ABSTRACT

A Switch Mode Power Supply (SMPS) is an electronic device that efficiently transforms electrical power by controlling voltage and current through switching methods. SMPS offers several advantages, including high efficiency, light weight, and compact size compared to linear power supplies. However, the switching method employed in SMPS generates electromagnetic waves that can trigger Electromagnetic Interference (EMI). EMI is an electromagnetic disturbance that can affect the performance of nearby electronic devices, leading to decreased functionality, errors, or even damage. This interference occurs because the switching in SMPS produces high-frequency emissions that can propagate through radiation or conduction. To address EMI issues, it is necessary to implement filters, design appropriate circuits, and provide shielding for SMPS devices. Research and development in SMPS and EMI mitigation aim to enhance device performance while meeting applicable electromagnetic compatibility (EMC) standards.

The use of LED drivers in a variety of lighting applications has increased significantly, but the challenge of controlling conducted emissions remains a major concern. These emissions can cause electromagnetic interference (EMI) that affects the performance of other electronic devices.

This research focuses on predicting conduction emissions in LED drivers using the spread spectrum technique as a mitigation strategy. The spread spectrum method operates by distributing the signal's energy across a broader frequency range, effectively lowering the energy peaks at specific frequencies that typically cause interference. The developed prediction model employs a simulation-based approach and is validated through experimental testing. Results indicate that the spread spectrum technique effectively decreases the amplitude of conduction emissions while maintaining the LED driver's core performance. These findings contribute significantly to the development of LED drivers that are both environmentally friendly and compatible with electromagnetic standards.

Keywords: *SMPS, EMI, Led Driver, Spread Spectrum, Conducted Emission*