

Definition

CCD (Charge Coupled Device), a video image sensor chip

CCD consists of several hundred thousand individual picture elements (pixels) on a tiny 1/2", 1/3", or 1/4" chip. Each pixel responds to light falling on it by storing a tiny charge of electricity. The pixels are arranged on a precise grid, with vertical and horizontal transfer registers carrying the signals to the camera's video processing circuitry. This transfer of signals occurs sixty times per second.

The 1/3" CCD chip is the most widely used sensor format these days; its size is 5.5mm (diagonal), 4.4mm (horizontal) and 3.3mm (vertical). The 1/4" sensor format, recently being used in color cameras, is 4mm (diagonal), 3.2mm (horizontal) and 2.4mm (vertical).

C-MOS (Complementary - Metal Oxide Semiconductor) chip, also a video image sensor

C-MOS produces much lower quality picture than CCD chip

Comparison

This short documentation is divided into three sections and it is aimed to give a quick orientation for those who choose between CCD and CMOS sensor.

I. Quick Reference

	CCD	CMOS
Power consumption	High	Lower
Sharpness	High	Moderate
System noise	Low	Moderate
Sensitivity	Higher	Lower
Uniform shuttering	Fast	Poor
System complexity	High	Low
Cost	High	Low

II. Key Advantages of CCD sensor

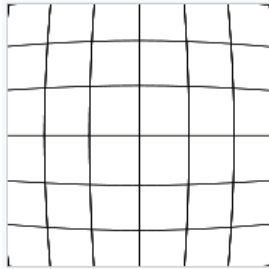
CCDs offer superior image quality and flexibility at the expense of system size. They remain the most suitable technology for high-end imaging application, such as fast moving object, high-performance industrial imaging, and most scientific and medical applications. Furthermore, flexibility means users can achieve greater system differentiation with CCDs than with CMOS imagers.

1. Very low minimum illumination performance

0.2lux	0.5lux	1lux	3200Klux	5100Klux	BLC
CCD sensor					
					
megapixel_ccd_0.2lux	megapixel_ccd_0.5lux	megapixel_ccd_1lux	megapixel_ccd_3200K...	megapixel_ccd_5100K...	megapixel_ccd_backlight
CMOS sensor					
					
		megapixel_cmos_1lux	megapixel_cmos_320...	megapixel_cmos_510...	megapixel_cmos_backl...

2. No geometrical distortions due to a precise two-dimensional construction:

The basic principle of CCD operation is the storing of the information of electrical charges in the elementary cells and then, when required, to shift these charges to the output stage. This is why CCD camera can capture a complete frame instead of read the image data line by line.



geometrical distortion

III. Applications / Conclusion

CCD and CMOS sensor could be applied in different situations and both could be brought into full play provided they meet the right scenario. Generally speaking, CCD sensor is more suitable for outdoor application than CMOS sensor because it functions within a wider range of luminosity. It also outperforms in terms of color representation. For indoor application with fixed luminosity, cameras with CMOS sensor could achieve very similar performance compared with that of CCD sensor. Making certain of your application is essential before deciding the right product.