

# Logic-controlled Active EMI Reducing Apparatus

 Others

Electricity and Power Electronics

Energy Conservation/Generation/Management/Storage (Battery)

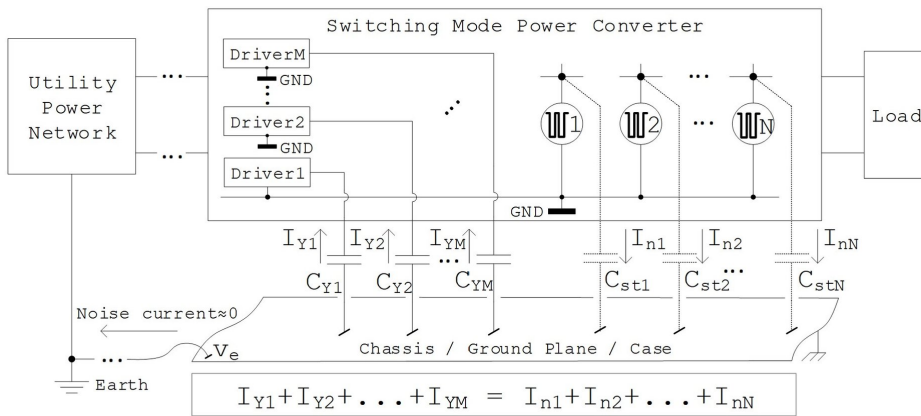


Figure 1. The diagram showing the principle of the presented invention

## Opportunity

Switching mode power converters are the most common electric power conversion systems for low- to mid-power applications, but their fast and strong voltage fluctuations generate unwanted noise. Typically, once the noise source waveform is known, a similar waveform is produced in synchronisation to cancel out the emitted noise and its interference with other devices. However, rather than considering the noise source waveform, the controller instead detects and controls the noise in real-time, resulting in errors. Existing filters to mitigate noise-related disturbance, such as common-mode chokes and Y-caps, can also be bulky, heavy, and can increase potentially hazardous AC leakage current to the earth. Whilst active-enhanced filters can overcome these limitations, they consume high power and are hard to implement and stabilise.

## Technology

This patent describes how electromagnetic interference (EMI) can be mitigated in switching mode power converters, whilst also reducing filter size and enhancing filter performance. By using a simple and low-cost logic circuit, a square noise source waveform can be produced—this makes it far easier to produce a similar, matched waveform that sinks the exact current from the noise sources. To achieve this, the invention provides a synchronous shunt of common-mode noise current to reduce EMI noise. Noise emission to the power network is reduced by mimicking the generation of the major noise current in an opposite polarity, and establishing a bypass for the noise to circulate between the converter and the conductive case.

IP Status  
Patent filed



Technology Readiness Level (TRL) ?

5

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Develop  
concept

Proof  
Concept

Follow-on

Build Value

## Advantages

- Programs a more precise noise-matching waveform
- Implements an active filtering technique without using high-speed linear amplifiers
- Compared with existing active EMI filters, the invention is more stable, lower-cost, lower-power, easier to integrate, and possibly more compact
- Compared with existing passive EMI filters, the invention is more compact and more stable

## Applications

- EMI noise filtering function
- Application in generic switching mode power converters
- Commercialization potential in switching mode power supplies

