

Choosing CCD or CMOS Image Sensor

CCD and CMOS image sensors are at the heart of 2D vision. This is where images are captured in photo sensitive pixels and converted to electronic signals for various outputs.

CCD stands for Charged Coupled Device. CCDs capture light onto an array of light-sensitive diodes, each diode representing one pixel.

CMOS stands for Complementary Metal Oxide Semiconductor. Like CCDs, CMOS imagers include an array of photo-sensitive diodes, one diode within each pixel. Unlike CCDs, however, each pixel in a CMOS imager has its own individual amplifier integrated inside.

The key features of CCD and CMOS are:

- Both CCD and CMOS sensors capture moving labels
- CCD can capture at speeds up to 60 frames per second
- CMOS can capture at speeds up to 30 frames per second
- CCD collects light more efficiently which means it can read lower contrast symbols.

Taken together, the CCD would typically be the choice for applications with higher line speeds and less symbol contrast. On the other hand, because CMOS is less costly to manufacture, it might be the preferred option when line speeds and marking conditions are not too severe.

The table below provides a checklist and may be helpful in making the decision between CCD and CMOS:

CCD vs. CMOS Checklist

	CCD	CMOS
Marking Method		
• Thermal Transfer	X	X
• Laser Etching - Metal	X	
• Laser Etching - Glass	X	
• Dot Peen Metal	X	
• Curved Surfaces	X	
• Ink Jet	X	
Line Speeds		
• Static (stop and go) applications	X	X
• Lower line speeds	X	X
• Higher line speeds	X	
• Closer product spacing	X	
Price Sensitivity		X