

Diagnostic method using discrete components for LED lighting systems

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As a result of continuous technical development for solid state light source, we can find application in general purpose lighting, automotive lighting, as well as for display systems like TV. Specially, light emitting diodes(LEDs) are rapidly replacing the existing lighting sources such as fluorescent lamps and HID lamps worldwide. Instead of LCD, LED TV is increasing the market share of the consumer electronics because of its power consumption saving. In case of automotive lamps, car manufacturers are able to design more beautiful and stylish automotive lamps including both exterior and interior lighting by using LEDs and can achieve eco-technology in the same time. Additionally, paradigm of lighting equipment also has been changed. Consumers want more sensitive and smart function for their lighting system, using sensor, communication, microcontroller. Among them, the most basic function is the detection of LED failure. For example, according to the ISO26262 standard, automotive head lamps should be designed to follow the instruction of Class B because of the functional safety[1,2]. If the LED module has problem, LED driver and microcontroller recognizes it and inform to user through the body control unit. Specifications of LED module, however, are very diverse and the function of driving IC is limited by the number of LED channels and definition of LED protection modes. In order to solve these kinds of difficulties, in this paper, using discrete components a method of LED protection like LED short circuit and over voltage protection is proposed which can be used for both automotive and general lighting and the proposed protection circuit is verified by PSIM simulation[3].

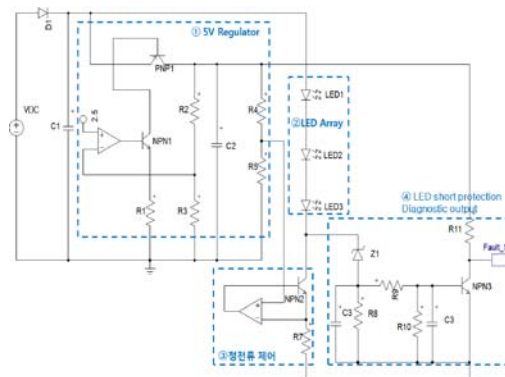
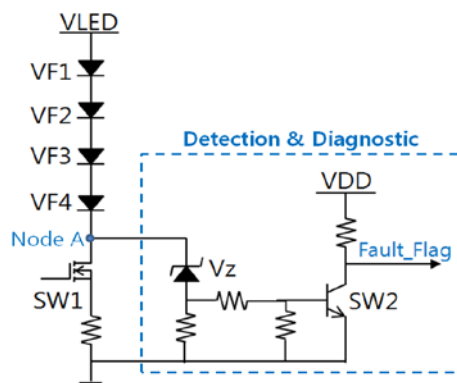


Fig. 1 The Proposed LED Protection Circuit diagram and PSIM simulation

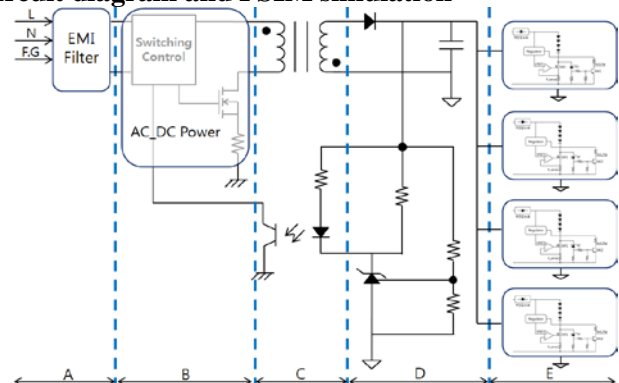
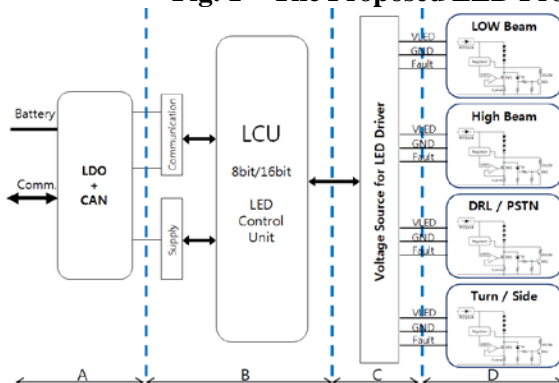


Fig. 2 Self-diagnostic function in automotive lamp and general lighting

References

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2. NATIONAL INSTRUMENTS, <http://www.ni.com/white-paper/13647/ko/>. 2012
3. POWERSIM, <http://powersimtech.co.kr/>