Crop Sensor vs Full Frame Sensor Cameras and Lenses

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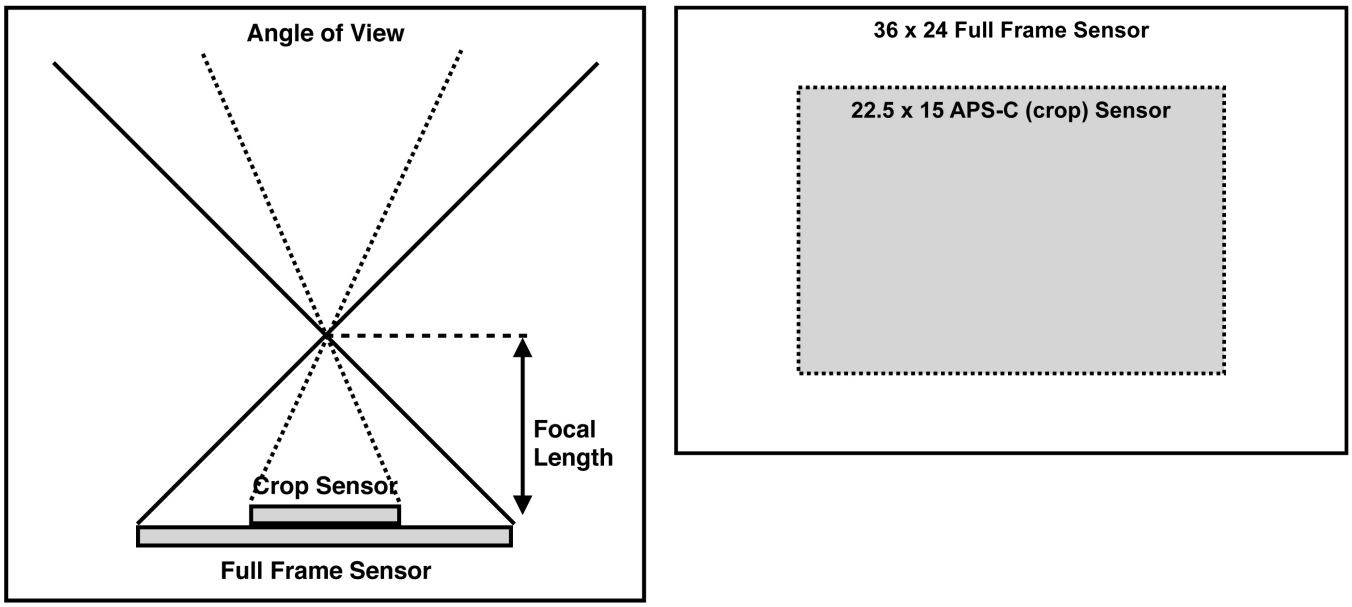
There is a great deal of confusion when it comes to comparing crop sensor camera lenses to full frame camera lenses. Often the specification of a crop sensor lens may be stated as 10 mm with a comparable 35 mm focal length of 15 mm. This may give the user the impression that they will have a 15 mm focal length. This is incorrect. The focal length doesn't change. Only the field of view changes. Therefore, it should be stated that the field of view is the same as a 15 mm focal length lens.

A full frame camera projects an image onto a sensor or film that is 36 mm x 24 mm in size. An APS-C camera projects an image that is 22.5 x 15 mm in size. An APS-C sensor costs less than a full frame sensor.

