



Fig 2: various types of photo sensor structures.

Slide 06

The figure 2 shows various types of photo sensor structures.

The type A device, which is the N+P+ junction Esaki diode is not a good photodiode because it has a very narrow depletion width and a very large electric field at the P+N+ junction inside the depletion region causing the large leakage current problems in reverse operation mode.

The type B device of the N+P junction type classical photodiode, which is widely used in classical MOS image sensors and early interline CCD image sensors is known to have the serious image lag problems.

The type E device which is a MOS capacitor type photo sensor has CCD like complete charge transfer operation mode with no image lag problems. However, it has the metal electrode which reflects light like a mirror and also absorbs the short wave length blue light, converting the illuminated light energy into heat.

Moreover the MOS capacitor has inherently the strong surface electric field that creates the serious surface dark current.

The type D photodiode, which is, the P+PN+P junction Pinned Photodiode can have the excellent blue light sensitivity near the silicon surface of 0.2 micro meter in depth, which is the main topics of this paper..