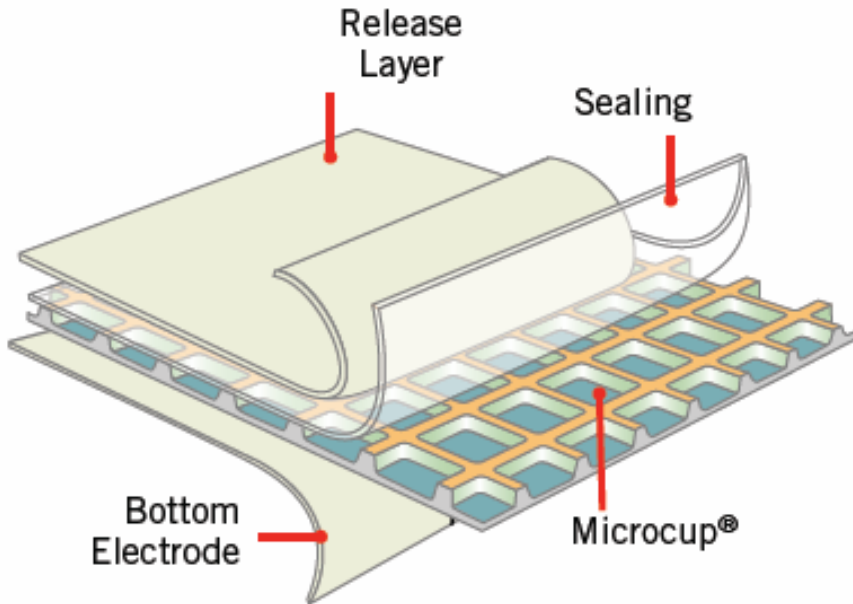


E-Paper Driving Theory

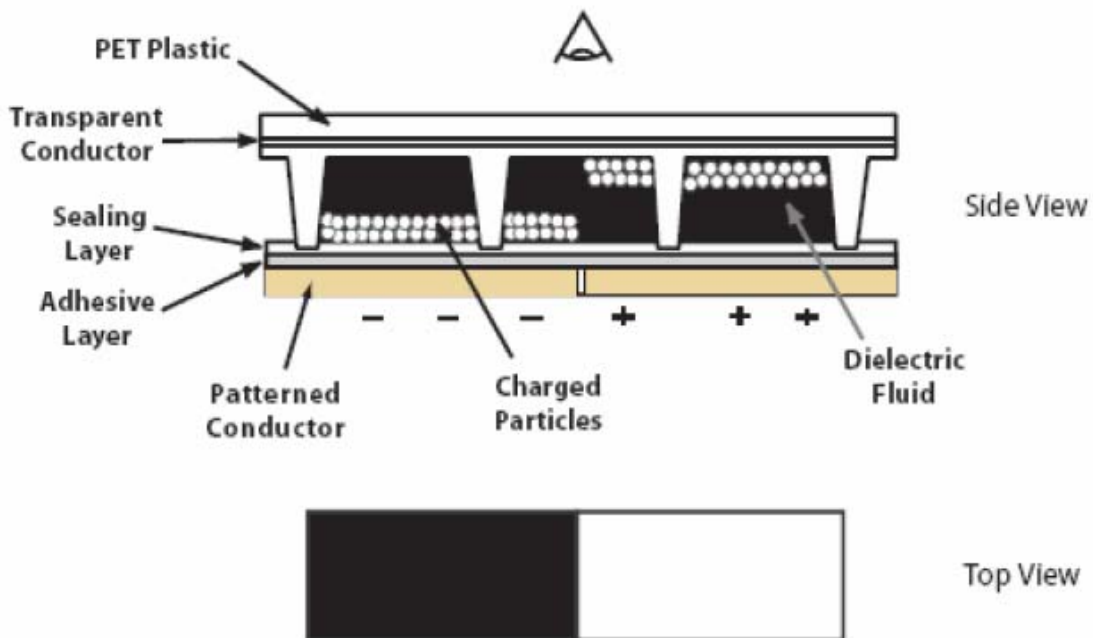
(I) 、E-Paper Technical Theory

1. E-Paper Film Mechanism :

E-Paper is composed of charged particle, which to be put into patent Microcup. (As below diagram)

