Allied Vision

APPLICATION NOTE

Usage of Heat Sinks with Goldeye Cameras

V 1.0.0
2015-Jul-28

Introduction

The image quality of an SWIR camera strongly depends on the sensor temperature. Compared to CCD and CMOS sensors, the dark current of InGaAs sensors is relatively high: several thousands of electrons/pixel/s resulting in thermal noise. As a rule of thumb, the noise doubles for every 6-8 K of sensor temperature. Therefore, keeping the sensor at a constant, preferably low, temperature is essential for a good image quality.

Goldeye standard camera models may not be able to dissipate sufficient heat without a good thermal connection. This may result in a decreased performance of the sensor cooling.

Figure 1: *Goldeye standard model with a single heat sink set applied to the top.*

To increase heat dissipation, Allied Vision offers a heat sink set for Goldeye standard cameras that may be mounted to the top, bottom, left, and right housing sides of the camera.

The Goldeye heat sink set constitutes a modular passive cooling solution. Depending on heat dissipation requirements, a combination of up to four heat sink sets can be applied to one camera where the customers' application allows it.

When and why to use the heat sink?

In many situations, the Goldeye camera can be attached to a solid metal part. This is the most commonly used heat dissipation method.

However, in some situations, for example microscopy applications, a solid metal part to attach the camera is not available. Also, a permanently operating fan provides a rather inconvenient solution because of noise, lifetime, and dust issues.

The heat sink set for Goldeye cameras provides inexpensive cooling capacity for all cases when flexible and effective cooling is required.

Solutions to improve sensor cooling

Below, a number of easy to apply alternative solutions to decrease the case temperature are briefly considered.

- **Mounting the camera to a solid metal part**
  As the usual way to achieve effective heat dissipation, the camera is attached to a solid metal part. However, the size, shape, and material of the metal part, as well as the rate of heat transition is unknown.
- **Using an external fan**
  This is the cheapest way to decrease the camera's housing temperature. There might be environments where this is suitable, but there are obvious disadvantages i.e. dust and noise.
- **External power source versus PoE**
  Powering the Goldeye via the I/O port, for example by using a power adapter, generates less heat dissipation than using Power over Ethernet (PoE) to power the camera.
- **Optimized sensor temperature set-points**
  By setting a higher temperature setpoint, it is possible to reduce the power consumption of the TEC element, which in turn reduces the

internal camera temperature. This might slightly increase the image noise, but could improve the overall system performance.

Important: good thermal connection

Of particular importance when using a heat sink is a good thermal connection between the camera case and the heat sink. This is the only way to ensure an optimal heat dissipation.

The heat sink set for Goldeye standard cameras is equipped with a thermal interface pad to optimize heat dissipation.

Improvements to be expected

Like other external cooling solutions, the heat sink set provides improved heat dissipation. The actual heat dissipation may differ between different Goldeye camera/model types.

Using multiple heat sinks with one camera

Heat dissipation from the camera improves with the number of heat sinks that are used at the same time. The table below gives a general indication about the effects to be expected when using multiple heat sinks.

Note that the table is a guide line only, results may differ due to the actual environmental situation, i.e. air stream or humidity.

Number of heat sinks	Temperature decrease
1	6 K
2	9 K
3	11 K
4	13 K

Table 1: *Indication of expected case temperature decrease when using multiple heat sinks.*

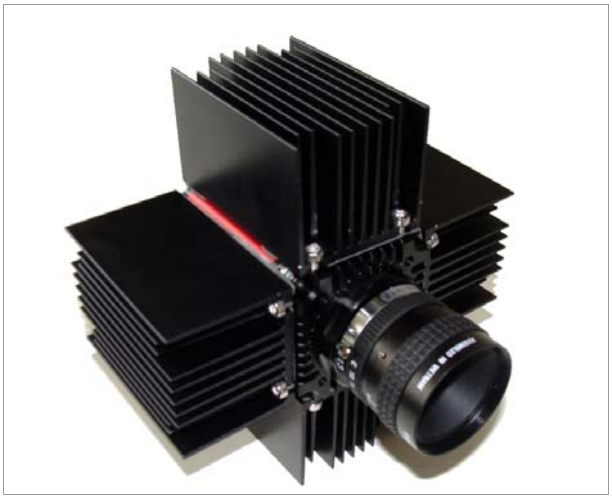

Figure 2: *Goldeye standard model with four heat sink sets applied.*

Mounting the heat sink

One heat sink can be mounted to each side of the camera, using the existing thread holes.

(Also refer to the Goldeye heat sink instruction leaflet which is included with the heat sink set.)

Availability

The heat sink set for Goldeye standard cameras is available from Allied Vision:

Model / Description	Allied Vision order no.
Goldeye heat sink set, dimensions (LxWxH in mm) 75x50x45, including thermal interface pad, 4xM4 T20 bolts, and mounting tool; weight 178g.	1068300

Disclaimer

Technical specifications are subject to change without notice. All trademarks are acknowledged as property of their respective owners.

Copyright © 2015 Allied Vision Technologies.