

Fast Impedance Matching using Semiconductor Switches

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Impedance matching is a crucial problem in rf plasma process control. Today's matchboxes are using adjustable capacitors. They have low losses and allow fine adjustments, limited by the mechanical system and the control system accuracy. Drawbacks are moving parts with lack of reliability and limited lifetime as well as slow operation, limiting process options, particularly for fast and pulsed processes.

We present a new matchbox design without moving parts using new types of semiconductor switches which can operate at 13.56 MHz at high voltages and high currents. A specialized circuit layout allows a wide matchable impedance range. Due to the fully semiconductor design without moving parts, very fast tuning operation can be achieved which allows high speed process control.

Data of test bench impedance measurements are shown as well as examples of several plasma processes using the new matching technology. A comparison between the old matchbox and the new one is made, differences are shown. Strategies for tuning are discussed.

Keywords

impedance
matching
matchbox
switch