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## **Display cover panel with partial offset layer**

### **ABSTRACT**

This disclosure describes a protection layer for a display panel that includes layers that are flush with the display panel and a partially offset metal layer. The partially offset metal layer enables laser cutting of the display panel and protection layer, while the flush layers provide additional protection to the display panel. The protection layer includes a metal layer, a foam layer, and an embo layer that are laminated together. The metal layer includes an offset relative to the display panel while the foam and embo layers do not include the offset. A laser cutting process is used to cut the protection layer and display panel. The foam and embo layers are cut along with display panel during the laser cutting process. The foam and embo layers provide protection for the edge region of the display panel.

### **KEYWORDS**

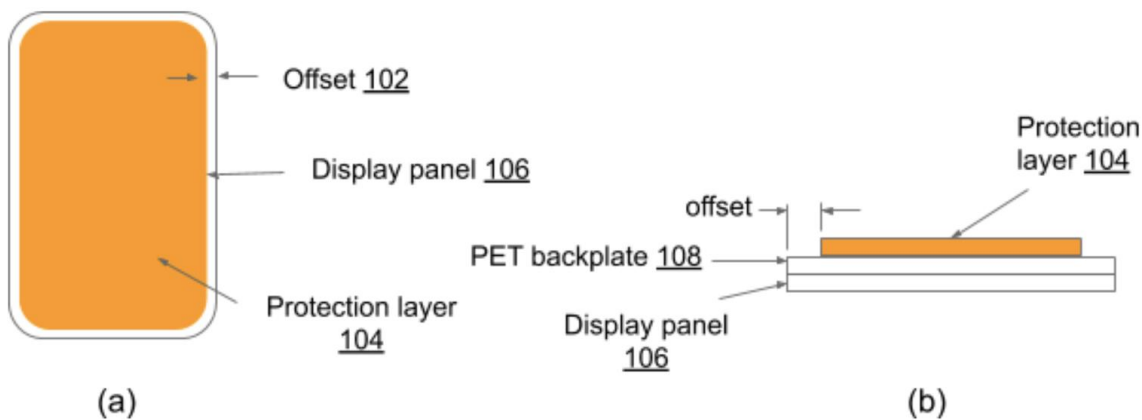
- Display cover
- OLED display
- Protection layer
- Growing dark spot (GDS)
- Growing black spot (GBS)
- Display panel
- Laser cutting

### **BACKGROUND**

A display panel of a computing device such as a smartphone, tablet, etc. is usually provided with a protection layer of a display cover panel or metal plate towards its rear surface.

The protection layer includes a metal layer and provides mechanical protection, electrical shielding, and electrical grounding for the display panel.

Fig. 1 illustrates example plan and cross-sectional views of a typical protection layer (104) attached to a polyethylene terephthalate (PET) backplate (108) of a display panel (106). As can be observed in the figure, a cutting and lamination tolerance offset (102) is provided between the protection layer and display panel since it can be difficult for the protection layer (due to the presence of metal) to be trimmed together with the display panel during manufacture.



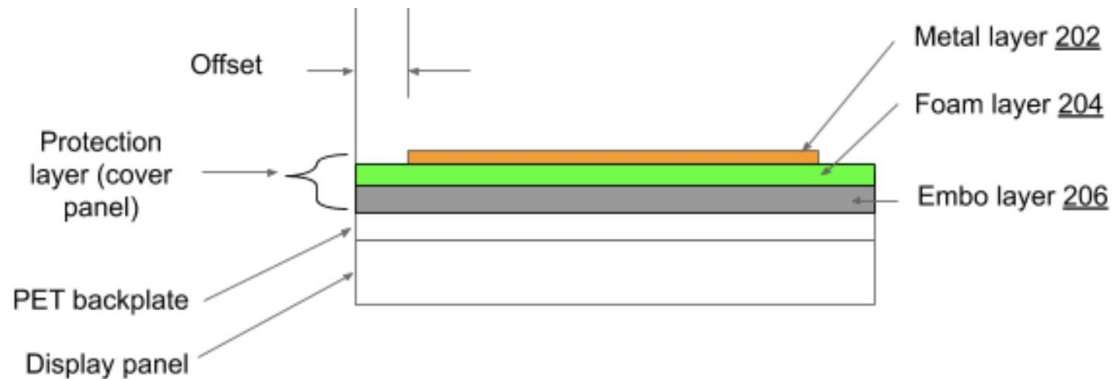
**Fig. 1: Display panel and display cover (a) plan view; (b) cross-sectional view**

The offset can cause the edges of the display panel to be exposed and leave the display panel only partially protected. Consequently, the display panel region near the edges, particularly in organic light emitting diode (OLED) designs, is susceptible to damage, e.g. from handling, shipping, etc. and can develop spots, e.g., growing black spots or dark spots.

**DESCRIPTION**

This disclosure describes a protection layer for a display panel that includes layers that are flush with the display panel and a partially offset metal layer. The partially offset metal

layer enables laser cutting of the display panel and protection layer, while the flush layers provide additional protection to the display panel.



**Fig. 2: Offsets in the copper layer allow for easy cutting while the foam and embo layers provide protection**

Fig. 2 illustrates an example protection layer (cover panel) and display panel, per techniques of this disclosure. The cover panel includes 3 layers: a metal layer (202), e.g., of copper, steel, etc.; a foam layer (204); and a light-shielding embo layer (206) that typically includes PET and acrylic adhesive. The cover panel is manufactured by lamination of the different layers.

As can be observed in Fig. 2, the metal layer is sized such that an offset is provided when the metal layer is placed over the display panel, while the foam and embo layers do not include the offset. The metal layer is pre-cut to its final size before lamination.

During manufacture of the display, a laser cutting process is used to cut the protection layer and display panel. The foam and embo layers can be cut easily along with display panel during the laser cutting process and is enabled by the offset in the metal layer. The foam and embo layers provide improved protection for the edge region of the display panel.

The techniques of this disclosure enable improved product design (e.g., a narrower border) in devices. System components can be attached to the exposed PET backplate portion (the area shown where the protection layer is partially offset) and derive the benefit of protection by the foam and embo layers.

## CONCLUSION

This disclosure describes a protection layer for a display panel that includes layers that are flush with the display panel and a partially offset metal layer. The partially offset metal layer enables laser cutting of the display panel and protection layer, while the flush layers provide additional protection to the display panel. The protection layer includes a metal layer, a foam layer, and an embo layer that are laminated together. The metal layer includes an offset relative to the display panel while the foam and embo layers do not include the offset. A laser cutting process is used to cut the protection layer and display panel. The foam and embo layers are cut along with display panel during the laser cutting process. The foam and embo layers provide protection for the edge region of the display panel.