

March 2<sup>nd</sup>, 2011  
CITIZEN ELECTRONICS CO., LTD.

**Development of LED lighting modules with  
built-in AC drive circuits capable of being driven directly  
by the general power supply (AC power source)  
- Expansion into the module business -**

Citizen Electronics Co., Ltd. (Head Office: Fujiyoshida City, Yamanashi Prefecture. President: Yoshihiro Gohta) has developed the “LMC10B series” of LED lighting modules with built-in AC drive circuits using innovative circuit technology. We will actively provide solutions such as LED modules that are needed greatly by the market, in addition to LED packages that are our core business.

Product demonstrations will be held during the “Lighting Fair 2011” (in Tokyo) from March 8, 2011.

[Developed products]

LED lighting modules with AC drive circuits

LMC10B Series (1000 lm)

Drive: AC 220 to 240V

(for Asian and European regions)

Color temperature: 3000K and 4000K

European CE marking will be affixed.

Mass production is scheduled to start in April 2011.



**[Background of development]**

LED lighting has been in the spotlight as LED bulbs have become common. As LEDs are usually driven by DC (direct current) power supply, when the general AC (alternating current) power supply is used, a DC drive circuit that converts AC into DC is needed. Accordingly, there are some issues for DC power driven LEDs, such as “the complexity of the circuit increases the number of components” and “electrical noise is easily generated.”

AC power driven LEDs have been commercialized by other manufacturers and these types of devices can be easily downsized due to their simplified drive circuits. However, they also have an issue of “presence of zero lighting condition in minute scales reduces the efficacy” when compared with the DC power driven LEDs.

For LED lighting, there are some difficulties such as the drive system as stated above and heat dissipation. A lot of small and medium-sized companies that manufacture equipment cannot enter the LED lighting market and the demand for LED modules has increased. Therefore, Citizen Electronics has developed LED modules, which incorporate drive circuits and lenses into LED packages that are our core business.

The developed products can be driven directly by an AC power supply by adopting a new

innovative technique (SCD technique \*1) in LED drive circuits. Accordingly, they do not need a DC power circuit, and downsizing and slimming of the products has been accomplished. In addition, their zero lighting time has been reduced compared with that of existing AC driven LEDs and a huge increase in efficacy has also been achieved.

You can have down lights or spotlights just by incorporating heat sinks and covers into the LMC10B series. We will expand our product lineup, adding linear modules such as straight-tube fluorescent light types. By providing 'easier-to-use' LED modules, we will greatly contribute to a reduction in the time and cost of development for LED lighting equipment makers.

**[Main features]**

**1. Capable of being driven directly by general power supply (AC power source)**

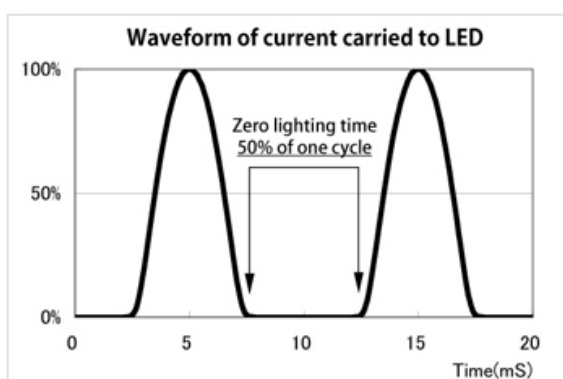
Power-supply voltage: AC 220 to 240V [for Asian and European regions]

- LED modules for Asian and European regions have been developed first due to greater demand. We will gradually release products that are compatible with AC 100V [for Japan] and AC 110 to 120V [for North America].

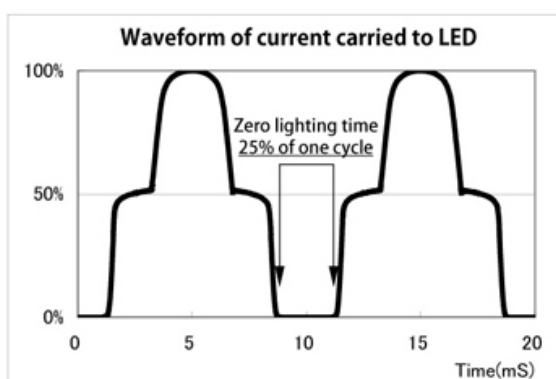
**2. Adoption of SCD technique in LED drive circuits has achieved high efficacy**

In the AC power driven circuit, a current of 100% does not always carry to LEDs. The ratio of current varies from 0 to 100% at a constant cycle as described in the table below (\*2).

Using a new technique in the drive circuit, the ratio of zero lighting time resulting from no current being carried to LEDs has been drastically decreased from 50% (existing level) to 25% with multi-stage controlling of the waveform of the current carried to LEDs. As a result, high efficacy has been achieved.



**Existing technique (as an example)**



**SCD technique**

**3. Compact and slim body**

Size: Φ90mm X H: 8.6mm

The SCD technique is suitable for downsizing the circuit due to a small number of components. In addition, the adoption of the new drive circuit technique makes it possible to drive LED modules directly by an AC power supply. Downsizing and slimming of the modules has been accomplished, as DC power circuits are not needed.

**4. 4KV of dielectric strength voltage has been achieved for the first time at a module level (\*3)**

4KV of dielectric strength voltage, necessary for lighting equipment of 220 to 240V, has been achieved for the first time at a module level. We provide 'easier-to-use' LED modules for which high security is ensured.

## 5. Lineup of condensing lenses

We have a lineup of lenses (ILU-008) specialized for the LMC10B series. Please refer to our website for more information about lenses.

## 6. Applications

Down lights, spotlights, etc.

## [Main specifications]

### LMC10B Series

[Input voltage: AC 220V, Tc=60°C]

Product code	LMC10B-23L180A-11	LMC10B-23W180A-11
Color temperature (K)	3000	4000
Total luminous flux (lm)	1000	1000
Power consumption (W)	22	22
Luminous efficacy (lm/W) [including drive circuit]	46	
Power factor (%)	>90	
General color rendering index Ra	80	
Dielectric strength voltage (V)	4K	
Rated life (hours)	40000	
Size (mm)	Φ90 X H: 8.6	

\*1 SCD technique: stands for Selective Current Diversion technique. This is a new technique for drive circuits developed by U.S. Once Innovations, Inc. Citizen Electronics Co., Ltd. has entered into a license agreement with Once Innovations, Inc.

\*2 AC power 50Hz = 100 cycles / second, 60Hz = 120 cycles / second

\*3 This is according to the results of the survey conducted by Citizen Electronics as of March 2011 when we announce the release of the LMC10B series.



"CITILED LED Module" is a brand name of LED lighting modules manufactured by CITIZEN ELECTRONICS CO., Japan.

CITILED is a registered trademark of CITIZEN ELECTRONICS CO., Japan.

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