DUAL SIDED LIQUID CRYSTAL DISPLAY DEVICE AND MOBILE TELECOMMUNICATION TERMINAL USING THE SAME

CROSS REFERENCES TO RELATED APPLICATIONS

This application claims the benefit of Korean Patent Application No. 22782/1999, filed on Jun. 17, 1999, the entirety of which is hereby incorporated by reference for all purposes as if fully set forth herein

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a double-faced liquid crystal display device and a mobile telecommunication terminal using the same.

2. Description of the Related Art

A related art liquid crystal display device will be described with reference to the accompanying drawings.

FIG. **1** is a sectional view showing a related art liquid crystal display device, and FIG. **2** is a schematic view showing a double-faced display device based on the related art liquid crystal display device.

As shown in FIG. **1**, the related art liquid crystal display device includes a lower substrate **13**, an upper substrate **12**, and a liquid crystal **14**. The lower substrate **13** includes a scan electrode pattern, a signal electrode pattern, and a pixel electrode pattern. The upper substrate **12** includes a common electrode pattern, a black matrix, and a color filter layer. The liquid crystal **14** is implanted between the upper substrate **12** and the lower substrate **13**.

Polarizers **11** and **15** are respectively disposed on the upper substrate **12** and below the lower substrate **13** to compensate a phase difference due to refraction of light when characters, numbers or figures are displayed. A reflector **16** is disposed on the bottom of the polarizer **15** to reflect light.

The upper substrate **12** and the lower substrate **13** between which the liquid crystal **14** is implanted are formed of glasses or films having excellent transmittivity of light. The electrode patterns formed in the upper substrate **12** and the lower substrate **13** may be of dot matrix types, segment types, or a mix of dot matrix and segment types.

In some applications, it is desirable to provide a double-faced display; that is, a display that can be viewed from two faces, or surfaces. One example of such an application is a folding cover type mobile telecommunicative terminal such as a cellular telephone. In this type of application, it is desirable to have a double-faced display with one display viewable on the inside of the folding cover for displaying information when the phone is in use by a user, and a second display viewable on the outside of the cover, which allows information such as caller identification information to be displayed to a user without requiring the user to open the phone.

The construction of a related art double-faced display device for displaying characters, numbers and/or figures on two faces using two conventional liquid crystal display devices of the type discussed above will now be described.

As shown in FIG. **2**, the related art double-faced display device includes first and second liquid crystal display devices **26***a* and **26***b* having respectively, signal electrodes and scan electrodes, a controller **21** for analyzing an input video signal and outputting a control signal for displaying characters, numbers or figures, a first memory **22** comprising a volatile memory device, for temporarily storing an input signal and storing booted data to promptly process the operation of the controller **21**, a second memory **23** comprising a nonvolatile memory device, for storing an operational algorithm of the controller **21**, a first driver **24***a* for driving the signal electrodes and the scan electrodes of the first liquid crystal display device **26***a* in accordance with a control signal of the controller **21** to display a video signal, a second driver **24***b* for driving the signal electrodes and the scan electrodes of the second liquid crystal display device **26***b* in accordance with the control signal of the controller **21** to display a video signal, and first and second frame memories **25***a* and **25***b* for storing signals for displaying characters, numbers or figures, applied from the first and second drivers **24***a* and **24***b*.

In other words, in a conventional double-faced display, there are provided two liquid crystal display devices having separate signal electrodes and scan electrodes, and two drivers for, respectively, the two liquid crystal display devices.

The operation of the conventional double-faced display device, in which one liquid crystal display device is attached on a front face and a second liquid crystal display device is attached on a rear face, will now be described.

When power is supplied to the system, the controller **21** accesses an operation program stored in the second memory **23** and detects the signals for displaying externally input characters, numbers or figures in a state that the system is initially booted.

At this time, if the externally input signals are detected, the controller **21** analyzes the input signals through the operational algorithm and analysis program set in the first and second memories **22** and **23** and applies the control signal for displaying characters, numbers or figures to the first and second drivers **24***a* and **24***b*.

The first and second drivers **24***a* and **24***b* apply a driving signal for displaying corresponding characters, numbers or figures to the scan electrodes and the signal electrodes of the first and second liquid crystal display devices **26***a* and **26***b* attached on inner and outer surfaces of the system for double-faced display, so that the same characters, number or figures can respectively be displayed on the first and second liquid crystal display devices **26***a* and **26***b*.

At this time, the first and second frame memories **25***a* and **25***b* process and store the control signal applied from the controller **21** for a frame. Then, the first and second frame memories **25***a* and **25***b* output the frame signal stored in corresponding memory areas in accordance with access signals of the first and second drivers **24***a* and **24***b*, so that corresponding characters, numbers or figures can stably be displayed on the first and second liquid crystal display devices **26***a* and **26***b*.

However, the related art double-faced display device has several drawbacks.

First, to display characters, numbers or figures on two faces, two liquid crystal display devices must separately be provided. To drive the two liquid crystal display devices, two drivers corresponding to the two liquid crystal display devices must be provided. To simultaneously display two faces, a duplicated control algorithm is used. This increases power consumption and thus increases the production cost.

Furthermore, since the two drivers are provided to drive the two liquid crystal display devices, a large area is required in the system. This makes it difficult to produce a light-