Ceramic Composites Based Portable Electromagnetic Relay Switch

1. Technology:

University researchers at ceramic composite laboratory have patented a cost effective, low power consuming and performance efficient microwave sintered magnetoelectric (ME) relay switch operating at high frequency. This relay switch is controlled by an electromagnet. In this, the core is generally an electromagnet, formed by winding a coil around a ME core. Fig.1., for schematic representation of ME relay, when the ME relay is ON mode, the current is passed through the coil and the core gets magnetized by the principle of electromagnetic induction. This results, the upper contact arm to attract towards lower contact arm, hence closes the contact arms causing short circuit's relay cuts the power supply to the rest of the circuit depending on the incoming frequency. In the present case, the ME relay would allow input frequency up to few MHz. If the incoming frequency is greater than few MHz the electromagnet acts as a diamagnet and expels the magnetic field from the core leading the contacts to move in opposite direction making the circuit open. This would turn the relay to OFF mode. The cut-off frequency of the relay can be tuned by tailoring the stoichiometry of the composite. In contrast to the commercially available relay, the ME relay would operate in OFF mode at high frequency protecting the electrical system from permanent damage. Additionally, the portable, detachable and silent features of the invented ME relay open its avenues to be utilized as low pass filter by electronic home appliance industry, automobile aerospace engineering industry and in power converters by the battery manufacturing industry.

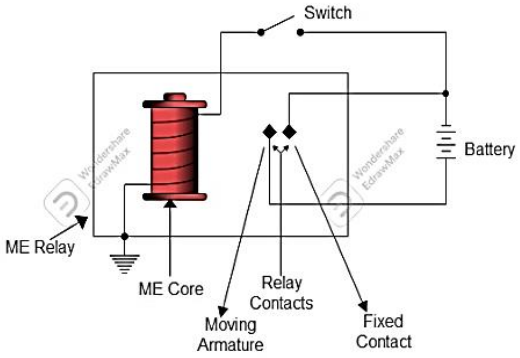

Fig. 1 Schematic diagram of Electromagnetic Relay

2. Problem Addressed:

The patented ME relay switch addresses the limitations of rigid in nature limiting the design flexibility, cost of production, and noise in communication systems and power converts where it is mostly used. Existing relays cannot withstand a very high frequency current and can damage the system as a whole. This new ME relay switch can be overcoming the challenge by operating at high frequency. Moreover, conventional metal relay is an in-built component of the actuator, whose failure would result in the replacement of the actuator whereas the invented ME relay switch is detachable and portable which would avoid replacement of entire system and save maintenance cost.

3. Industrial Applications:

The ME relay designed can be adopted by the following applications by the industry:

1. Low pass filter by electronic home appliance industry.
2. The relay can be widely used in the automobile aerospace engineering industry.
3. In power converters by the battery manufacturing industry.

4. Patent Application Number: 202241035440