

2.1.4 Introduction to TFT-LCD manufacturing processes

Before we introduce the manufacturing processes for Thin Film Transistor Liquid Crystal Display (abbreviated as TFT-LCD), we will introduce first the basic structure of TFT-LCD as shown in the figure; we can see from the figure that TFT array circuit is formed at the bottom glass substrate and color filter and corresponding electrodes are formed at the top glass substrate, Liquid Crystal material is injected in between two glass substrates to form the general LC Cell; meanwhile, the exterior side of two glass substrates is pasted with Polarized Plate to form the basic structure of TFT LCD display.

The manufacturing technology of TFT-LCD is a combination of semiconductor industry technology, chemical material technology and optoelectronic industry manufacturing technology; therefore, its manufacturing technology can be divided into three major steps: TFT Array Process (or called TFT), LC Cell Process (or called cell), Module Assembly Process (or called LCM); for each of the process, in addition to different manufacturing schedule and goal, there are also many complicated production capability and materials constraints.

The correlation among these three processes is:

1. **TFT Array Process:** It is also abbreviated as Array Process. In this process, glass substrate is made into TFT array substrate through processes such as: thin film deposition, exposure, developing and etching, etc.; the process has the characteristics of recycling, but TFT-LCD manufacturing process only takes about 5-7 cycles which is much simpler than that of about 20-30 cycles in the semiconductor wafer fab; TFT-LCD manufacturing technology is very similar to semiconductor manufacturing process which is very mature domestically, hence, the yield rate can always be kept above 90%.
2. **LC Cell Process:** It is also abbreviated as Cell Process. In this process, TFT substrate and color filter finished with Array Process are treated with alignment respectively, meanwhile, aligning machine is used for aligning and pressing action, and then the panel is cut, injected with liquid crystal, pasted with polarized plate and performed with testing, etc.; this process is pretty difficult, and is the part of the current TFT-LCD panel process with lowest yield rate.
3. **Module Assembly Process:** In this process, cut TFT-LCD panel, driver IC, PCB, backlight plate and other exterior components are assembled together

and performed with final product testing; this part of process is not difficult and the yield rate is usually close to 100%.

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