Allied Vision

APPLICATION NOTE

Prosilica GT
Camera Body Temperature

2016-Mar-17

Overview

The improved thermal conductivity of the Prosilica GT camera family allows for camera operation at an increased ambient temperature range from-20 °C up to +65 °C. This is achieved in the GT by minimizing the temperature differential between the heat generating internal camera components and the camera body, through a uniquely designed thermal housing.

This document explains the correlation between ambient temperature and camera body temperature.

Ambient temperature range is camera model dependent. See Prosilica GT technical manual for more details:

http://www.alliedvision.com/en/support/technical-documentation

Free convection cooling

The temperature differential between the camera body (T_B) and the surrounding air temperature (T_A) is defined by Newton's Law of Cooling for free convection:

$$Q = H_C \times A \times (T_B - T_A)$$

Q	Rate of heat. This is equal to camera power consumption, in Watts.
H_C	Convection heat-transfer coefficient of air. This will vary depending on the density and humidity of the air. In general, H_C of air = 5 – 25 W/m^2°C. Allied Vision's lab tests measured this at 12.3 W/m^2°C.
A	Object's exposed area. Depending on the sensor type, the Prosilica GT comes in a short (86 mm) or long (92 mm) case. A_{SHORT} = 0.0184 m^2, A_{LONG} = 0.0194 m^2.
T_B	Camera body temperature. For lab tests, this was measured on the bottom face of the camera—the hottest point. Testing showed less than 2°C temperature differential between all points on the camera body.
T_A	Ambient temperature, defined as the air temperature surrounding a camera, not influenced by the heat radiating from the camera itself. For lab tests, T_A was measured 60 cm away from the camera body.

Testing methodology

A GT1380 with a measured power consumption of 3.4 W and surface area of 0.0184 m^2 was brought to thermal stability over a period of one hour. Using a thermocouple probe, T_A was measured at 25°C and T_B at 40°C.

$$H_C = \frac{3.4}{(0.0184 \times (40 - 25))} = 12.3\ W/(m^2{}^\circ C)$$

The test was repeated with a GT2300 at 5.4 W with a surface area 0.0194 m^2 for the same result in H_C.

Results

Using Newton's law of cooling, camera body temperature can be calculated at any ambient temperature by applying the appropriate camera area, power consumption, and H_C value.

T_A °C	T_B °C				
	GT1290 - 2.9 W	**GT1380 - 3.4 W**	**GT1600 - 3.3 W**	**GT1660 - 5.1 W**	**GT1910 - 5.1 W**
20	33	35	35	41	41
25	38	40	40	46	46
30	43	45	45	51	51
35	48	50	50	56	56
40	53	55	55	61	61
45	58	60	60	66	66
50	63	65	65	71	71
55	68	70	70	76	76
60	73	75	75	81	81
65	78	80	80	86	86

T_A °C	T_B °C				
	GT1920 - 4.9 W	**GT2300 - 5.4 W**	**GT2450 - 3.8W**	**GT2750 - 5.4 W**	**GT3300 - 5.6 W**
20	41	43	37	43	43
25	46	48	42	48	48
30	51	53	47	53	53
35	56	58	52	58	58
40	61	63	57	63	63
45	66	68	62	68	68
50	71	73	67	73	73
55	76	78	72	78	78
60	81	83	77	83	83
65	86	88	82	88	88

Further reduction of camera body temperature

In demanding ambient temperature applications, it may be desirable to further reduce T_B, thereby reducing the temperature of the camera's internal components. There are several ways of doing this:

- Increase camera surface area (A). This could be achieved by attaching a heat sink to the camera. Care should be taken to ensure proper thermal bonding between the camera body and a heat sink.
- Reduce ambient temperature (T_A). For example, in an outdoor application with direct sunlight, provide shading using an enclosure.
- Forced convection cooling, via air flow over the camera body.

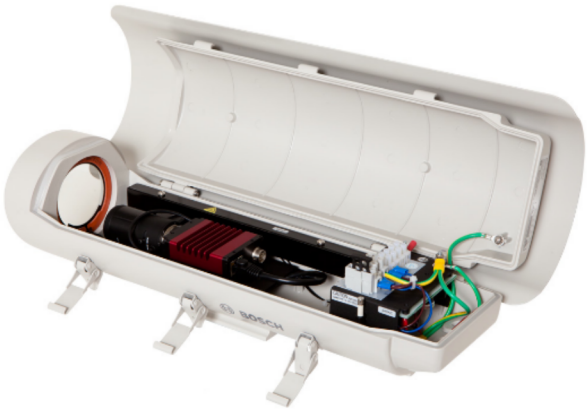

Figure 1: *Prosilica GT in a Bosch UHO-HBGS-10 enclosure with fan: http://products.boschsecurity systems.eu/en/EMEA/products/bxp/SKU20/4805515295/6/0027-CAIM5c349f1333c6d3f900df31184/e4da08*

Additional References

Technical manuals and GigE feature reference
https://www.alliedvision.com/en/support/technical-documentation

For technical support, please contact support@alliedvision.com.
For comments or suggestions regarding this document, please contact info@alliedvision.com.

Disclaimer

Due to continual product development, technical specifications may be subject to change without notice. All trademarks are acknowledged as property of their respective owners. We are convinced that this information is correct. We acknowledge that it may not be comprehensive. Nevertheless, Allied Vision cannot be held responsible for any damage in equipment or subsequent loss of data or whatsoever in consequence of this document.

For the latest version of this document, please visit the Allied Vision documentation website.