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(POS-29) Development of a High Power, Fast-Switching Radio Frequency Switch for TRASE MRI

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TRansmit Array Spatial Encoding (TRASE) Magnetic Resonance Imaging (MRI) is a method for MRI which uses an array of Radio Frequency (RF) transmission coils that produce RF (B_1) field phase gradients to spatially encode imaging information. TRASE MRI has allowed progress in the development of low-field, gradient-free MRI designs. These designs are compact MRI designs that could be deployed in remote areas where the resources required to perform imaging with a traditional MRI are not available. Currently, TRASE MRI is limited by the inductive coupling which occurs between the coils in the array during imaging. An RF switch capable of isolating transmit coils during the imaging sequence is required for further progress. The goal of the RF switch development presented here is to keep within the low Size, Weight, and Power (SWaP) profile desired for the next generation of compact MRI designs. Current methods of implementing such an RF switch in MRI – the use of PIN diodes – produce too much noise for low field MRI use due to their biasing circuitry. A commercially available RF Integrated Circuit (IC) was found that met the fast-switching and low noise criteria required to function within a TRASE MRI. The RF switch developed was initially simulated using Electronic Automation Design (EDA) software, before being modeled, manufactured, and assembled. The RF switches were integrated with TRASE MRI coils and benchtop experiments were undertaken to investigate efficacy of the switch at decoupling the coils. The results of these experiments will be presented.

Keyword-1

MRI

Keyword-2

Electronics

Keyword-3

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