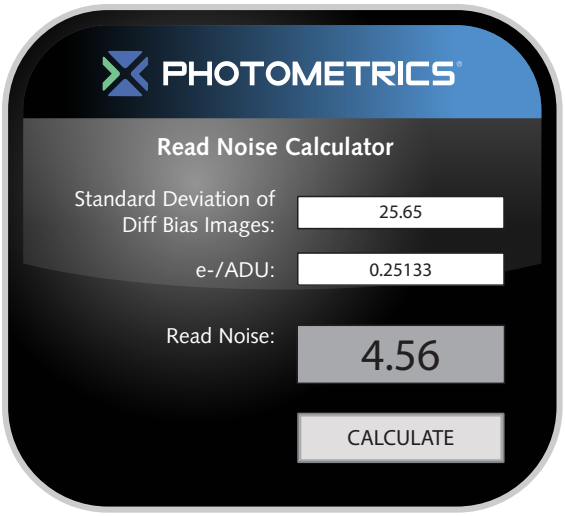
Read Noise Calculator



Read noise is the amount of noise generated by electronics as the charge present in the pixels is transferred to the camera. It is a combination of all the noise generated by system components which convert the charge of each CCD pixel into a signal for conversion into a digital unit (ADU or grey-scale value). Since read noise is added to each pixel as it is read out, it is applied uniformly across the CCD as the data is read out.

A lower read noise is always desirable. It gives you the ability to detect very weak signals that would otherwise have been hidden below the noise bed. It also allows for a higher dynamic range, enabling you to detect the difference in signal levels much more accurately.

Read noise is calculated by using the equation:

$$\textit{Total System Read Noise} = \frac{\textit{Standard Deviation Diff Image} * \textit{Gain}}{\sqrt{2}}$$

You begin by taking 2 bias (0ms exposure) images. Using imaging software, subtract one image from another. This results in a differential image of the biases. Continue by taking the standard deviation of the differential image on a pixel per pixel basis. This is the value that you want to multiply by your gain.

If you do not know the exact value of your gain, use the Single Point Mean Variance calculator provided on the Photometrics website.

Once you have value of the gain, and the standard deviation from the differential image, you are able to calculate the read noise of your camera system.

To take a more in-depth look into how the read noise equation is derived, please refer to the Mean Variance technical note on the Photometrics website.

The read noise is an important factor that determines the ability of your camera. It allows for detection of weak signals which might not be otherwise detected and allows for a much higher dynamic range.

The Read Noise Calculator is available at
http://www.photometrics.com/resources/whitepapers/read-noise.php

PHOTOMETRICS
USA 520.889.9933
Asia Pacific +65.6841.2094
France +33.1.60.86.03.65
Germany +49.89.660.779.3
Japan +81.3.5639.2731
UK +44.1628.890858
www.photometrics.com
info@photometrics.com