We develop and manufacture photomasks (circuit master plates), which are essential to frontend processes in semiconductor manufacturing, provide LSI design services and wafer processing services including color filter arrays for image sensors, nanoimprint solutions that provide total services from mold creation to prototyping and mass production, develop and manufacture semiconductor packaging components used in backend processes, and various types of etched products.

### Display-Related

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We develop and manufacture color filter that is an essential part that defines image quality on displays, surface treatment film that is an optical film for displays, metal masks for OLED display, light control film that can instantly switch between transparent and opaque by turning the power on/off, small to medium-size TFT LCDs with high definition and low power consumption, and provide sensor film for touch panels that enables light.

### Semiconductor-Related

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<th>Product</th>
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We develop and manufacture photomasks (circuit master plates), which are essential to frontend processes in semiconductor manufacturing, provide LSI design services and wafer processing services including color filter arrays for image sensors, nanoimprint solutions that provide total services from mold creation to prototyping and mass production, develop and manufacture semiconductor packaging components used in backend processes, and various types of etched products.
Color Filters

A wide range of applications from large televisions to smartphones

A color filter is a critical component that determines color display image quality. In 1971, Toppan developed color stripe filters for image pick-up tubes by applying microfabrication technology based on plate making in printing. Since then, Toppan’s color filters are applied to various products ranging from large televisions to tablets and smartphones.

Structure of Color LCD panel

The color image is created by light passing through a color filter.

Structure of Color filter

As the basic structure of the color filter, red (R), green (G) and blue (B) color resist patterns that allow transmission of light are formed on a thin glass substrate first, together with a black matrix that prevents defects such as light leakage while displaying black color as well as any color mixture with an adjacent color resist. Then, an ITO (Indium Tin Oxide) layer (transparent conductive layer), which becomes the common electrode for an array substrate, is formed over it.

Color filter manufacturing process

While there are a number of color filter manufacturing methods used, the photolithography method (in which pigment-based color resists are coated over a glass substrate, and exposure and development are carried out) is now mainstream.

1. Formation of black matrix (low reflection chrome and resin)
   In order to prevent any backlight leakage and mixture of RGB, a black matrix is formed first.

2. Color resist coating
   Color resist is coated on the entire glass substrate.

3. Exposure
   To make the pattern insoluble, it is UV-cured by exposure through a photomask.

4. Development & baking
   After removal of unnecessary portions on the color resist by a developing solution, the pattern is cured by baking.

5. Formation of ITO layer
   ITO layer (transparent conductive layer) is formed by the sputtering method.

6. PS process
   Photo spacers (PS) are formed to improve image quality by precisely controlling the value of the cell gap between two pieces of glass (color filter and thin film transistor array).
Small to Medium size TFT LCDs

Provide LCDs for various applications, especially for industrial equipment

The high value-added small TFT LCD panel of the “ORTUS” brand realizes high pixel count, high definition and low power consumption while enhancing outdoor visibility by using HAST® (Hyper Amorphous Silicon TFT) as its core technology, and is adopted for various equipment such as industrial equipment. We will continue to develop products for further improvement of outdoor visibility and low power consumption in the future and will provide better products to customers.

Ultra high definition and image quality amorphous silicon TFT

HAST Hyper Amorphous Silicon TFT

<table>
<thead>
<tr>
<th>Conventional a-Si TFT</th>
<th>ORTUSTECH a-Si TFT (HAST)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>30% increase aperture ratio! (2.4”QVGA conversion)</td>
</tr>
<tr>
<td></td>
<td>30% Brighter</td>
</tr>
<tr>
<td></td>
<td>30% Backlight power Reduceable</td>
</tr>
</tbody>
</table>

- Ultra-high-definition TFT array
- Low-resistance fine wiring technology
- Super-narrow pitch COG bonding technology
- High-image-quality optics design technology

Excellent features of Transfective TFT-LCD "Blanview"

Blanview is original TFT-LCD technology to realize high-quality display performance in any brightness circumstances (indoor / outdoor) with overwhelming low power consumption.

- Unique High Reflection Panel Design
- Superior Outdoor Readability
- Ultra Low Power Consumption

"NEW-Blanview" realizing ultimate low power consumption and outdoor visibility

Transmissive TFT-LCD

- Crispy and bright display created by a backlight.
- Display performance deteriorates by a sunlight reflection at LCD surface.

TFT-LCD

Reflective electrode

Transfective TFT-LCD (other-companies products)

- Reflection area works to improve outdoor display quality but leads to large power consumption in indoor usage.

