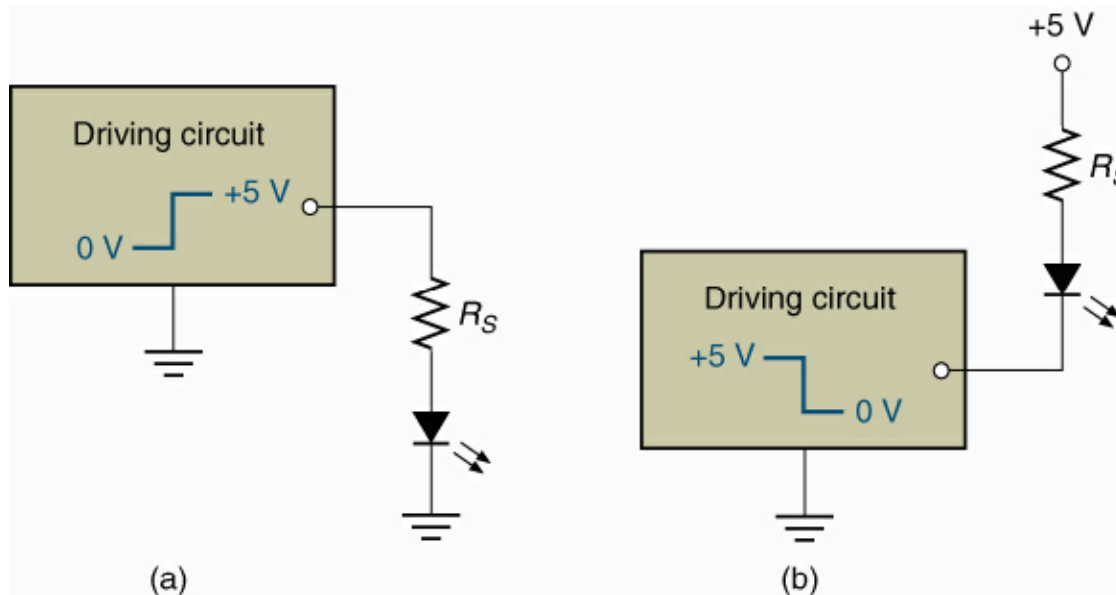


LED Level Indicators

- The LED in circuit (a) lights when the driver output is +5 V.
- The LED in circuit (b) lights when the driver output is 0 V.

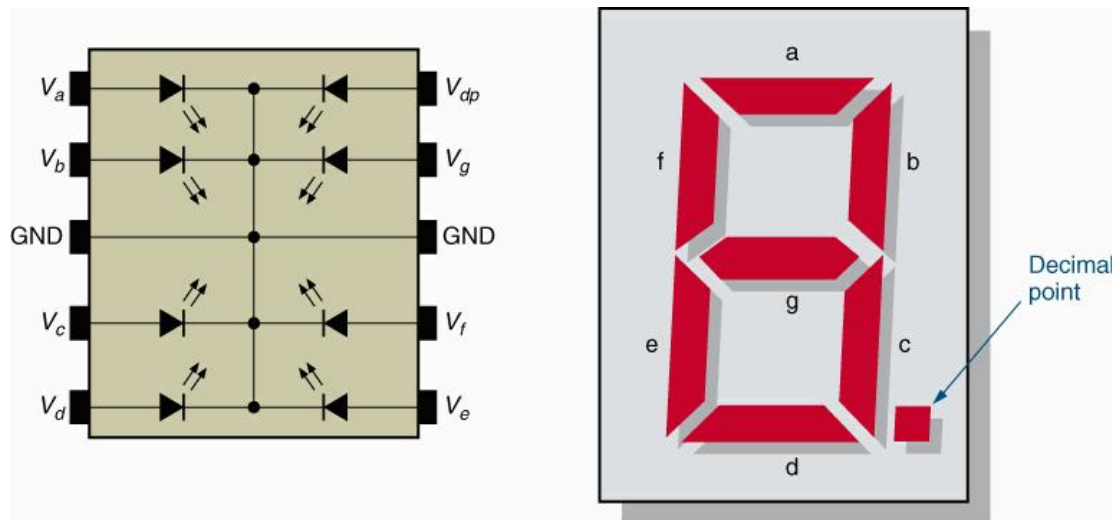


Multisegment Display

- Multisegment display – A device used to display *alphanumeric characters* (numbers, letters, symbols, and punctuation marks).
 - LED displays contain some number of diodes that are connected in a common-cathode or a common-anode configuration.
 - A liquid crystal display (LCD) consists of segments that reflect (or do not reflect) ambient light when provided an active input.

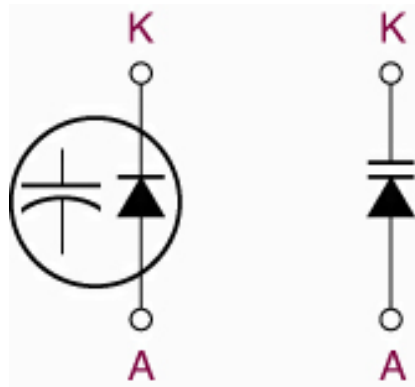
Seven-Segment Displays

- The display uses LEDs that are arranged in a figure 8 configuration.
 - The display represented below is a common-cathode display. Each LED lights when a positive voltage is applied to the appropriate pin.



Varactor Diodes

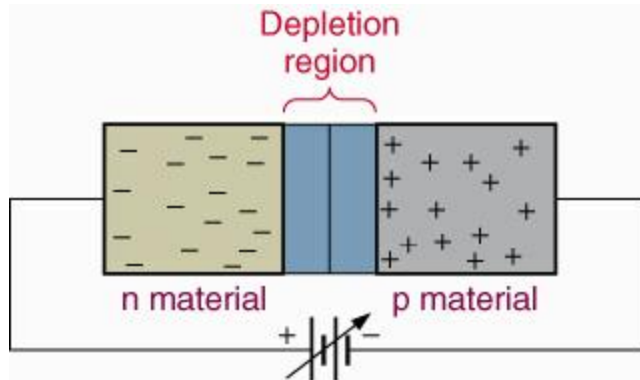
- Varactor diodes have relatively high junction capacitance when reverse biased.



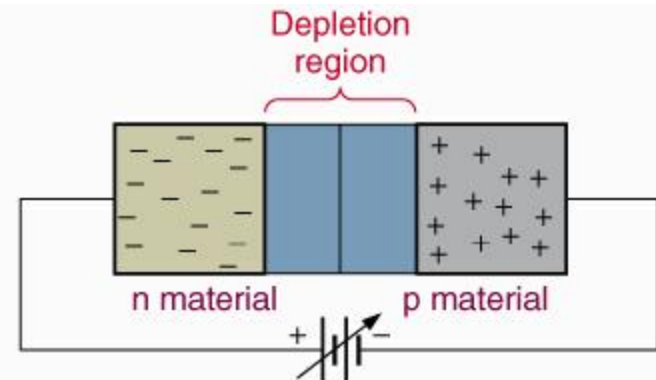
Varactor Junction Capacitance

- The width of the varactor depletion layer (W_d) is controlled by the junction reverse bias.

$$C_t = \epsilon \frac{A}{W_d}$$



(a) *pn* Junction with small reverse bias voltage applied



(b) *pn* Junction with increased reverse bias voltage applied

Varactor Bias vs. Capacitance

Capacitance decreases as the magnitude of reverse bias increases.

