LUMISSIL Microsystems
A Division of ISSI

IS32LT3120
LED Driver for Map/Dome Light

Automotive, Truck & Airplane Applications

Automotive Lighting

Interior and exterior automotive lighting represents a fast-growing market for LED driver ICs according to IMS Research. Interior applications include ambient, reading, footwell, and trunk lighting while a major exterior application for LED drivers is rear, brake, and puddle lights as well as license plate lighting.

More and more automotive manufacturers are realizing the benefits of LED lighting for energy efficiency and features not possible with traditional lights. Light-emitting diodes (LEDs) are an attractive technology for automotive lighting since they consume less electric energy than traditional incandescent or halogen light bulbs. An LED light source will typically consume 80% less electric energy than a conventional light bulb which leads to an improvement of the vehicle's fuel efficiency and an extended range for electric vehicles.

Introducing IS32LT3120 for Map/Dome Light

Next generation LED drivers such as the IS32LT3120 are enabling automotive lighting designers to optimize their lamp designs for size and performance. The features range from accurate LED current matching, enhanced pulse width modulation (PWM) dimming algorithms, all in a small SOP8-EP package and qualified to the AECQ-100 automotive standards. Additional benefits are compact lamp designs with flexible operating conditions and protection features resulting in high reliability and long-term operating life.

The IS32LT3120 represents a "simple yet elegant" approach to interior LED lighting; designed with automotive customer feedback. It is a linear, two channel constant current source (200mA per channel) incorporating some of the best features found in our FxLED products. A single resistor, RISET programs the current sources to any value between 10mA to 200mA per channel. While there are a multitude of competitive linear current drivers in the market space, none have the enhanced features found in the IS32LT3120. See Fig1.

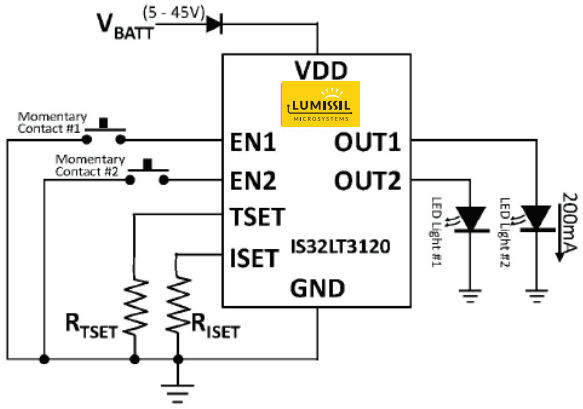

Fig1 A. IS32LT3120 Circuit

Fig1 B. Typical Application

IS32LT3120 Features

A major function of the IS32LT3120 is to perform LED light dimming in a way optimized for the human eye. The graph below (Fig 2) is an over simplification to illustrate that the human eye perceives brightness changes in a non-linear fashion, ie the eye has better sensitivity at low luminance than at high luminance.

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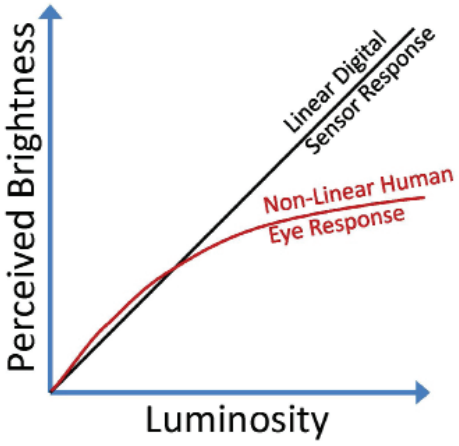

Fig2. Brightness Response Curves

Typically when dimming UP or DOWN, an LED driver would tend to follow the linear curve shown in Fig2 resulting in noticeable dimming performance at the low brightness but a minimal response at the high brightness levels. This results in perceived jumps in brightness levels for what should be a smooth PWM dimming. The IS32LT3120 compensates for this by integrating a PWM dimming correction in the form of a lookup table that compensates or corrects the PWM value to fit the human eye response curve. The end result is a smooth and appealing dimming transition. A single resistor, RTEST sets the dimming transition speed from instant to 1 second when the switch is pressed.

The target application for the IS32LT3120 is pushbutton activated map or dome reading lights found in automotive, airplane, train and commuter bus interior cabins. These applications typically implement a momentary contact button to turn ON and OFF the light source. Two problems arise from this use; one pressing the momentary button results in many signal transitions which need to be cleared and two, the state of the ON/OFF needs to be remembered.

The IS32LT3120 resolves both of these issues by integrating a de-bounce circuit and a memory latch to keep track of the button operation status, see Fig 3.

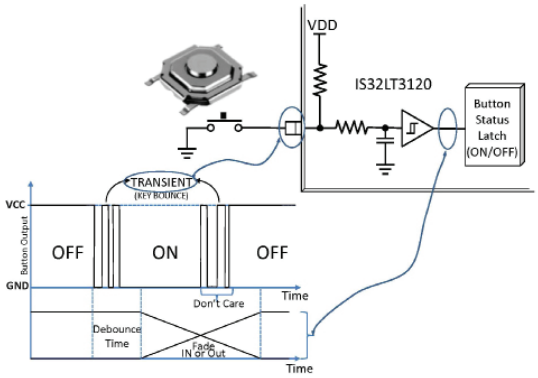

Fig3. Button de-Bounce and Status Latch

IS32LT3120 Availability

Engineering IC samples and evaluation boards for the IS32LT3120 are currently available to qualified automotive accounts. The ongoing customer evaluation has generated an amazingly positive feedback suggesting an up and coming huge success with wide market acceptance. The IS32LT3120 is completing its final phase of the AECQ-100 qualification process which will correspond with a production release date of June 2015. The device datasheet and evaluation board documentation are available for download from our website, https://www.lumissil.com/products/led-driver/hbled.

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