

Understanding DPI and Pixel Dimensions

Dear Customer,

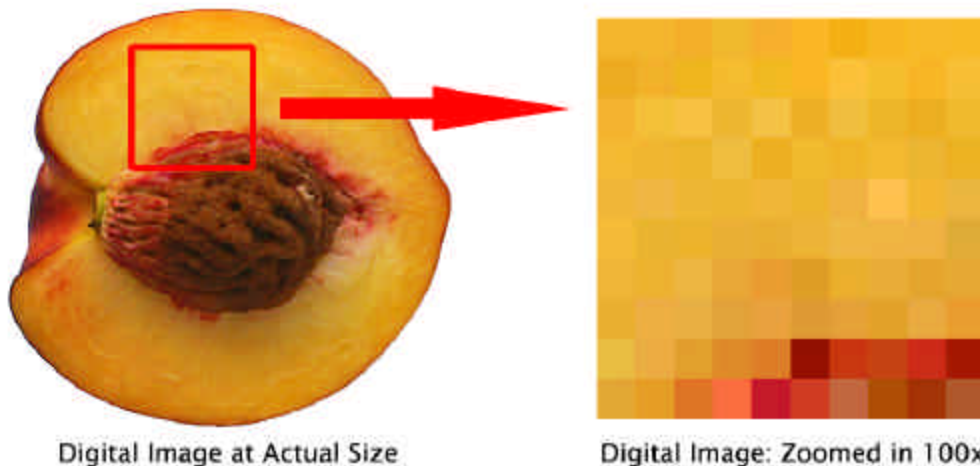
Thank you for visiting iPrintfromHome.com.

We have prepared this document to help you prepare your digital files to get the best possible Photographic Prints and Fine Art Prints. Over the next few pages, we provide information about the meaning of DPI and we explain how the pixel dimensions of a digital file will impact the clarity and resolution of prints that you produce from that digital file.

If you have any questions about the process of ordering Photographic Prints and Fine Art Prints from digital files, please contact us at www.iPrintfromHome.com/contact.asp.

Take Care,
the iPrintfromHome.com team

Introduction



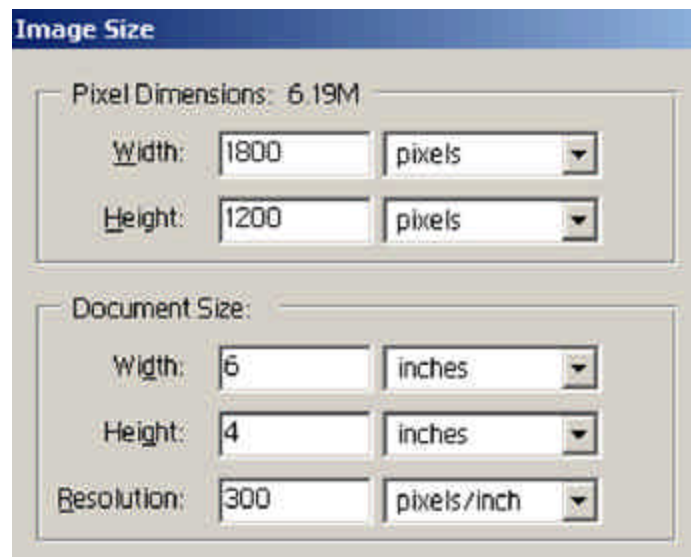
Digital images are made up of square-shaped dots (pixels). And, the more dots a digital image has, the clearer the image, which is why you want to use high resolution (lots of dots) images to make Photographic Prints and Fine Art Prints.

Definitions

Pixel dimensions: The total pixel dimensions of an image will tell you how many total pixels (dots) the image is made up of. For example, let's say we have a digital image that is 1200x1800 pixels (dots). That means our digital image is 1200 dots high by 1800 dots wide.

Digital Image Size: The size in inches of your digital image. In the table pictured below, the digital image size is shown as "Width: 6 inches" and "Height: 4 inches". This table was found in PhotoShop by going to Image >> Image Size.

DPI of digital image: DPI means **Dots Per Inch**. This number is calculated using your digital image's pixel dimensions and digital image size. In the table pictured below, the DPI is shown next to "Resolution" as 300 pixels/inch.



Output (Print) Size: The size in inches of the print that you want to make from your digital file. For example, if you order a 4x6 print, your output (print) size is 4 inches x 6 inches.

DPI of print: DPI means **Dots Per Inch**. This number is calculated using your digital image's pixel dimensions and the output size (size of your print).

Pixel Dimensions and DPI

There are three different ways to describe a digital image's resolution that essentially mean the same thing: (1) total pixel dimensions, (2) DPI at a certain digital image size, and (3) DPI at a certain output size.

The total pixel dimensions of an image will tell you how many total pixels (dots) the image is made up of. For example, let's say we have a digital image that is 1200x1800 pixels (dots). That means our digital image is 1200 dots high by 1800 dots wide. So, unless you resample (which means you artificially alter the pixel dimensions in a photo editing program) or crop the image, your image will **always** be 1200x1800 pixels.

People regularly discuss digital images in terms of DPI, which stands for **Dots Per Inch**. The DPI of a digital image is calculated by dividing the total number of dots wide by the total number of inches wide OR by calculating the total number of dots high by the total number of inches high.

For example, let's say we have a digital image that is 1200x1800 pixels (dots) and 4x6 inches in size. That means our digital image is 1200 dots high by 1800 dots wide and 4 inches high by 6 inches wide. Our digital image has 300 DPI. I figured that out by dividing the number of dots wide by the number of inches wide:

$$\frac{1800 \text{ dots wide}}{6 \text{ inches wide}} = \frac{300 \text{ dots}}{1 \text{ inch}} = 300 \text{ Dots Per Inch}$$

Why is DPI so Confusing?