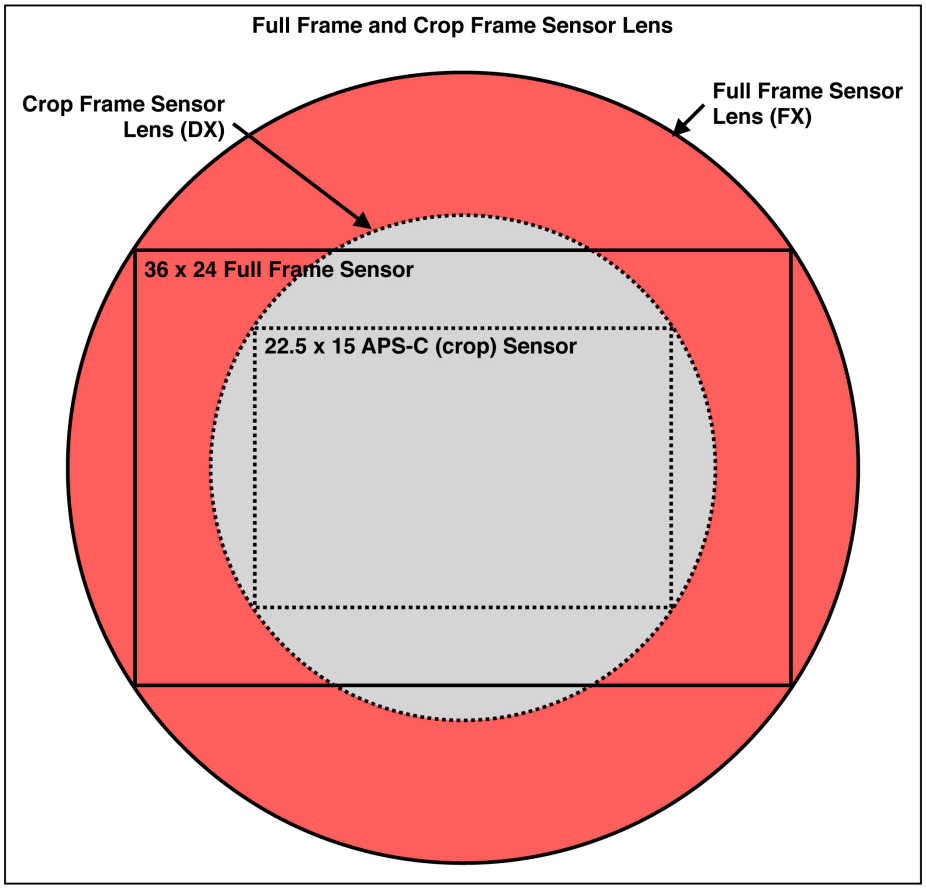
What is of primary concern is the field of view that is produced by these two sensors. As seen in the diagram below, the field of view that is seen by the full frame sensor is wider than the field of view seen by the APS-C or "crop" sensor. The focal length remains the same, which is often confused. The only aspect that changes is the field of view, not the focal length.

Lens and the images projected onto a sensor are round in shape, whereas the sensors are rectangular in shape. The diameter of the circle needs to be larger than the diagonal of the rectangular sensor. A full frame 35 mm lens must have an image circle larger than 43.27 mm. An APS-C camera lens needs to have an image circle larger than 27.04 mm. If an APS-C lens is used on a full frame camera, the image circle would not be large enough to cover the corners of the sensor. If a full frame camera lens is used on an APS-C camera, it will cover the corners of the APS-C sensor.

What makes this concept confusing is that when photos are added to a photo software program, they are often enlarged by the software to a specific size. Most people don't pay attention to the enlargement size in the software. Photos are then presented online using the same frame size, which gives the appearance that they are enlarged. But, the photos are not enlarged from the camera, only from the photo software. In this article, the actual photos are presented in actual size format.

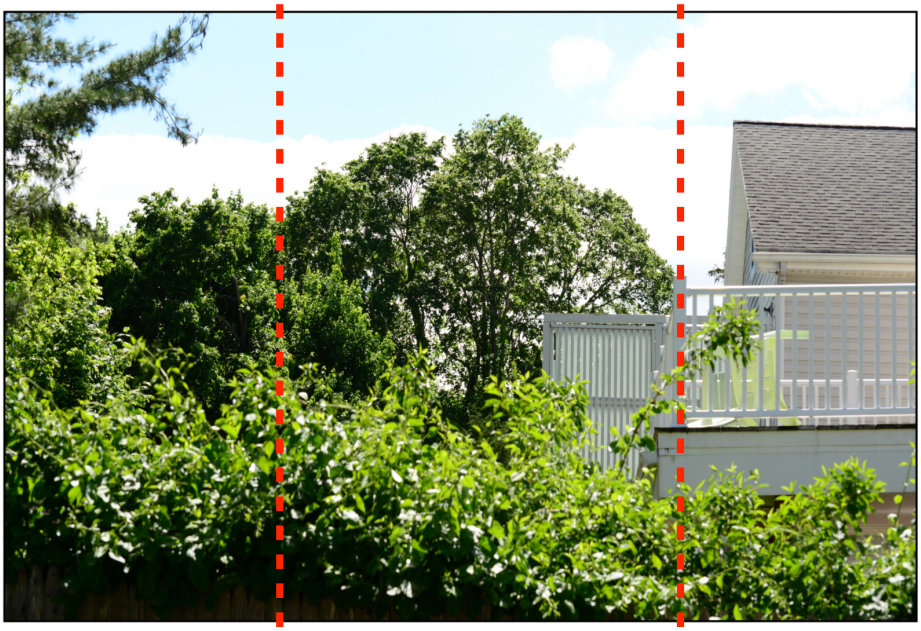


APS-C (Crop Sensor) vs Full Frame Sensor



APS-C (Crop Sensor) vs Full Frame Sensor Lenses

APS-C (Crop Sensor) Camera with 70 mm FX Lens (actual size)



Full Frame Sensor Camera with 70 mm FX Lens (actual size)