TFT-LCD

Reflective electrode

New-Blanview

High light reflection panel design along with low power consumption functionality; Good display performance in any surrounding situations.
Surface Treatment Films

**Structure of surface treatment film**

Surface treatment film is an optical film applied to the front surface of a display in order to minimize reflection of external light. Various types of surface treatment film can be provided for different applications, examples of which include low reflection (LR) film that has excellent anti-reflection properties, anti-static performance and high contrast; and anti-glare (AG) film that controls reflection with excellent anti-glare properties. In addition, such films effectively protect the display by preventing the accumulation of dust and enhancing strength and durability.

Toppan Tomoegeawa Optical Films Co., Ltd. manufactures and sells Toppan's surface treatment films.

<table>
<thead>
<tr>
<th>Product Type</th>
<th>LR (Low Reflection)</th>
<th>CHC (Clear Hard Coat)</th>
<th>AG (Anti Glare)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reflectance</td>
<td>0.7%〜1.0%</td>
<td>4.0%</td>
<td>—</td>
</tr>
<tr>
<td>Structure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Features</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Main applications</td>
<td></td>
<td></td>
<td>TV, monitor, notebook PC, etc.</td>
</tr>
</tbody>
</table>

**Preventing light reflection (LR)**

The film structure is designed so that the light reflected at the boundary between the anti-reflection layer and the base film has the same amplitude as, but the opposite phase to the light reflected on the surface of the anti-reflection layer. Reflection is reduced as the two different lights cancel each other out due to interference.

**Preventing screen glare (AG)**

Within the hard coat layer formed over the base film, microparticles whose light refractive index differs from that of its resin are deployed. As such particles disperse external light, glare on the screen is diminished.
Fine Metal Masks for OLED Displays

Ultra high definition metal mask making full use of Toppan etching technology

This is a metal mask used for depositing RGB and electrodes on low molecular OLED displays. Toppan utilizes its advanced processing technologies to control the metal etching effectively to build the metal masks.

How OLED Metal Mask is used (cross-section profile)

Copper Touch Sensors

“Total support” touch sensor solutions that cover every stage from planning to manufacturing

Toppan has developed copper sensor film for touch panels, utilizing its microfabrication technologies for electronics products. Improved operability, increase in size, and decrease in weight, are achieved by lowering the resistance level through the use of copper as an electrode material. VTS Touchsensor Co., Ltd. manufactures Toppan’s copper touch sensor.

Advantages of the copper touch sensor

As copper has lower electric resistance and higher conductivity, it can be used to ensure superior high-speed performance in large-sized electrical devices.

● Narrow sensor line width / Copper blackening treatment
  Toppan has manufactured the finest copper mesh of 3um line width. A four-sided blackening treatment process is possible, making the sensor electrode less visible. The display panel visibility is greatly improved.

● Single Routing
  Copper sensor itself has a unique characteristic of low resistance, that afford to fabricate sensor and routing line simultaneously. Also, double routing is not necessary. Therefore, the narrow bezel will be achievable and improve applications design.

● Double-sided patterning in a single process
  Two film laminating processes are rendered unnecessary, because the wiring pattern is formed on both sides of the film at the same time. The process is simplified, and wiring accuracy is improved.

Copper Touch Sensors

Specifications

<table>
<thead>
<tr>
<th>Thickness</th>
<th>0.030 ~ 0.200mm(t)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pitch Precision</td>
<td>±0.005mm / Thickness 0.030mm(t) / 470x700mm area</td>
</tr>
<tr>
<td>Aperture Precision</td>
<td>±0.003mm / Thickness 0.030mm(t)</td>
</tr>
<tr>
<td>Minimum Aperture Size</td>
<td>0.030mm / Thickness 0.030mm(t)</td>
</tr>
<tr>
<td></td>
<td>0.050mm / Thickness 0.050mm(t)</td>
</tr>
</tbody>
</table>

Glass substrate

Fluorescent pixel

Metal mask

Thermal deposition source (Heat source)
Light Control Film

Create a new space with the magic of light. The liquid crystal light control film allows to “show”, “not to show” or “project” depending on the situation.

LC MAGIC is an ultra-thin liquid crystal film developed using liquid crystal technology on our long-established display related businesses. The change between power-on and power-off switches the film type between transparent and opaque accordingly. LC MAGIC is in the spotlight as a groundbreaking product for the possibilities used not only as alternative to the window shade or curtain but also as a projection screen of digital signages.

Features of light control film “LC MAGAC”

- **Satisfy both high transparency and securing privacy**
  The highest level of transparency ensures clear viewing from not only front direction but also oblique direction.