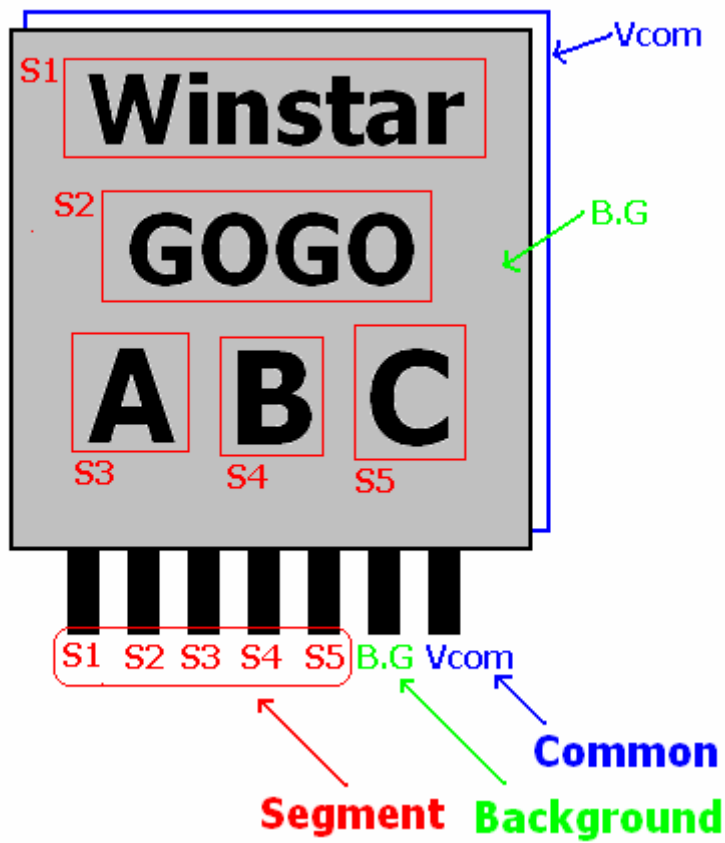


If charged particle is floating on the surface, the color will be white. On the other hand, if white particle is dragged to the bottom, the color will be black. White particle to be on the surface or bottom is controlled by patterned conductor and transparent conductor with electrode. (As below diagram)



2. E-Paper Driving Theory :

E-Paper driving pin has three parts, as below :

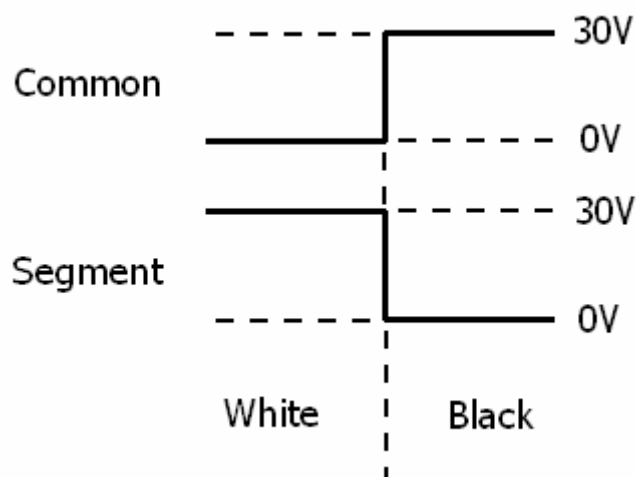


(1) **Common** : Transparent Conductor of E-Paper Film.

(2) **Background** : Background color of E-Paper, which is a big ICON(Segment) that signal driving method is same as Segment.

(3) **Segment** : To display E-Paper ICON.

