

PENTAX® | 14.6MP CMOS SENSOR TECHNICAL INFORMATION

K20D

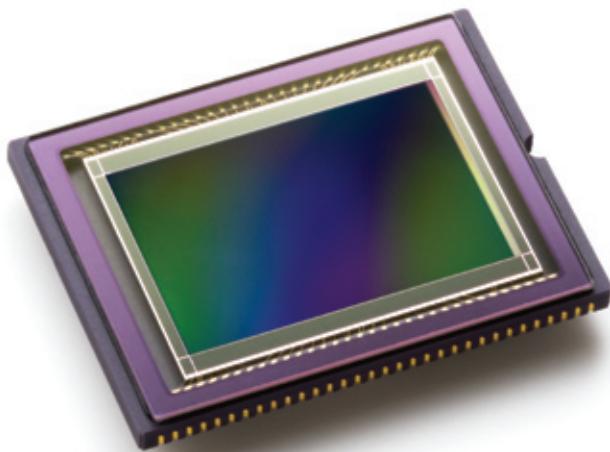
THE NEXT GENERATION

In designing the K20D Digital SLR, PENTAX decided to make the significant transition to a higher resolution 14.6 megapixel sensor, rivaling the detail previously only found in images captured with 35mm film. This considerable gain offers 50 percent more resolution than 10 megapixel sensors, and 20 percent more resolution than 12 megapixel sensors, used by our competition. PENTAX Imaging (a leading innovator in the imaging business) collaborated with Samsung Electronics (a market leader in developing and producing semiconductors) in the development of the 14.6 megapixel CMOS Sensor found in the PENTAX K20D Digital SLR.

WHY CMOS?

CMOS, or complementary metal-oxide-semiconductors, (pronounced "see-moss,") are a major class of integrated circuits, and CMOS technology is used in a number of electronics including image sensors. (CMOS is also sometimes referred to as complementary-symmetry metal-oxide semiconductor.)

With a CCD Sensor, light is not amplified at the photo diode; rather, the charge is carried in sequence and converted to voltage. This creates more heat on the sensor, which can lead to increased noise. Any increase in sensitivity is applied at the A/D converter, which in turn amplifies any noise created in the flexible circuit boards and mother board.



Two important characteristics of CMOS devices are high noise immunity and low power consumption. Significant power is only drawn when the transistors in the CMOS device are switching between on and off states. Consequently, CMOS devices do not produce as much waste heat as other types of sensors (resulting in less noise) and give longer battery life. CMOS technology also allows a high density of circuitry at the pixel level allowing sensitivity adjustments on the sensor, rather than at the A/D converter. The CMOS sensor converts the signal from the photo diode to voltage at the pixel level and the voltage is amplified at the photo site with built-in components. Noise due to increased sensitivity is independent of other components such as flexible circuit boards and the main circuit board. Additionally, the low heat, low power consumption of the CMOS sensor allows the K20D to offer the Live View function, ideal for critical composition of images, and improved battery life over previous models.

ACHIEVING THE HIGH RESOLUTION SENSOR

Development of the high resolution CMOS sensor required decreasing the size of the peripheral circuitry to maintain photo diode size. The peripheral circuitry of the new sensor is a mere 0.13 micro-meters thick per pixel , which allows the photo diode space to be maximized to over 40 percent of the pixel (typically 30-35% of the pixel); this is the same size as photo diodes on other manufacturers' 12 megapixel sensors. The larger photo diode gathers more light in a shorter time and therefore can respond more sensitively. As a result, the K20D is able to achieve higher sensitivity levels (up to 6400 in the expanded ISO mode). Also, there is a more direct light path to the pixels, allowing higher quality results from classic PENTAX lenses.