- **Free-form capability (design flexibility)**
  LC MAGIC is freely processable into your ideal shape with the appropriate electric design before modularizing.

- **Easy process even onto carved design or post lamination**
  Thin film makes it easier to be applied to curved surface or post lamination.

- **Usage of projection screen**
  Optically developed, LC MAGIC in opaque state could be used as a projection screen for high resolution digital images, such as 4K. It enables to project advertisement or promotion videos.

- **Wide viewing angle**
  LC MAGIC has a 180° wide-viewing angle in each direction.

- **Light control function**
  Transparency level is smoothly controlled by a controller.
  *Only normal type is possible.

- **Roll-to-roll processing**
  Our production line is produced by roll-to-roll process, it enable to use a variety of applications.
  *Normal type is 1500mm wide. Reverse type is 1200mm wide.

- **Stable supply of high quality products**
  In addition to the high quality control with years of experiences in our electronics business, well experienced coating and lamination technologies using class-100 level cleanroom ensure high quality products.

Exhibition Room (TOPPAN Shibaura bldg.)

- **OFF / Opaque**
- **ON / Transparent**

Reverse type

"Reverse type" is transparent when the power is off. This is the world’s first.
Using ultraviolet light, the semiconductor circuit pattern formed on the surface of a photomask is transferred onto the photo resist (photosensitive resin) that is coated over the surface of a silicon wafer. The pattern is usually reduced to a quarter size through reduction lenses on the stepper (exposure device).

**How is a photomask used?**

**Type of Photomasks**

**Binary Masks**
Structure of binary mask is simple; it is a photomask blank covered with patterned layer of opaque material. Its transmission characteristics are either transparent or non-transparent. Binary mask is used for building a pattern in which line width being larger than the exposure wave length.

**EUV Masks**
EUV is next generation lithography technology. EUV lithography uses EUV light shorter wave length than existing DUV, and requires reflective optics exposure system.

**Phase Shift Masks**
Phase-shifting mask (PSM) has achieved improved wafer printability with higher resolution and increased DOF (Depth of Focus), by controlling the phase shift and the transmission rate. This is a standard technology for lithography in which line width being smaller than the exposure wave length.

**Stencil Masks**
Silicon stencil mask is a photomask for Electron Beam Lithography, with nanometer size apertures to fabricate nanometer scale patterns.

**Photomask manufacturing processes**

1. **Photomask Blanks**
   An absorber layer with a thickness of tens of nanometers is formed by depositing a substance such as chrome on the quartz substrate. The quartz substrate in this state is called a photomask blank.

2. **Exposure (Patterning)**
   Photosensitive resin is uniformly coated over the surface of a photomask blank. Then an LSI circuit pattern is drawn by using an electron beam or a laser beam.

3. **Development**
   The portions of resist exposed to the electron beam are removed through the development process (positive tone resist). Depending on the type of resist, there are cases in which non-exposed portions of resist are removed (negative tone resist).

4. **Etching**
   The portions where resist was removed by the development process and the absorber layer is exposed are then etched through a chemical reaction by dry etching.

5. **Resist Removal**
   A photomask is completed upon removal of the resist and cleaned, and is finally shipped after passing several strict inspection processes.

A photomask is an essential device used as the master plate in the manufacturing process for semiconductor chips such as LSI. Circuit patterns drawn by electron beams or laser beams are etched onto composite quartz glass on which a metal (such as chrome) light shielding film is formed. Toppan has photomask manufacturing bases in seven countries around the world and offers high quality photomasks to customers all over the world.
Toppan provides high-definition and reliable photomasks for a wide range of applications, such as for LCDs and for various industrial and R&D purposes etc.

**3D Photo masks (Gray-tone masks)**

By using a pattern smaller than the resolution limit, halftones are expressed without resolving the pattern on an object such as a wafer. High quality 3D structure can be formed.

**TEST CHART**

Test chart is the photomask which formed the basic shaped pattern on the glass substrate. It is available in the uses such as accuracy management of equipment, a resolution check, and a valuation basis at photo-resist selection.

**Examples of Photomasks**

- Masks for MEMS
- Masks for IC (bump)
- Masks for Thermal Head
- Test Chart
- Masks for various R&D etc.
- Mask for Device Accuracy control
- Master masks for High-resolution Printing
- Masks for Semiconductor Packaging Substrates etc.

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**LSI Design / LSI Turnkey Service**

Toppan Technical Design Center develops and designs LSIs based on various technologies related to LSIs such as digital, analog and memory etc.

