

Innovative Product: Development of Heart-shaped directional characteristics LED Backlight Unit for LCD

Electronic parts manufacturer, Citizen Electronics, (Fujiyoshida City, Yamanashi Prefecture; Capital: 1,988,550,000 yen; President: Takashi Masuzawa) has developed an innovative 'heart-shaped directional characteristics LED backlight unit for LCDs' with bilateral directivity of light.

In recent years, the development of LCDs has been remarkable, with big, small and various kinds of LCDs for cellular phones, digital still cameras, PDAs (personal digital assistants), flat-panel televisions and PCs in high demand. It is a fast-growing segment of the market. LCDs require the use of backlight units to illuminate liquid crystal parts from the rear. Backlighting processes typically use either white LEDs or cold cathode fluorescence lamps (CCFLs). In many cases, white LED backlight units suitable for downsized devices are used for small and low profile products like cellular phones, while middle or larger sized devices are mostly equipped with CCFLs.

At the same time, when we think of environmental concerns, CCFLs contain mercury (Hg) but LED lamps do not have any hazardous chemical substances. In addition, the LED lamps used in this backlight unit are environment-friendly products, lead (Pb)-free, and meet applicable environmental laws and regulations like the EU RoHS directive.

LED backlight units are not only hazardous substance-free, but also have a level of power consumption superior to that of CCFLs. Furthermore, LED backlight units are becoming one of the increasingly important devices as a core part of LCDs as they have a longer life than CCFLs.

Citizen Electronics has introduced many products to both domestic and overseas cellular phone suppliers as a top manufacturer of backlight units for cellular phones. The new backlight units are offered by Citizen Electronics, which has the top share globally of the chip LED lamps used for light sources of backlighting. Improvement has been achieved through the use of the newly developed high efficiency white chip LED lamps 'CL-410' and the development of the super low profile high efficiency light guides manufactured with original optical design, precision tool and injection molding technologies.

Characteristics required by backlight units are mainly related to the enhancement of the image quality such as high luminous intensity and high uniformity. In order to achieve these characteristics, Citizen Electronics has adopted unique new structure and technology for light guides and optical sheets. On the other hand, in the TV and car navigation fields, it is a significant challenge to enhance the image visibility from bilateral directions. The new LED backlight unit has extended the directivity of light toward both the left and right to meet this challenge.

Key features are as follows:

- ◆ Directional characteristics of the current color LCD backlight unit typically have a unidirectional peak of luminous intensity toward the front direction (0°). In this unidirectional pattern, the monitor screen shows the brightest luminous intensity in the front (0°) area, becoming darker along the bilateral direction (bilateral meaning 90° directions) and the image visibility deteriorates from a slanting direction. The new backlight LED unit has achieved the bilateral directional characteristic, which has two peak points of the luminous intensity at both the left and right slanting directions.
- ◆ The directional characteristic enables control of the bilateral peak points of luminous intensity in the range of 0° to 45° on a single side.
- ◆ Under the same power, the newly developed model has bilateral peak luminous intensity equivalent to the front peak luminous intensity of the current models.

The newly developed product is a 7-inch single-sided emitting backlight unit with 21 LEDs, which achieves the peak points at bilateral 45°. The specifications of all units currently available have been decided in response to customers' orders. Samples will be shipped after mutual consultation.

The actual products will be on display at the 16th FINETECH JAPAN 2006, Tokyo Big Sight, opening on April 19. (Exhibition date: April 19 to 21, 2006)

Basic technical development has been completed. Mass production of the products will be started in January 2006 or later.

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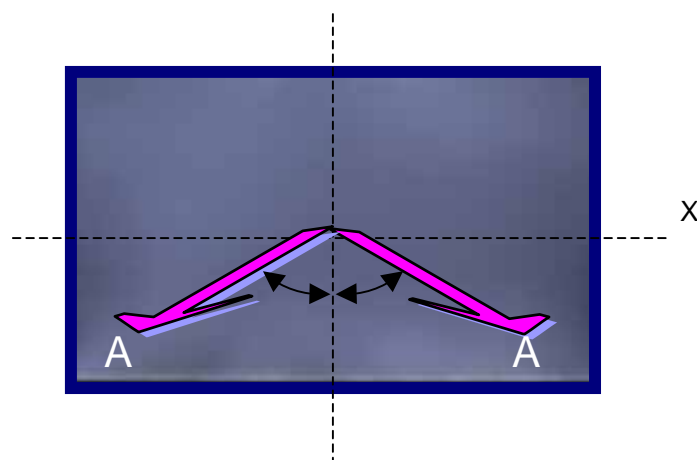
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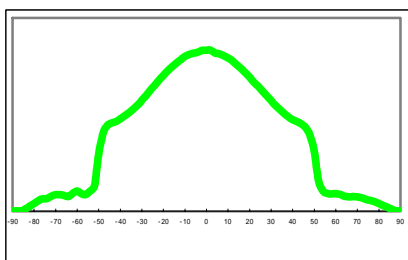
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Characteristics

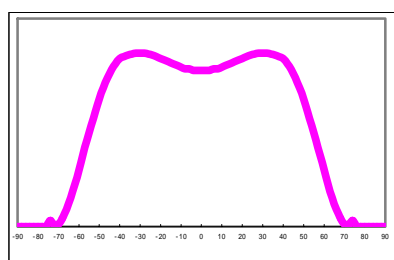


Parameter	Conditions	Conventional model	Newly Developed model
Luminous intensity (cd/m ²)	Bilateral 45° (Point A/A')	5,000	10,000
	Front 0°	10,000	-
Directivity (x-direction)	50% brightness/half width intersection angle	0°±45°	Bilateral 45°±20°
Power consumption (w)	-	4.5	4.5

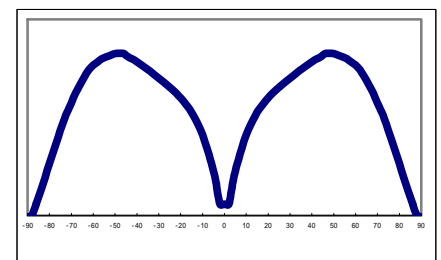
Relative luminous intensity graphs of directivity



Normal directivity



Wide-range directivity



Bilateral directivity