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# Switchable Luminance LED Light Bulb Device

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## INVENTORS

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## OTHER INFORMATION

### KEYWORDS

Cat4, incandescent, incandescent  
light bulb, LED, Edison, light bulb,  
switchable, lamp, light emitting  
diode, LED light bulb, 3-way, lighting,  
white light, multiple-intensity,  
multiple-intensity light bulb, light  
bulbs

### CATEGORIZED AS

- **Energy**
- Lighting
- **Environment**
- Other

### RELATED CASES

2012-734-0

BACKGROUND

While white light LED light bulbs have proven to be highly successful, they historically have lacked one feature available in traditional incandescent light bulbs: the ability to provide multiple light outputs from one lamp. For example, 3-way Edison or incandescent light bulbs are widely used to provide switchable light outputs. A 3-way incandescent light bulb uses switched filaments to produce the light output of a 50 Watt (W), a 100 W, or a 150 W light bulb. Conventionally the incandescent has two filaments to produce different amounts of light at full voltage; it has a low-power 50 W filament and a medium-power 100 W filament, and when switched to being used at the same time 150 W of power (and light) is delivered. This feature has proven to be extremely popular and useful in 3-way incandescent light bulbs. As compared to conventional sources (e.g., incandescent, halogen, fluorescent), some reports predict the market penetration for white-light LEDs will continue to rise, from 36% in 2020 to >70% by 2030. In the U.S. (2018) LEDs have been used in almost 30% of indoor applications and >50% in outdoor applications. White light LED light bulbs having switch-selectable light outputs may be found useful and commercially desirable.

TECHNOLOGY DESCRIPTION

Researchers at UC Santa Cruz have developed a low-power, transformerless, LED light bulb power supply capable of providing varying levels of electric current capable of powering variable numbers of LEDs to produce proportionally varying levels of light. The invention allows any lamp using a standard Edison, screw bayonet type base to become an arbitrary-way lamp. This is similar to the traditional ‘3-way’ lamp, but with the following key differences: (a) no specialty lamp is required, (b) no specialty 3-way bulb is required. The light bulb device comprises an AC electrical input, a plurality of (one or more) LEDs capable of emitting variable light intensities depending on the DC input current. The LEDs are in electrical communication with a driver board, and the driver board is in communication with the AC electrical input. The driver board comprises a rectifier for rectifying AC current into DC current, and a switch having at least two selectable positions corresponding to a DC output of a first amperage or a second amperage corresponding to the selected switch position. The switch directs the current through one of two or more selectable resistors to provide the desired current. The DC output amperage corresponds to the light output intensity of the LED(s).

In certain embodiments, the light bulb device will include a switch that can direct the current through a number of resistors, with no switchable selection of capacitors. In other embodiments, the device includes a switchable selection of capacitors. A current regulating device may be integrated into the device, and may be, in certain embodiments, a step-down constant current controller. The device may comprise a current-regulating device and at least one transistor, wherein the current regulating device modulates the gate of the output transistor by reading the voltage, thereby regulating current delivered to LEDs.

APPLICATIONS

- General lighting applications

FEATURES/BENEFITS

- no specialty lamp is required
- no specialty ‘3-way’ bulb is required
- LEDs may emit white light or a colored light

INTELLECTUAL PROPERTY INFORMATION

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	9,730,282	08/08/2017	2012-734
United States Of America	Issued Patent	9,144,129	09/22/2015	2012-734

