

**Andrew Morris** 

**Popular Mechanics**, 2000-01 Popular Mechanics inspires instructs and influences readers to help them master the modern world Whether it s practical DIY home improvement tips gadgets and digital technology information on the newest cars or the latest breakthroughs in science PM is the ultimate guide to our high tech lifestyle **Power Supplies for LED Driving** Steve Winder, 2016-12-28 Power Supplies for LED Driving Second Edition explores the wide use of light emitting diodes due to their efficient use of power The applications for power LEDs include traffic lights street lamps automotive lighting architectural lights theatre lighting household light replacements signage lighting replacing neon strip lights and fluorescent tubes LCD display backlighting and many more Powering driving these LED s is not always simple Linear driving is inefficient and generates far too much heat With a switching supply the main issues are EMI efficiency and of course cost This book covers the design trade offs involved in LED driving applications from low power to UB LEDs and beyond Provides a practical hands on approach to power supply design for LED drivers Contains detailed examples of what works throughout the design process Presents commentary on how the calculated component value compares with the actual value used including a description of why the choice was made High Power LED Driver Mohamad Fakhrudin Sulaiman Mustahim, 2012 LED technology has been used widely in various applications due to its advantage in term of functionality high efficiency low cost small size and high reliability In order to improve LED performance and prolong LED s life High Power LED driver is been developed LED driver is used to control output voltage by using current mode controlled method This development of LED driver can increase the LED operation efficiency provide high voltage protection decreases the driver size and lastly make possible of user friendly installation Voltage source is step up by using boost converter as main circuit In control circuit current mode controlled is used to regulate output characteristic of High Power LED LTC 3783 is used as PWM controller to drive the gate and provide pulse signal to the MOSFET This driver is designed to operate load that consists of 6 units LED each rating of 5 Watt connected in series Theoretical calculation is made to obtain component specification The LTspice software is used to simulate the driver circuit by using calculated parameters before move on to hardware implementation Eagle software is used to design the Printed Circuit Board PCB Then all components are mounted on the PCB which is made of FR4 material The hardware built is tested experimentally and the output waveform is recorded

Research on Driver Circuit Design for Sustainable LED Lighting Systems Chi Shing Wong,2018 Led Lighting and Drivers J Marcos Alonso,2019-11-27 The book is organized in four chapters Chapter 1 deals with an introduction to light and lighting As a power electronics engineer working on LEDs and lighting systems in general I think it is important for the reader to have the basic knowledge about lighting systems which I have tried to summarize in this chapter Because of the extremely interesting possibilities of LEDs to generate different light colors Chapter 1 includes a section related to the

understanding of color quantification and measurement in different color spaces The Chapter also includes several examples on light and color calculations In order to develop and implement a suitable LED driver it is necessary to have a good knowledge about LED behavior and characteristics Thus Chapter 2 aims at providing the reader with the most important issues related to LED operation and modeling from a practical point of view The most common LED structures and materials are presented in this chapter together with the most relevant electrical thermal and optical characteristics making special emphasis on those characteristics provided by LED manufacturers in their datasheets Special sections are dedicated to light dimming and color mixing The chapter is closed with a brief review of organic LED OLED technology which is another promising LED technology nowadays Chapter 3 is devoted to DC LED drivers which are those LED drivers intended to supply the LED from a DC voltage source like a battery or a DC bus This chapter covers the three most relevant technologies that are being used to implement DC LED drivers at the present time which are those based on linear regulators switched capacitor regulators and switching regulators The most relevant solutions to implement DC LED drivers are reviewed from a practical point of view The chapter also reviews the most common control methods applied to DC LED drivers Examples are included by means of computer simulations based on LTspice which is a free but powerful SPICE based simulation software developed by former Linear Technologies Company now part of Analog Devices The chapter ends with a section devoted to LED configurations namely series parallel and matrix configurations which are employed to implement high power LED lamps Finally Chapter 4 is dedicated to off line LED drivers This is the denomination given to LED drivers that are intended to operate from an AC grid voltage These are the most complicated LED drivers since they usually require the implementation of a front end power factor correction PFC stage followed by a downstream DC DC converter to adapt voltage levels and provide regulated current to the LED lamp The most important standards and regulations related to this type of LED drivers are presented at the beginning of the chapter Then single stage LED drivers are studied which can be used as a stand alone off line LED driver or as a first stage in a two stage off line LED driver The highly relevant problem of requiring a large storage capacitance in single stage off line LED drivers to cope with the double line frequency pulsating power originated from line voltage rectification is addressed in this chapter Finally integrated two stage off line LED drivers are presented and studied as a solution to reduce the storage capacitance of off line LED drivers aiming at using high reliability film capacitors instead of less reliable electrolytic capacitors LTspice simulation examples are also provided in this chapter to allow the reader to have a better idea about the design and operation of this type of LED drivers Integrated Automotive High-Power LED-Lighting Systems in 3D-MID Technology Werner Thomas, 2014-02-18 The growing energy consumption of lighting as well as rising luminous efficacies and fluxes of high power Light Emitting Diodes LEDs have contributed to the widespread use of LEDs in modern lighting systems One of the most prominent users of the LED technology is automotive exterior lighting It benefits from LEDs high efficiencies and long lifetimes but furthermore uses

