

CLAIMS

1. A semiconductor processing chamber for processing semiconductor substrates, the semiconductor processing chamber comprising:
 - a pedestal to support a substrate, wherein the pedestal comprises:
 - a plurality of heater zones to heat the substrate; and
 - a wire mesh configured to deliver a Radio Frequency (RF) signal to a plasma in the processing chamber with the substrate;
 - one or more heater zone controls configured to deliver current to the plurality of heater zones; and
 - a filter circuit between the one or more heater zone controls and the plurality of heater zones, wherein the filter circuit comprises:
 - a plurality of inductors on a plurality of leads from the plurality of heater zones; and
 - a resonant circuit comprising a resonant inductor that is magnetically coupled to the plurality of inductors, wherein the resonant circuit produces a resonant peak that filters the RF signal delivered to the wire mesh from the plurality of leads from the plurality of heater zones to prevent the RF signal from reaching the one or more heater zone controls.
2. The semiconductor processing chamber of claim 1, wherein the resonant circuit further comprises a resonant capacitor in series with the resonant inductor that contributes to producing the resonant peak.
3. The semiconductor processing chamber of claim 1, wherein the plurality of heater zones comprises at least seven heater zones in the pedestal, wherein the at least seven heater zones comprise four heater zones around a perimeter of the pedestal and three concentric heater zones radiating from a center of the pedestal.

4. The semiconductor processing chamber of claim 3, wherein the plurality of leads from the plurality of heater zones comprises at least nine leads, a first lead in the at least nine leads corresponding to a first return lead shared by the four heater zones around the perimeter of the pedestal, and a second lead in the at least nine leads corresponding to a second return lead shared by the three concentric heater zones radiating from the center of the pedestal.

5. The semiconductor processing chamber of claim 1, wherein the filter circuit is part of a filter box that also receives the RF signal from one or more RF generators and provides the RF signal to the wire mesh.

6. The semiconductor processing chamber of claim 5, wherein the plurality of inductors and the resonant inductor are enclosed in the filter box.

7. The semiconductor processing chamber of claim 1, wherein the resonant inductor is magnetically coupled to each of the plurality of inductors individually such that the resonant circuit produces the resonant peak for each of the plurality of leads from the plurality of heater zones.

8. A filter circuit for a semiconductor processing chamber, the filtering circuit comprising:

a first lead corresponding to a first heater zone in a pedestal of the semiconductor processing chamber;

a first inductor connected to the first lead; and

a resonant inductor that is magnetically coupled to the first inductor, wherein the filter circuit produces a resonant peak corresponding to a frequency of an RF signal that is provided to a plasma in the semiconductor processing chamber,

a first capacitor connected to the first lead; and

a resonant capacitor connected in series with the resonant inductor, wherein the first inductor, the first capacitor, the resonant inductor, and the resonant capacitor combine to produce the resonant peak.

9. The filter circuit of claim 8, further comprising:
a second lead corresponding to a second heater zone in the pedestal;
a second inductor connected to the second lead, wherein the resonant inductor is also magnetically coupled to the second inductor.

10. The filter circuit of claim 8, further comprising a magnetic core, wherein the first inductor and the resonant inductor are wound around the magnetic core.

11. The filter circuit of claim 10, wherein the magnetic core comprises a straight ferrite rod.

12. The filter circuit of claim 10, wherein the magnetic core comprises a toroid ring.

13. The filter circuit of claim 8, further comprising:
a second inductor connected in series with the first inductor to the first lead;
and
a second resonant inductor that is magnetically coupled to the second inductor, wherein the filter circuit produces a second resonant peak corresponding to a second frequency of the RF signal that is provided to the plasma in the semiconductor processing chamber.

14. The filter circuit of claim 8, further comprising:

a ferrite toroid magnetic core, wherein the first inductor and the resonant inductor are wound around the ferrite toroid magnetic core;

a first capacitor connected in series with the first inductor and in parallel with a second lead corresponding to a first-tier zone control; and

a printed circuit board, wherein the first inductor and the ferrite toroid magnetic core is wired to the printed circuit board with a connection to the first capacitor.