

**DISPLAY DRIVING DEVICE, DISPLAY
DEVICE AND OPERATING METHOD
THEREOF**

**CROSS-REFERENCE TO RELATED
APPLICATION**

[0001] This application claims priority from Korean Patent Application No. 10-2014-0156245, filed on Nov. 11, 2014, in the Korean Intellectual Property Office, the disclosure of which is incorporated herein in its entirety by reference.

BACKGROUND

[0002] The inventive concept relates to a display driving device, a display device, and an operating method of the display device, and more particularly, to a display driving device for improving the reliability of image-related data reception and reducing a chip size thereof, a display device, and an operating method of the display device.

[0003] In order to display high quality and wide view images, a display driving device for transmitting display data to a display panel needs to transmit display data at a high speed. In particular, the display data has to be transmitted at a high speed through a long transmission channel to drive a large display screen. However, due to a size limit of a printed circuit board (PCB), the PCB has to be separated into several substrates, and thus, an influence on a reflected wave increases at a connection part between the substrates, thereby causing transmission speed degradation. Accordingly, various methods are used to drive a large display screen, but have difficulties in overcoming technical limits.

SUMMARY

[0004] According to an aspect of the inventive concept, there is provided a display device including a display panel including a plurality of pixel arrangement areas, a data driving unit including a plurality of source drivers, each of which outputs display data to data lines of its corresponding pixels; and a timing controller configured to process data that is input from an external device and configured to generate output data. Each of the plurality of pixel arrangement areas includes a plurality of pixels arranged in areas in which a plurality of gate lines intersect a plurality of data lines. Each of the plurality of source drivers outputs display data to data lines of its corresponding pixels. The timing controller classifies the plurality of pixel arrangement areas based on a distance between the timing controller and each of the plurality of pixel arrangement areas, and transmits the output data to the data driving unit at at least two transmission speeds based on the classification.

[0005] The number of pixels of each of the plurality of pixel arrangement areas may change according to the distance between the timing controller and each of the plurality of pixel arrangement areas.

[0006] The display device may further include at least two transmission channels transmitting the output data from the timing controller to the data driving unit. At least one of at least two transmission channels transmits the output data at a speed other than speeds at which the other transmission channels transmit the output data.

[0007] The timing controller may include at least two port output terminals transmitting the output data to the data driving unit at different transmission speeds.

[0008] The plurality of pixel arrangement areas may include a first pixel arrangement area and a second pixel arrangement area. A vertical or horizontal distance from the timing controller to the first pixel arrangement area is shorter than that from the timing controller to the second pixel arrangement area.

[0009] The data driving unit may include a first source driver unit including at least one source driver for outputting a first display data group corresponding to the first pixel arrangement area, and a second source driver unit including at least one source driver for outputting a second display data group corresponding to the second pixel arrangement area. The first source driver unit and the second source driver unit are connected to the timing controller through a plurality of transmission channels.

[0010] A first transmission speed at which the timing controller transmits a first output data group to the first source driver unit may be higher than a second transmission speed at which the timing controller transmits a second output data group to the second source driver unit.

[0011] The number of pixels of the first pixel arrangement area may be greater than that of the second pixel arrangement area, and the amount of data of the first output data group may be greater than that of the second output data group.

[0012] The data driving unit may include an output data buffer unit for receiving the output data from the timing controller. The timing controller may control timing so that the first output data group and the second output data group are simultaneously received by the output data buffer unit.

[0013] The timing controller may include a first port output terminal that transmits the first output data group at the first transmission speed, and a second port output terminal that transmits the second output data group at the second transmission speed.

[0014] The number of electrical interconnection lines through which the first port output terminal is connected to the first source driver unit may be less than the number of electrical interconnection lines through which the second port output terminal is connected to the second source driver unit.

[0015] According to an aspect of the inventive concept, there is provided a display driving device including a display panel including first and second pixel arrangement areas, a data driving unit including a first source driver unit outputting a first display data group to a data line of the first pixel arrangement area and a second source driver unit outputting a second display data group to a data line of the second pixel arrangement area, and a timing controller configured to array data that is input from an external device and configured to transmit output data to the data driving unit at at least two transmission speeds. Each of the first and second pixel arrangement areas includes a plurality of pixels arranged in areas in which a plurality of gate lines intersect a plurality of data lines.

[0016] A printed circuit board (PCB) with the first source driver unit formed thereon may be connected to a PCB with the second source driver unit formed thereon through a bridge cable.

[0017] A vertical or horizontal distance from the timing controller to the first source driver unit may be shorter than that from the timing controller to the second source driver unit.

[0018] The amount of data of the first display data group may be greater than that of the second display data group.