their small size as key feature to obtain new degrees of freedom in placing light elements Although automotive LED lighting is at the leading edge regarding 3D LED lighting systems their current construction is not optimised towards complex design requirements This thesis deals with decreasing the complexity and improving the degrees of freedom in the design of three dimensional high power LED lighting systems with power electronic LED driver by enhancing the level of function integration Three main challenges are identified for the proposed concept and are investigated throughout the thesis These are the integration of the power electronic LED driver of spatial and electrical functions as well as of thermal management functions into the three dimensional multifunctional component Development and Design of Light-emitting-diode (LED) <u>Lighting Power Supplies</u>, 2010 Ph D Dept of Electronic and Information Engineering The Hong Kong Polytechnic University Topics on Light-emitting-diode Driver Research Jaber Hasan, 2012 In this dissertation light emitting diode LED 2010 drivers are investigated for efficiency issues related to driving Red Green Blue RGB pixels and multiple LED strings in parallel A high efficiency digitally controlled RGB LED driver was designed for driving a 3x3 RGB LED display panel A multiplexer was used to sense the voltage drop across the current controllers This driver maintained a minimum drive voltage across the RGB LED pixels required to keep it in regulation leading to a reduction of unwanted power losses in the RGB LED pixels by selecting the minimum drop across the current controllers as the reference voltage of the digital controller Additionally analog dimming was implemented to dim each individual LED in a 3x3 RGB LED display panel Efficiencies of 85 6 % 93 3 % and 91 1 % were experimentally obtained for red green and blue LEDs respectively at the rated output current For comparison efficiencies of 38 3% for the red LED 66 2 % for the green LED and 64 5 % for the blue LED at the nominal current of 20mA using a 5 V supply were achieved in conventional LED drivers For parallel connected LED strings a current controller is required for each string to maintain the desired current with the drive voltage provided by a switch mode power converter SMPC A novel analog digital LED driver controller was designed for driving a two string LED load with three white LEDs in each string for backlight application in liquid crystal displays LCDs In this implementation an analog controller was used to control the output voltage of the SMPC while a digital controller was used to achieve the minimum drive voltage across the output LED strings leading to an efficiency of 89 % at the rated output current A phase shifted pulse width modulation PSPWM dimming was implemented to reduce load stresses improve electromagnetic interferences EMI and increase system efficiency A mathematical model based on multirate simulation technique for merging the analog and digital controllers was proposed Finally a LED driver chip was designed and fabricated using a 0.5 micron CMOS process to reduce size of the overall LED driver system The integrated circuit consisted of a 16 channel analog multiplexers five current controllers and buffer circuits The LED driver chip function was experimentally verified using a SMPC to drive a five string LED load in parallel with a single green LED in each string for display panel applications by maintaining a minimum drive voltage across the LED strings thus leading to an efficiency of 75 % at the rated output current

Design and Implementation of an Active Led Driver Scheme with High Power Factor and Extra-low Total

Harmonic Distortion of Input Current [][],[][],2014 LED DRIVERS - The Definitive Guide Andrew Morris,2025-06-22

