

Application Note:
Cover Glass Cleaning
For Image Sensors

Eastman Kodak Company
Image Sensor Solutions
Rochester, New York 14650-2010

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Purpose of Cover Glass Cleaning

The cover glass of an image sensor routinely needs to be cleaned during the manufacture of imaging devices; particulates and other surface contaminants may degrade the quality of images captured by the device. Cleaning operations must be performed in a way that do not damage the cover glass, or result in static charges that can damage the sensor or the imaging device electronics. A surface can never be perfectly clean, but contamination of the cover glass can be lowered to an acceptable level with proper cleaning procedures. The following procedure is intended as a template for imaging device manufacturers to develop their own cleaning procedure.

Cover Glass Cleaning Procedure

Caution:

Perform cleaning at a clean ESD protected workstation.

A filtered clean hood is best to prevent recontamination after cleaning, and should include an air ionizer. Wear a tested wrist strap connected to ground.

Handling.

It is important to never touch the cover glass with fingers or anything other than lens cleaning paper with solvent. Any mechanical contact can scratch the cover glass.

Finger grease can etch optical coatings, causing permanent damage.

Generally, it is not recommended to use gloves during cleaning or sensor handling unless they are powder-free and anti-static. Most Latex gloves have powder that can be a source of particles that contaminate the glass. Also, most gloves do not dissipate static charges, and can actually create static charges that could damage the sensor.

1. **Blow off the surface of the glass with a compressed gas source.**

The source should not produce a net charge, and may be ionized. The gas should be dry, and may be nitrogen or air.

Caution:

Compressed gas canisters should not be used. The fluid and coldness may affect the cover glass, and the gas may cause ESD events.

This operation should remove large particulates that would scratch the surface during the wiping operation. Blow as close to parallel to the glass as possible to push contaminants off the glass. Gas pressure normally incident (perpendicular to the glass surface) will act to drive contaminants into the glass, not off of the glass. This step assumes that the surfaces near the imager are also clean, so that the operation does not blow contaminants onto the glass from other places. If the sensor is mounted in a recessed surface, it may be advisable to skip this step.

2. **Inspect.**

Use a 7x to 10x magnifier and a good light, such as an illuminator for a microscope. If the only contaminants are particles, the previous step may be adequate to clean the glass. If the glass is now clean, skip the remaining steps.

3. **Fold a lens cleaning paper to the appropriate size.**

Use lens cleaning paper (Kodak lens cleaning paper catalog # 154 6027 or equivalent) that is specifically for use on high quality optics. The paper may already be folded and mounted on a stick to form a swab.

Note:

Folded paper may be secured with hemostats so that contamination from fingers is not dissolved in the solvent.



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If using lens paper and hemostats, fold the wipe until one dimension is the same as the width of the cover glass. If using preformed swabs, the width of the swab should be the same as the cover glass. If the folded paper is too narrow, it will not clean the entire glass surface. If it is too wide, it can collect contaminants from the package surface or a camera surface, which can accidentally be transferred to the glass. Be sure not to touch the cleaning edge of the paper before use.

4. **Wet the entire paper with solvent.**

Kodak Image Sensor Solutions uses high-grade iso-propanol or 200 proof ethyl alcohol.

Cautions:

Acetone is strongly discouraged because it attacks the resin that attaches the cover glass to the package.

Methanol is not used by Kodak Image Sensor Solutions due to its potential toxicity and poorer cleaning properties.

The solvent should not be allowed to collect moisture, and is best if used from a standard chemistry squeeze bottle. The quantity should be enough to ensure that the paper is wet, but too much solvent will leave streaks during cleaning. Shake the paper before use to removed excess solvent. Not enough solvent will result in the paper rubbing directly on the cover glass surface without the lubrication of the solvent. This can result in scratches to the surface. Some companies offer pre-wetted paper in a sealed packet.

5. **Wipe the surface once and then discard the cleaning paper.**

Make sure that the paper does not contact any surface other than the cover glass, including the image sensor package or the camera. Single use of the wipe is important, because contaminants collected by the wipe will be transferred back to the glass if the wipe is used more than once. There will usually be a short trail of the solvent directly behind the paper as it wipes.

6. **Inspect.**

If the surface is not clean, repeat the wiping steps. If a contaminant is not removed in two or three wipes, it is possible that there is permanent damage to the cover glass. If more than one wipe is necessary, always wipe in the same direction.



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