DPI is so confusing because people forget that the DPI of a digital image is not necessarily the same as the DPI of a print made from that digital image. If the digital image size and the print size are the same, then the DPI of the digital image will be the same as the DPI of the print. But if your print size is different than your digital image size, your digital image will have a different DPI than your print.

For example, you may have a digital image that is sized at 4x6 inches, but you may want to make a Photographic Print that is sized at 20x30. Accordingly, in this case, the DPI of your digital image will not be an important factor to consider when preparing your digital image because it does not tell us anything about the resulting print.

And, to confuse things further, *the very same digital file can produce prints that have many different DPIs*. That is because, when you use the same digital file to produce different sized prints, you are using the same number of dots to fill different sized spaces.



As you can see in the above illustration, when you use the same image to make two different sized prints, the prints will not necessarily look the same. The print on the left (the small print) looks sharp and clear, while the print on the right (the large print) looks fuzzy and pixelated (meaning you can see the individual pixels).

There are fewer **Dots Per Inch** in the larger print, which is why you can see them (the image looks pixelated). Even though we used the same digital file to make both prints, each print has a different DPI. That is because we used the same digital file (a certain number of dots) to fill a small space (4x6 inches) and a large space (20x30 inches). When you fill a large space with a limited number of dots, you've got to blow up the dots (make them bigger) to fill up the space.

That is why a photographic print made from a low-resolution digital file appears grainy or pixelated: the dots are so big that you can see them.

Now, let's say we have a digital image that is 1200x1800 pixels (dots). That means our digital image is 1200 dots high by 1800 dots wide. If we take all those dots and make a 4 inch x 6 inch Photographic Print, we will have a print that is 300 DPI. I figured that out by dividing the number of dots wide by the number of inches wide:

$$\frac{1800 \text{ dots wide}}{6 \text{ inches wide}} = \frac{300 \text{ dots}}{1 \text{ inch}} = 300 \text{ Dots Per Inch}$$

If we take the same image and make an 20 inch by 30 inch print, we will have a print that is 60 DPI. Again, I figured that out by dividing the number of dots wide by the number of inches wide:

$$\frac{1800 \text{ dots wide}}{30 \text{ inches wide}} = \frac{60 \text{ dots}}{1 \text{ inch}} = 60 \text{ Dots Per Inch}$$

As you can see, DPI is a relative term. The same image can produce two prints with two different DPIs. So, where does that leave us? Well, we can continue discussing our digital images in terms of DPI, but we need to remember to always pair that number with inches. For example, if we were going to talk about the image we used to make the 4x6 and 20x30 prints, we would say it has a DPI of 300 at 4x6 and/or it has a DPI of 60 at 20x30.

Alternatively, we can discuss images in terms of pixel dimensions, which we think is a whole lot easier because it is a *constant* term. A constant term doesn't change and it doesn't depend on anything. You can say your image is 1200x1800 pixels and it doesn't matter if you intend to print a 4x6 or a 20x30. You can simply say, "I have an image that is 1200x1800 pixels." Which is a lot easier than saying, "My image is 60 DPI at 20x30, and 300 DPI at 4x6, and 100 DPI at 12x18 and so on and so on."

Why is DPI important?

Although DPI may be a little confusing, it can be very helpful when discussing Photographic and Fine Art prints because a print with sufficient **Dots Per Inch** will appear sharp, not fuzzy or pixelated.

At iPrintfromHome.com we recommend that customers prepare their files so that their Photographic Prints will have a DPI somewhere between 150 and 300. We chose those numbers because our experience has shown us that a print with at least 150 DPI will satisfy most customers (the image will look sharp) and 300 DPI is the maximum resolution at which we produce our prints.

We use those DPI targets (150 DPI minimum and 300 DPI maximum) to figure out our minimum and maximum file size recommendations for different sized Photographic Prints. In the table below, the minimum recommended file size will make a Photographic that has 150 DPI and the maximum recommended file size will make a Photographic Print that is 300 DPI.

Print Size	MIN File Size	MAX File Size
4x6	600x900	1200x1800
5x7	750x1050	1500x2100
8x10	1200x1500	2400x3000
8.5x11	1275x1650	2550x3300
8x12	1200x1800	2400x3600
11x14	1650x2100	3300x4200
12x18	1800x2700	3600x5400
16x20	2400x3000	4800x6000
16x24	2400x3600	4800x7200
20x24	3000x3600	6000x7200
20x30	3000x4500	6000x9000

According to the table, if you want a 12x18 Photographic Print with a DPI of 300, you would want to use a file with 3600x5400 pixels. We figured that number out by multiplying the number of inches by the desired DPI:

$$(12 \times 18) \times 300 = (12 \times 300) \times (18 \times 300) = 3600 \times 5400$$

To find out more about our file size recommendations for Photographic Prints, please go to iPrintfromHome.com >> Photographic Prints >> File Size: Photographic Prints.

To find out more about our file size recommendations for Fine Art Prints, please go to iPrintfromHome.com >> Fine Art Prints >> File Size: Fine Art Prints.

Looking Forward

Now that you know how to calculate DPI and you know why it's important, you're on the right track to making more satisfactory Photographic and Fine Art Prints at iPrintfromHome.com.

If you still have questions after reading this article, feel free to contact us at www.iPrintfromHome.com/contact.asp so that one of our customer service representatives can be of further assistance.