The landscape of drivers for LED lighting is so vast and complex that even technicians often have a hard time navigating the multitude of different models and technologies Voltage drivers current drivers fixed drivers dimmable drivers CCT RGB PWM KNX and all the odd acronyms This guide is a quick course with a practical fast paced slant on lighting LED technology and the different power supply modes possible Whether you are a technician or a hobbyist you will find practical and useful insights Development and Design of Light-emitting-diode (LED) Lighting Power Supplies Xiaohui Qu,Hong Kong Polytechnic University. Department of Electronic and Information Engineering,2010 A High Efficiency High Power Led Driver with Fault Tolerance and Multiple Led Load Driving Using a Coupled Cuk Converter Ahmed Ali Sayyid,2013

Sliding Mode Pulsed Averaging IC Drivers for High Brightness Light Emitting Diodes ,2006 Power LED Driver Using PIC Microcontroller Mohd Taufik Ab Rahman, 2008 One traditional low cost way of driving LED in electrical applications uses a resistor in series with the LED device Although this driving scheme is simple and inexpensive it suffers several disadvantages The LED current can vary substantially over the battery voltage range even in normal operation of the device thus affecting the brightness and reducing the service life of the lighting device Additionally protection is needed from automotive voltage transients and reverse polarity These disadvantages are typically resolved by using constant current linear regulators Besides driving the LED at a programmed current these regulators can inherently protect from a reverse polarity application and block voltage transients up to tens of volts Linear current regulators do not require input EMI filters and can yield inexpensive LED driver solutions However both the resistor ballasts and the linear regulators exhibit low efficiency They may become impractical for driving high brightness LED loads due to the excessive heat dissipation Therefore switching power converters are needed for driving many signal and lighting LED devices Novel Boost Converter Based LED Driver Chip Targeting Mobile Applications Ge Wang, 2016 A novel integrated constant current LED driver design on a single chip is developed in this dissertation. The entire design consists of two sections The first section is a DC DC switching regulator boost regulator as the frontend power supply the second section is the constant current LED driver system In the first section a pulse width modulated PWM peak current mode boost regulator is utilized The overall boost regulator system and its related sub cells are explained Among them an original error amplifier design a current sensing circuit and slope compensation circuit are presented In the second section the focus of this dissertation a highly accurate constant current LED driver system design is unveiled The detailed description of this highly accurate LED driver system and its related sub cells are presented A hybrid PWM and linear current modulation scheme to adjust the LED driver output currents is explained The novel design ideas to improve the LED current accuracy and channel to channel output current mismatch are also explained in detail These ideas include a novel LED driver system architecture utilizing 1 a dynamic current mirror structure and 2 a closed loop structure to keep the feedback loop of the LED driver active all the time during both PWM on duty and PWM off duty periods Inside the LED driver structure the driving amplifier with a novel slew rate enhancement circuit to dramatically accelerate its response time is also presented **Design and Modeling of High Performance LED Dimming Driver with Reduced Current Spikes Using Turn-on Snubber Across Power MOSFET** Venkata Shesha Vamsi Borra, Youngstown State University. Department of Electrical Engineering, 2014 The LEVEL 3 power MOSFET SPICE model IRF034 is used to design and model the LED driver Three LED drivers are designed and their efficiency values are compared for picking the optimum driver among them The switching frequency of 20 kHz to 40 kHz to the MOSFET indeed produce sharp current spikes across the MOSFET which are at least 30 40 times more than the desired value around 2A To resolve this problem an efficient turn on Snubber circuit is designed for the driver for safe operation The efficiency of the LED driver is enhanced by modeling the LED s PSpice model and reconfiguring the circuit elements The simulation results of the designed driver propose an efficiency value of 92 2% The efficiency is calculated to be 88% when the designed model is replaced by a commercial LED model Development of Driver and Color Control System for High-power RGB LED Sau Kin Nick Ng, Hong Kong Polytechnic University. Department of Electronic and Information Engineering, 2013

High-power LED Driver with Power-efficient LED-current-sensing Technique, X 73 leaves ill 30 cm High Speed, High Current Pulsed Driver Circuit, 2017 Various technologies presented herein relate to driving a LED such that the LED emits short duration pulses of light This is accomplished by driving the LED with short duration high amplitude current pulses When the LED is driven by short duration high amplitude current pulses the LED emits light at a greater amplitude compared to when the LED is driven by continuous wave current A High-Power-Factor Non-Electrolytic-Capacitor LED Driver [][],2013

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