**Toppan Technical Design Center Co., Ltd.**

http://www.top HDC.com/en/

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**LSI Design Service**

As an LSI design partner of various semiconductor manufacturers, the company has been providing LSI development and design services for about 50 years. Development performed in the past encompasses a wide variety of fields, including analog, memory, LCD, LED drivers, and microcomputer logic. For development of RF and analog mixed signal in particular, a wealth of technologies including power circuit, amplifier circuit, high frequency LSI, and system LSI digital mixed macro have been accumulated. TOPPAN prides itself on industry-leading technical know-how.

**Analog mixed signal development achievements**

- Power management / DC-DC converter
- High-speed data interface (SerDes/LVDS)
- CMOS image sensor
- Silicon tuner
- ADC/DAC
- Sensor
- LCD Driver
- Wireless
- PLL/VCO
- LED Driver
- RF : LNA/MIX

---

**LSI Turnkey Service**

This is a solution-based business aiming to provide a total range of services, from circuit design to LSI prototype and mass production based on each customer’s requirements and specifications. Its strengths in the analog field include wireless communication technologies, high-speed transmission technologies, sensor circuits, and power circuits.

In the digital field, the company has expertise in low power consumption technologies. Through collaborations with partners with their own particular strengths, we respond to clients’ requests for custom LSIs.

**Features**

- Response from design to production
- Flexible interface
- Correspondence of small quantity lot
- Production and quality control
- Prototype service compliant

**Specialties**

- High-speed transmission system device
- Wireless communication RF front end
- AFE for sensors
- Power supply IC

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**Examples of LSI Development**

- Wireless communication RF front end
- AFE for sensors
- Power supply IC

---

**Features**

- Response from design to production
- Flexible interface
- Correspondence of small quantity lot
- Production and quality control
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**Specialties**

- High-speed transmission system device
- Wireless communication RF front end
- AFE for sensors
- Power supply IC
Color Filter Arrays (On-chip Color Filters)

Increasing demand for smartphones, digital cameras and security devices

Color filter arrays are necessary for providing color for CMOS image sensors and small display devices such as LCOS. Demand for such products is rapidly increasing, along with an expansion of markets for items such as smartphones, digital cameras, automobile devices, and security cameras. Because a color filter for red, green and blue (RGB) as the three primary colors of light is formed on each photodiode generated on a silicon wafer, it is called an “on-chip color filter.” Such filters are essential components to input color images. In addition, microlenses are formed on the color filter for the purposes of enhancing light converging capabilities and sensitivity.

What is an image sensor?

An image sensor consists of a large number of small elements called pixels. Each pixel further consists of a photodiode and light transfer unit. Although the photodiode generates electric signals once it receives light, it does not produce any color images since the element reacts only to light and dark. Accordingly, a color filter is formed on the photodiode, enabling detection of light strength received and perception of the image as a color image.

Effect of microlens

By changing the light direction through the effect of the lens, a higher volume of light can be converged onto the photodiode.

World’s leading color filter array supplier

Toppan provides high-quality color filter arrays to image sensor manufacturers. By fully utilizing color filter technologies, semiconductor-related technologies and other leading edge technologies that Toppan has accumulated, we provide highly reliable products to satisfy each customer’s needs. We have 3 production bases: Kumamoto in Japan; Shanghai in China; and Taoyuan in Taiwan.

Toppan SMIC Electronics (Shanghai) Co., Ltd.

Toppan SMIC Electronics’ production site is located in Zhangjiang High Technology Park, which has good access to Shanghai Pudong International Airport.

Toppan Chunghwa Electronics Co., Ltd.

Our Taiwanese manufacturing site is located in Padeh City in Taoyuan County, which is conveniently accessible from Taoyuan International Airport.
Nanoimprint Solutions

Supplying highly fine precision templates (molds) for next-generation microfabrication technologies

Nanoimprint lithography is a microfabrication technology used to transfer patterns that measure a few dozen nanometers by placing resin between a mold and a substrate and hardening the resin. Its process is so simple that it is expected to enable inexpensive and highly repeatable mass volume manufacturing of microstructures.

Toppan develops and produces high-precision molds for nanoimprint lithography, applying lithography technologies that have been developed in the company’s semiconductor photomask business.

Methods of nanoimprint lithography

Nanoimprint lithography can be roughly classified into two types: “UV method” and “Thermal Method.”

• UV Nanoimprint Method

The UV nanoimprint method replicates patterns by pressing the pattern on the mold against UV-curable resin, which is then hardened by UV irradiation.

