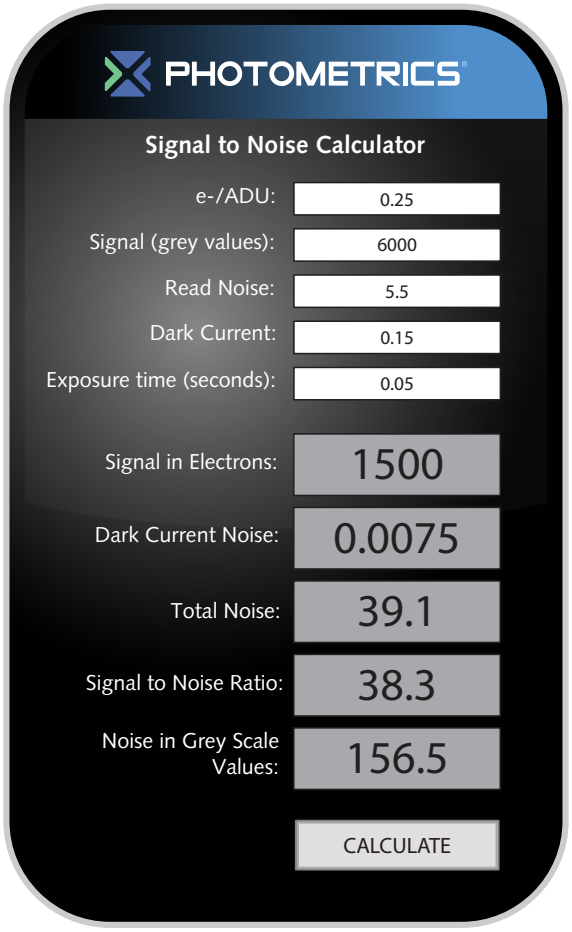
Signal to Noise Ratio Calculator



In each image taken by a camera, noise is contributed by various components including the CCD or CMOS sensor. The different types of noise in a camera are typically read noise, noise from dark current, and noise present in the signal of the image itself.

The Signal to Noise Ratio (SNR) is the defining factor when it comes to quality of measurement. A high SNR guarantees clear acquisitions with low distortions and artifacts caused by noise. The better your SNR, the better the signal stands out, the better the quality of your images, and the better you ability to see the results you desire.

Shot noise is used to measure the amount of noise present in any image acquisition as it takes into account all the different sources of noise present in the image. Shot Noise is defined as:

$$Shot\ Noise = \frac{N}{\sqrt{N}} = \sqrt{N}$$

where N is the total amount of signal measured.

To find the total signal then, we need to find the amount of signal contributed by noise. By squaring the value of the noise, we arrive at the signal value.

$$Signal\ Due\ to\ Noise = Noise^2$$

To find the total amount of signal being measured we need to account for the signal generated by read noise and dark current.

$$Total\ Signal = Actual\ Signal + Read\ Noise^2 + Dark\ Current\ Noise^2$$

By calculating the shot noise of the total signal, you arrive at the value of total noise present in your acquisition.

$$Total\ Noise = \sqrt{Total\ Signal}$$

From here, you can calculate your SNR.

$$SNR = \frac{Actual\ Signal}{Total\ Noise}$$

By using these measurements, you can ensure that your image acquisitions are at an acceptable signal-to-noise ratio, allowing for cleaner, crisper images.

The Signal to Noise Ratio Calculator is available at http://www.photometrics.com/resources/whitepapers/signal-to-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