~2, wherein the third inductor is disposed within a second distance of the first inductor and within a third distance of the second inductor to induce magnetic coupling between the first, second, and third inductors.

2~~4~~2. ~~The integrated circuit of claim 21, wherein the first and second inductors overlay the third inductor~~ An integrated circuit package housing a plurality of LC resonators and having first, second, third, and fourth interconnect terminals, comprising:

a first inductor having a first end terminal coupled to the first interconnect terminal and a second end terminal coupled to the second interconnect terminal, the

first and second end terminals of the first inductor separated by a first gap;

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

a second inductor having a first end terminal coupled to the third interconnect terminal and a second end terminal coupled to the fourth interconnect terminal, the first and second end terminals of the second inductor separated by a second gap;

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

a third inductor disposed adjacent to the first and second inductors to induce magnetic coupling between the first, second, and third inductors; and

a third capacitor coupled between first and second end terminals of the third inductor, the first and second end terminals of the third inductor separated by a third gap;

wherein the first and second inductors are substantially coplanar and overlay the third inductor.

251. The integrated circuit of claim 210, wherein the first inductor is disposed adjacent and non-overlapping with the second inductor, and the third inductor is disposed around a perimeter and non-overlapping with the first and second inductors.

25. An LC resonator circuit, comprising:

a first inductor;

a second inductor having a first portion alongside a first portion of the first inductor;

a third inductor having a first portion alongside a second portion of the first inductor and second portion alongside a second portion of the second inductor;

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

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

a third capacitor electrically coupled between first and second terminals of the third inductor.

26. The LC resonator circuit of claim 25, further including the LC resonator circuit integrated on a substrate.

27. The LC resonator circuit of claim 25, further including the first inductor disposed substantially coplanar with the second inductor and overlaying the third inductor.

28. The LC resonator circuit of claim 25, further including the third inductor disposed substantially coplanar with the first and second inductors.

29. The LC resonator circuit of claim 25, further including the third inductor disposed around a perimeter

of the first and second inductors.

30. The LC resonator circuit of claim 25, further including the first, second, and third inductors magnetically coupled to each other.