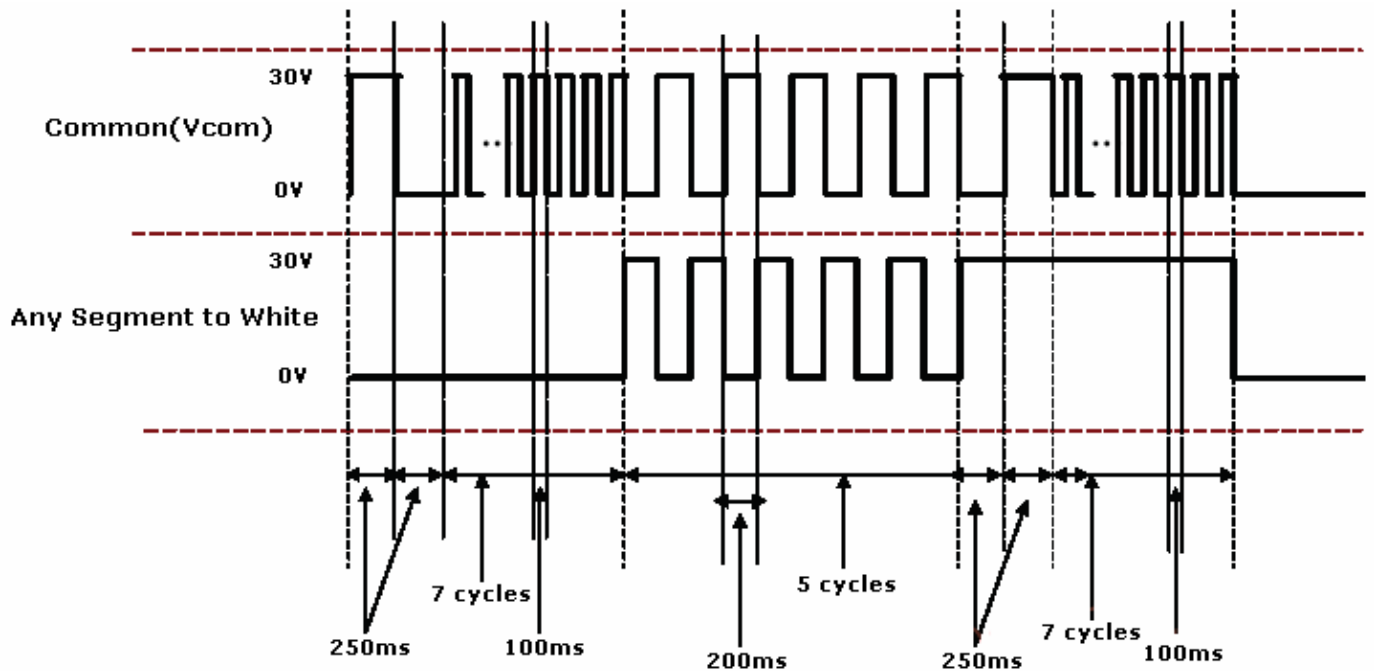
To display ICON black or white, there must be potential difference in common and segment. Waveform as below:



To display White : Common : 0V Segment : 30V

To display E-Paper is very simple, just by inputting difference voltage. One characteristics of E-Paper is when E-Paper is driven successfully, E-paper display will still last even after removing power supply. However, to display longer enough, for example 2 months, it has to be inputted certain waveform of common and segment which is 7-5-7 waveform. Waveform as below;

7-5-7 White Display Waveform :



Common and Segment has to use the above waveform to maintain 2-month display performance.

(II) 、 E-Paper: Technical theory of how to drive

1. DenMOS-DSM040 E-Paper Driver Introduction :

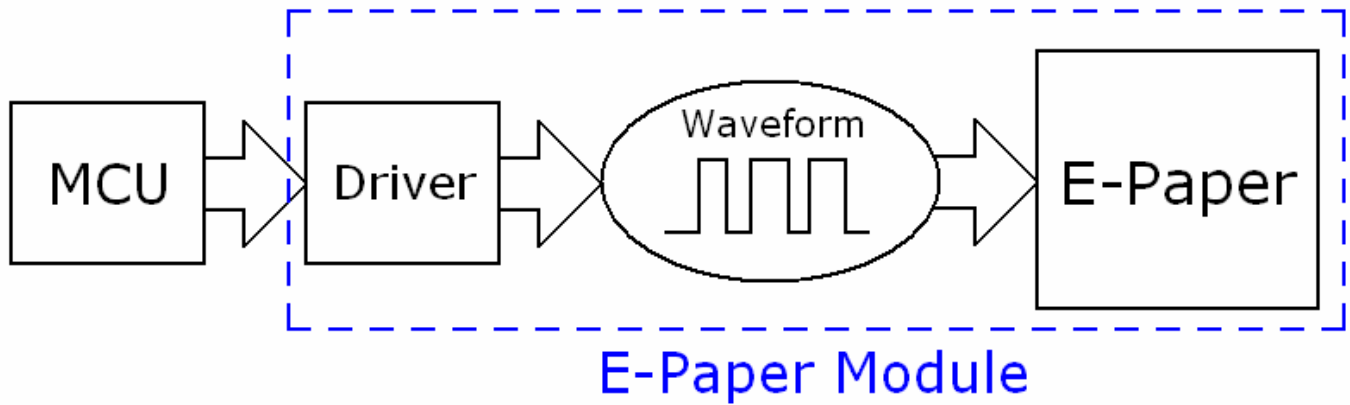
DSM040: Special Driver IC for E-Paper

Specification of DSM040:

