

# An Efficient Digitally Controlled of RGB Driver for LED Pixels

Shaheer Shaida Durrani

Sustainable Energy & Power Electronics Research (SuPER),  
Faculty of Electrical & Electronics Engineering,  
University Malaysia Pahang, Pekan, Pahang, Malaysia  
shaheerdurrani@hotmail.com

Abu Zaharin Ahmad

Sustainable Energy & Power Electronics Research (SuPER),  
Faculty of Electrical & Electronics Engineering,  
University Malaysia Pahang, Pekan, Pahang, Malaysia  
zaharin@ump.edu.my

## *Abstract*

The RGB LEDs are used for producing different colours and different intensities. These LEDs are generally driven by constant current sources because their colours and brightness are directly related to their forward current. This paper proposes a digital control of the DC-DC converter to provide accurate currents for the RGB LED driver for achieving a high efficiency and accuracy of load current. The load current accuracy is an essential index for a high performance LED driver. The proposed maintains the current source for the minimum drive of the voltage across the LEDs which lead to reduce power dissipation in the MOSFET and increase efficiency in the LEDs' string. The RGB LEDs use three different voltage sources as each RGB colour requires different drive voltages. The proposed LED driver system is also able to dim LEDs in the pixel through pulse width modulation signals as dimming signals. These dimming signals also work as a reference voltage for the current controllers to regulate the load current. The proposed model is simulated in MATLAB/Simulink environment, and the results are verified accordingly. With 12V supply voltage, the efficiency of RGB LEDs are 93%, 97% and 97% respectively.

*Keywords: RGB LED driver; Digital Controller, DC-DC Converter*