

Special Provisions for Defects in Sensors

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This document defines the special provisions for sensor aging and for cameras with Taped Cover Glass (TCG) and Removed Cover Glass (RCG) sensor options.

Sensor aging

All current sensor technologies, whether CCD, CMOS, InGaAs, microbolometer focal plane arrays, or others, have a number of receptors or pixels, some of which are usually defective or suboptimal from the time of manufacture, and which continue to age over time due to exposure to heat, gamma radiation, etc. The manufacturer of the sensor, which is a supplier to the camera manufacturer, usually provides an allowable defect standard such as "x bright pixels in dark area" or "y dark pixels in bright area" even for a new sensor, as well as indications of sensor aging, making claims for defects very difficult to enforce.

As a further challenge to camera manufacturers and their customers, many sensor manufacturers impose non-disclosure agreements on camera manufacturers that prohibit the camera manufacturer from releasing the sensor's defect specifications.

Definition of terms

1. **Gross sensor failure** – Failure of the sensor's ability, when appropriately parameterized for imaging conditions, to render a well-formed image substantially consistent with the subject, i.e. complete failure, image strongly distorted, or substantial interference relative to industry norms for the same sensor technology and camera type.
2. **Defective pixel** – Bright pixel in a dark field, dark pixel in a bright field, or pixel yielding substantially differing value relative to its immediate neighbors when exposed to the same conditions.
3. **On-camera defective pixel compensation** – Certain camera models may offer a feature such as defective pixel correction (conventional term), which in fact is more accurately defect pixel substitution, optionally (at user's discretion upon enabling and configuring the feature when present) replacing a defective pixel's value with the averaged value of its nearest neighbors.



4. **Host-based defective pixel compensation** – When a camera model does not provide on-camera defective pixel compensation, users wishing to avoid images with defective pixels must purchase or develop software that can implement a suitable nearest-neighbor (or similar) pixel averaging and substitution, at their own discretion and expense. Many machine vision software libraries provide such functionality, or the user may develop his/her own software, to achieve the desired outcome.

Sensor aging and statutory warranty

- a. Gross failure of the sensor is usually a defect and therefore the same statutory warranty and statute of limitations apply as for the camera as a whole.
- b. Pixel defects as such are not a defect, as they are a normal phenomenon in the field of digital imaging.
- c. For cameras with in-camera pixel error compensation, the stated performance of this feature is part of the specification. Performance limitations of the pixel error compensation are therefore regularly a defect and therefore the same statutory warranty and statute of limitations apply as for the camera as a whole.
- d. For cameras without pixel error compensation, it is the user's responsibility to accept pixel errors or provide host-based pixel error compensation. Since the pixel errors are not a defect, there are no claims against Allied Vision.

Sensor cover glass options and statutory warranty

The Modular Concept offers Taped Cover Glass (TCG) and Removed Cover Glass (RCG) sensor options.

A sensor with the protective glass removed is sensitive to dust, which can no longer be removed from the surface, and to mechanical damage to the microstructures. Such damage consequently only occurs within the customer's sphere of influence once the sensor protection glass or protective film has been removed and is therefore not a defect.