

## Terminology

**Anti - Reflective Coating:** A vacuum deposited optical coating designed to minimize or eliminate reflections of specific wave lengths of light. One of the most common AR Coatings used is MgFI Magnesium Fluoride. This is usually deposited on the photomask on one or both sides after the is made.

**AR Chrome:** A Chrome photomask plate with an Anti -Reflective coating deposited on the reflective chrome metal to minimize reflect it in the Ultra-Violet range of the spectrum. It minimizes standing wave effects and reflections between two substrates during contact printing.

**AutoCAD:** A computer-aided design software tool use to create the mask patterns of a mask set. Because this software was never intended at a mask design program, there are some special requirements for the use of Auto -CAD such as closing polygons.

**Background:** This is the background of the images in a mask design. Field is also referred to as the back ground. e.g. a dark field mask will have an opaque background with clear images.

**CAD:** Computer-aided design (CAD) is the use of computer systems or workstations to aid in the creation, modification, analysis, or optimization of a design.

**Calma GDSII:** This is a photomask design system that has used in the industry for many years. Many new design software programs model after this system and still have the capability of output - ting Calma Stream or GDSII data.

**CD's:** is short for Critical Dimensions. **Most images of circuit patterns have critical dimensions.** One dimension (usually the smallest and most vulnerable to the process) is specified to be the most critical. The size is specified with tolerance or variance when the mask is ordered and this image is the single pattern to be measured and documented normally.

**Chrome:** The most popular metallization used for photoplates. Chrome metal is usually sputtered or evaporated onto a glass substrate which is the plate the mask will be made with. Chrome metal was chosen in the early 1960's as a medium that was easy to deposit with good adherence to glass, and durability when used by the customer in the process.

**Defects: Mask pattern irregularities that cause the customers process to produce bad parts. e.g. opaque spots in clear areas, torn geometries, clear holes in opaque patterns ,etc.**

**Field:** The background of a pattern on a photomask. Usually not the digitized areas. Dark field masks have an opaque background with clear images. Clear field masks have a clear background with opaque images.

**Gerber:** A photo plotting tool data type that is used primarily to pattern a photoplotted film mask. Gerber data can many times be translated into other formats to be used on other types of mask making systems.

**Glass:** The substrate medium most widely used in high-resolution photomasks. The most popular types of glass used are as follows: 1. Soda Lime (high thermal expansion) lowest cost 2. White

Crown (high thermal expansion) low cost 3. Borosilicate ( low thermal expansion) higher cost 4. Quartz, Fused Silica (lowest thermal expansion) high cost

Hard Surface: This term relates to the durability of a mask medium while in use. Chrome metal, Iron Oxide, and Silicon Oxide mask mediums are considered Hard Surface Mask Making materials.

Image: The working geometry or pattern of a mask. (this is usually the digitized data) Images may be dark or clear.

Iron Oxide: An orange, see - through material used as a photomask medium on any type of glass. This material is actinically opaque with an optical density of about 2.0 -2.5 O.D. to ultra violet light which is typically used to expose photoresist. This material is popular when it is required to see through the opaque areas of a mask for better alignment.

Negative: A process or mask type that results with its use to change to field of the image to the opposite of the original. e.g. a negative process will turn clear images into opaque (dark) images.

Nominal: This term relates primarily to Critical Dimensions. The Nominal size of an image is the ideal size and there usually is a tolerance + - range specified as an acceptable variance.

Optical Density: This is a measurement of opacity of a mask medium. A certain optical density may be required to hold back light with various light sources. Common optical densities used in the photomask industry are 2.5 - 4.0. A 4.0 O.D., is considered opaque to conventional light sources. When a user needs greater O.D., it is possible to achieve this with thicker metals as a mask medium. It is difficult to measure actual O.D. greater than 4.0. The tool used to measure O.D. is a densitometer. Most Chrome photo blank suppliers have an O.D. of 3.0 as a standard.

Parity: In mask making this relates to Mask Orientation. (frontward or backward) Mirror image mask patterns are considered Right Reading of the Titles through the back of the glass mask. Right reading also relates to Working Plate or Master Parity. This is also stated as right reading chrome down. Right reading while looking at the mask images from the front or image side is called Sub Parity or Right Reading Chrome up

Photomask: a substrate with a design of opaque patterns which is to be used to with hold light during its use. It will mask out selected area of light during the patterning of other substrates. Photomasks can be made on glass or film substrates. The opaque patterns can be made of silver, chrome, chrome oxide iron oxide, copper, aluminum, silicon oxide and other materials.

Polarity: Polarity relates to the field or background density. e.g. if you wish to change the polarity of a mask you would change it from clear field to dark field or vice versa.

Positive: Usually means "the same" or yielding the same density in replication as the original.

Positive Process: Produces the same density as the original. In photolithography the exposed areas become clear.

Silicon Oxide:

An orange, see-through mask material used to make high-quality photomasks. This material is not commercially available at this time.

Substrate: The base material onto which patterns are produced. Typical substrates in mask making are glasses or films. In the manufacture of micro-electronics they could be silicon wafers, alumina, quartz, sapphire, etc.

Target CD: Usually the specific image and Critical Dimension specified by the customer for the mask maker to measure.

Tolerance: A quality tolerance for the measurement of a Target CD or critical pattern.