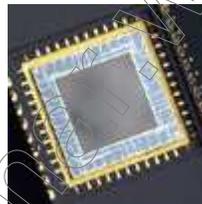


Charge Coupled Device or CCD

CCD is an electronic chip used to collect images of areas which are not accessible to ordinary imaging devices. It is mainly used in **Endoscopy**. The head of the Endoscope has a **CCD** which works on the basis of charge movements which can be converted into **Digital** values. CCD shifts the charge between stages within the device. The **Capacitive Bins** in the CCD are meant for shifting the charges. The CCD is integrated with **Image sensors** so that digital imaging is possible.

The CCD has an **Epitaxial layer of Silicon** which is **Photo reactive** and a **Transmission** region. The Epitaxial layer of CCD is doped with **Boron** which forms the **p- region**. Some areas are doped with **Phosphorous** to form the **n- region**. A **Capacitive dielectric** called **Gate Oxide** is present on the top of the Silicon layer. **Polysilicon gates** are deposited through **Photolithography** to form the phased gates perpendicular to the channels. The channels in the CCD prevent the thermally producing oxides so as to separate the charge packets of the columns.



The Lens assembly projects the image onto the Capacitive array of CCD. This causes accumulation of charge in each capacitor proportional to the light intensity of the imaging area. The **clocking gates** of the CCD change the state **high** and **low** and forward and reverse bias the **n** and **p** doped regions. This will cause **depletion** at the p-n junction so that the charge moves through the channels. The individual capacitor then transfers the charge to the neighboring capacitor like a **shift register**. Finally the last capacitor transfers the charge into a **Charge Amplifier** which then converts the charge into corresponding voltage. The **Control unit** converts all the charge levels into a series of Voltages. These voltages can be sampled and digitalized and stored in memory or displayed through the Monitor.