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INTEGRATION OF DISPLAY WITH CAMERA CABLE

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Integration of display with camera cable

Abstract

This invention discloses a display that integrates the camera cable, and the overall hinge up design for such integrated system. The display has pre-made metal lines for camera. The camera is connected to these metal lines. And these metal lines eventually merge with panel eDP as one cable that go through the hinge. This inherent metal lines have overlap area to the display metal lines. In the overlap area there is addition insulator pad and metal pad.

Background

In the NB hinge up, camera cable is required and usually route in the backside of display panel and PCB, which increases overall thickness of laptop hinge up. At least two cables need to go through the hinge, one for display panel, one for camera. Some existing solution is to recess (cut) the thickness of A cover, in order to allow the cable routing without too much impact on thickness. But that may cause ME concern or appearance concern. Therefore, reducing the components in the hinge up is one interesting topic for laptop design.

Invention Description

Metal lines are made on the display panel in advance, together with the TFT backplane process. Camera is connected to these metal lines, and eventually merge with display panel eDP as one cable, so only one cable needs to go through the hinge. And the total pin number of the cable is reduced, because some pins like ground pin and power pin can be shared between panel and camera.

Further, in order to avoid the signal interference between camera and display, some structure modification is needed for the overlap area of camera metal lines (vertical, red color) and display metal lines (horizontal, black color). Conventionally the vertical metal line and horizontal metal line are two different metal layers, with an insulator in between. In order to minimize the interference, we have two addition design options: (1) Add a second insulator on this overlap area. It makes the distance of two metal line longer. (2) Further add a metal pad on this overlap area. The metal can block the signal coupling effect.

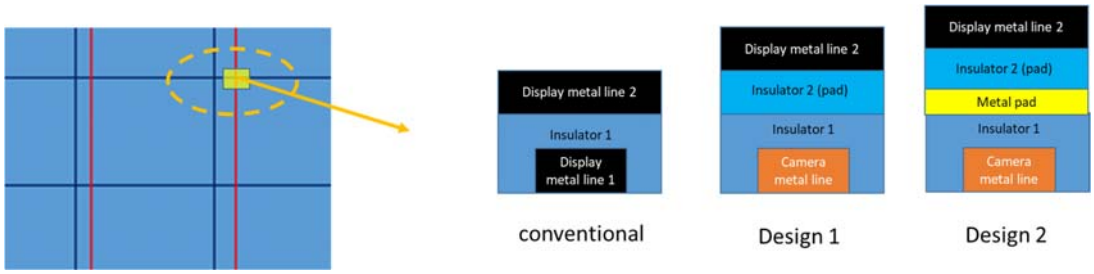

Figure 1. Structure of integrating camera and display signal lines.

Advantages

- Integration design of camera and display.
- Save cable routing thickness and space.
- Total pin number of cable is reduced.
- Minimize the signal interference between camera and display.

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