

## SENSOR SIZE

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Every digital camera has a sensor, it is the heart of the camera.

The image that the lens 'sees' is projected onto the sensor while the shutter is open and the sensor sends the information pixel by pixel to the camera's engine for preliminary processing before being recorded on the memory card.

Generally speaking, large cameras have large sensors and smaller cameras have smaller sensors.

A full frame DSLR has a sensor which is 24 X 36 mm which has an aspect ratio of (3:2)

In the case of crop frame cameras, Nikon, Sony, Pentax, Fuji etc. have a sensor size of 23.6 X 15.6 mm also with an aspect ratio of (3:2).

Canon has a slightly smaller sensor, 22.2 X 14.8 mm but the aspect ratio is still (3:2).

The next two slides show a comparison of sensor sizes.

## Sensor size comparisons for digital cameras.

PhotoSeek.com

For new digital cameras, a bigger sensor area captures better quality, but requires larger diameter, bulkier lenses. To optimize the size of a serious travel camera, consider 1-inch Type sensor or up to APS-C sensor size.

Full-frame sensor (Nikon FX, Canon EF, Sony FE) = 36 mm wide

**"Full-frame 35mm"** sensor / film size (36 x 24 mm) is a standard for comparison, with a **diagonal field-of-view crop factor** = 1.0

*In comparison, a pocket camera's 1/2.5" Type sensor crops the light gathering by 6.0x smaller diagonally (with a surface area 35 times smaller than full frame).*

**APS-C** Nikon DX, Sony E = 1.5x crop

**APS-C** Canon EF-S = 1.6x crop

**Four Thirds** 4/3" = 2x crop

**1" Type** = 2.7x crop  
Sony RX10, RX100

1/1.7": 4.6x

1/2.5":  
6.0x crop

24 mm

"Medium format" size 48 x 36 mm

Compact & pocket zoom cameras have small, noisy sensors, tiny enough to extend superzoom lens reach.

APS-C sensor gathers 15 times more light (area) than a 1/2.5" Type sensor, and 2.4 times less than Full Frame.

The designations that some manufacturers put on their sensors is very confusing. I can't make head or tail out of what they call a 1/2.5 or a 1/3.2 or a 2/3 or a 4/3 and I still can't see how they come up with 1 inch designation for a sensor which is 12.8 X 9.6 millimeters since 1 inch = 25.4 mm.

While we'd like to see all camera manufacturers listing the size of their sensors in millimeters but I can't see it happening any time soon. So, in the meantime, here's a graphic showing some of the most common sensor sizes in relation to a Full Frame sensor.



Full Frame  
36.00 x 24.00 mm



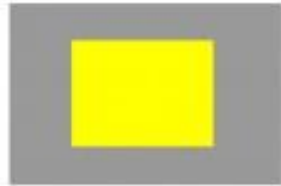
APS-H  
27.90 x 18.60 mm



APS-C  
23.60 x 15.60 mm



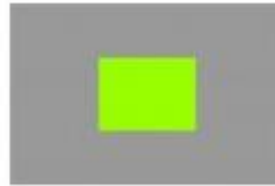
APS-C (Canon)  
22.20 x 14.80 mm



1.5"  
18.70 x 14.00 mm



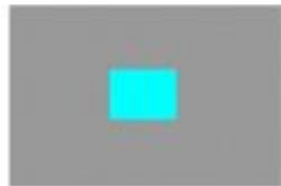
Micro Four Thirds 4/3"  
17.30 x 13.00mm



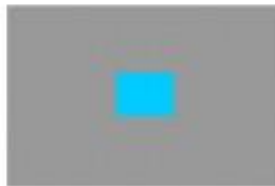
1"  
12.80 x 9.60 mm



1/1.2"  
10.67 x 8.00 mm



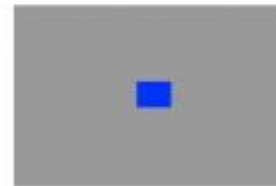
2/3"  
8.80 x 6.60 mm



1/1.7"  
7.60 x 5.70 mm



1/2.3"  
6.17 x 4.55 mm



1/3.2"  
4.54 x 3.42 mm

**SIZE MATTERS -**

**BIGGER IS BETTER!!**

Yes sensor size does matter and bigger is indeed better.

**Bigger sensors have bigger pixels and bigger pixels are capable of gathering more light and have a larger dynamic range.**

This means that you will be able to take pictures in lower light and there will be more detail in the shadows compared to a smaller sensor.

There is also the added advantage of lower noise at the same ISO setting.

While we are talking about sensors let's look at megapixels.

More megapixels will allow you to make your prints larger or crop more severely before objectionable pixilation takes place.

More megapixels means larger file sizes which will fill your memory card (and harddrive) faster and adding more pixels into the same size sensor means that the pixels will be smaller.

So is it counterproductive to have too many megapixels? Possibly. More is not necessarily better when it comes to the number of megapixels a sensor has. You will have to decide how big you are going to print and how large you want your files to be.



One might ask why a new model of a particular camera has more megapixels and yet the manufacturer claims better ISO performance (lower noise). Good question.

Every camera has digital imaging software installed which modifies the image right after the picture is taken and before it is transferred onto the memory card. This software is sometimes referred to as an engine. These engines perform approx. 20 functions to improve the digital image before it is stored on your memory card. Panasonic calls theirs a Venus Engine, Nikon calls theirs an Expeed Engine, Sony call theirs BIONZ and Canon call theirs DGIC, (digital imaging integrated circuit).

One of the things that the engine does is reduce noise. So you will find that the new model camera with more megapixels and "better ISO performance" also has an improved later model engine.

If the camera has twice as many megapixels and the engine is only twice as good there would be little or no difference in ISO performance. However if the engine is four or eight or more times as good your new camera could be a real winner.

These engines are constantly being refined and improved and are differentiated by their generation, e.g. Expeed 4, Venus 2, etc.

For example, my Nikon D7000 has a 16 megapixel sensor and an Expeed 3 engine and I would not want to go much higher than ISO 6400. My Nikon D7200 has a 24 megapixel sensor and an Expeed 4 engine and I have taken quite good pictures at ISO 25,600.

Is all this just too much information for you to consider when looking for a new camera? How do you make an intelligent decision? You don't have the equipment to do the highly technical tests so you probably can't make the best decision all by yourself.

Look at what the manufacturer claims then go on-line and read the reviews to see if the manufacturer is being too optimistic. Some of the glowing reviews may be biased. (The manufacturer may be nudging the reviewer.) and some of the bad reviews may be biased. (The competition may be nudging the reviewer.) The reviews somewhere in the middle will probably be the most honest.

As long as the engines keep ahead of the megapixels there should be no problem with performance and the only downside may be the large files that you have to deal with. Photography is all about compromises.

I hope that this has shed some light on sensors (no pun intended).