- Segment output: 160 Channel.
- Each channel voltage level can be set at High resistor.
- 3 BIT parallel interface.
- Segment/Common driving voltage range : 15V~40V
- Power supply voltage range : 2.0V~5.5V
- IC Operation Temp. : -10°C~75°C (E-Paper Operation Temp. : 0°C~50°C)
- IC Package : Chip On FPC(COF)

(III) Driving Theory of Driver and E-Paper:

Output of Y0~Y161 can be controlled by XCK, LATCH and DI2~DI0 of DSM040, but DSM040 is driver only which can't output Waveform directly. Thus Waveform will be provided by MCU and through DSM040 accordingly to drive E-paper. Below is the control diagram.

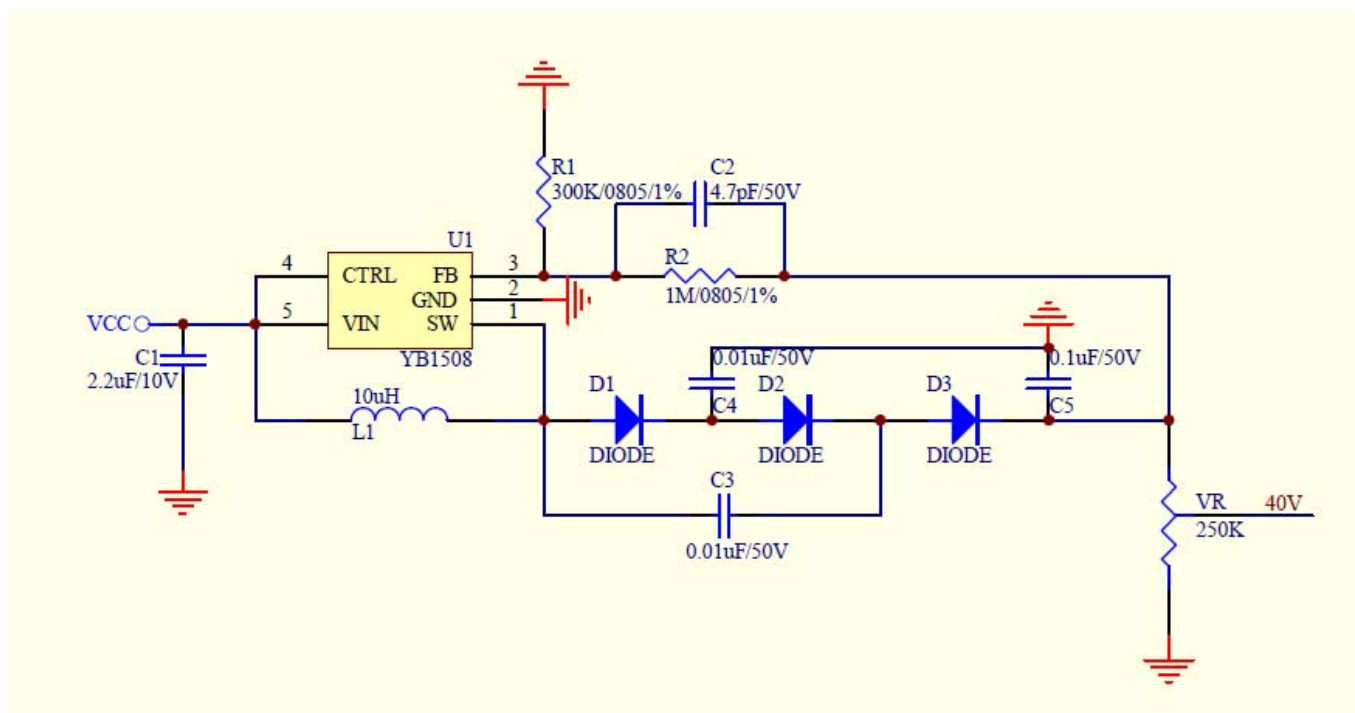


Note : E-Paper Module includes Driver and E-Paper film

(IV) E-Paper Hardware Circuit :

Boost Circuit :

It has to use above 30V input to drive E-Paper. Below Circuit can output 40V.



E-Paper Interface :

