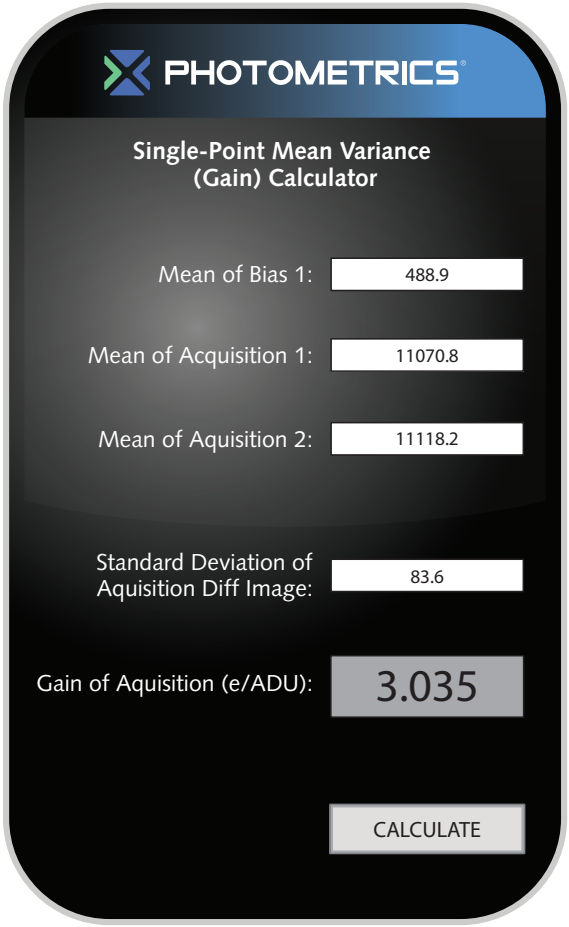
Single-Point Mean Variance Calculator



When light is detected by the camera, it needs to be processed and quantified, so that the data displayed to the user is accurate and precise. This quantization process is the application of the camera system gain. This system gain can vary from camera to camera, depending on a few factors ranging from camera electronics to CCD properties. To be accurate in the quantization process, each camera needs to be benchmarked for its specific system gain.

The mean-variance test is an experimental way to determine the gain. The premise of this test is rather simple: If the amount of light (photoelectrons) going into the camera is linearly increased, is the response of the camera (ADUs or Grey levels) also linear? With a linear response it becomes apparent that a constant gain value is being applied by the camera.

The single-point mean variance calculator allows you to determine the exact gain being applied to your image by calculating the linear relationship corresponding to your current camera setup.

To accomplish this calculation, you will need to do some image calculations using your imaging software.

1. Begin with 1 bias image and 2 acquisitions.
2. Using the software, calculate the difference between the 2 acquisitions. This will be your diff image.
3. Using the software, calculate the standard deviation of the diff image.

$$Variance_{Image1-Image2} = \frac{(standard\ deviation_{diff\ image})^2}{2}$$

The gain is then calculated using the equation below:

$$Gain = \frac{Average\ of\ Acquisitions}{Variance_{Image1-Image2}}$$

The result is your gain value in e^-/ADU.

The mean variance test allows us to measure and characterize each camera specifically and to provide you with this data in the form of a Certificate of Performance which goes out with every camera. It is an established method used by Photometrics to ensure that you are provided with the highest quality of results.

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