Working at normal temperature is possible, giving this method the unique nature of allowing a high level of precision in the replication of patterns.

Quartz molds

Quartz molds are mainly used in the UV nanoimprint method. Quartz is used as the material for semiconductor photomasks. It is characterized by high rigidity and flatness.

The manufacturing process, same as that of semiconductor photomasks, allows to fabricate fine level patterns that measure a few dozen nanometers. Toppan also develops and manufactures multistage structure molds.

Silicon molds

Silicon molds are mainly used in the thermal nanoimprint method. Patterns are drawn with an electron beam on a silicon substrate that has been coated with photosensitive resin. Dry etching is then used to make the patterns deeper.

The manufacturing process, same as that of Quartz molds, allows to form fine precision patterns. Silicon molds with high aspect ratio patterns are under development.

Nickel molds

Nickel molds are mainly used in the thermal nanoimprint method. The mold is fabricated by attaching electrolyzed nickel ion to the master plate through an electroforming process and then peeling it off.

The material used for molds is metal, giving it high durability and elasticity, thereby making it possible to wrap it around a cylinder. This makes it suitable for print transfer to substrates that have a large surface area.

Nanoimprint solution service

Toppan offers comprehensive solution service of nanoimprint ranging from optical design and simulation to master mold manufacturing and mass production of end products through the capital and business alliance with SCIVAX Corporation.
FC-BGA Substrates (High Density Semiconductor Package Boards)

Satisfying diversified requirements with build-up wiring board technology

An FC-BGA (Flip Chip-Ball Grid Array) substrate is a high density semiconductor package board that enables higher speed LSI chips with more functions. We have developed ultra high density wiring substrates with our original microfabrication and build-up wiring technologies, offering products supporting current semiconductor microfabrication. In the areas of microprocessors and graphic processors for PCs, servers and game devices, as well as LSIs for digital home appliances, Toppan comprehensively supports customer’s needs from substrate design to manufacture. Solutions for lead-free and halogen-free products are also available.

Structure of FC-BGA package

Structure of FC-BGA substrate

This type of substrate is excellent in terms of its narrow pitch, electric characteristics and heat radiation due to a structure that combines IC chip connecting FC bumps with ball pads on the substrate side.

Coreless FC-BGA Substrate

Since there is no core layer, it makes possible to ultra-high density and ultra-thin, and has excellent electrical characteristics, enabling high speed and multi-function of LSI chips. In addition, the freedom of design is greatly improved because the through hole of the core material is unnecessary as one of the features.

Technologies that support higher density

- **Hyper Build-up**
  In terms of power strengthening and signal quality, high-end products such as highly functional processors require build-up technology with a higher layer count specification. Using the filled via hole technology that enabled the optimization of manufacturing conditions, Toppan guarantees reliability of interlayer connections.

- **Higher Pin Count / Ultra Fine Wiring**
  It is high-precision patterning technology that supports the increasing demand for higher density wiring. Based on Toppan’s copper plating technology that has been cultivated through the manufacture of substrates for super computers that need strict impedance control, the thickness of conductors has been successfully made uniform, allowing super-fine wiring with little fluctuation.

- **Narrow Pitch FC Bumps**
  With a trend toward smaller bumps with narrower pitch, Toppan has adopted various advanced production methods in addition to the high-resolution silkcreen printing process and successfully developed a pre-soldering method that minimizes fluctuation. Through a stable supply of such solder, we support customer’s high yield component mounting.

- **Development of New Substrates**
  Demands for higher speed devices and smaller packages are driving needs for new substrate technologies. To respond to such needs, Toppan is actively tackling the development of substrates with new structures such as substrates for 2.1D packaging.

Line-up of products

- FC-BGA Substrate
- FC-LGA Substrate
- Coreless FC-BGA Substrate
- FC-BGA Substrate for 2.5D Packaging
- FC-BGA Substrate for 2.1D Packaging

Under Development
A leadframe is a thin metal plate used in semiconductor packages such as IC and LSI. While it supports and fixes an IC chip, its other role is to function as connection pins when the chip is mounted on a printed wiring board. The leadframe maximizes chip performance with functions such as heat diffusion, and enables it to be operated for long periods of time.

**Expanding the high definition etching technology cultivated in lead frame to a wide range of fields**

Toppan manufactures and sells various lead frames for semiconductor packages, making full use of advanced etching technology. We will respond to market needs such as semiconductors with high functionality and miniaturization with our technology development capabilities. We also manufacture and sell products other than semiconductor package related products, based on photofabrication technology such as internal parts, exterior parts and jigs for electronic devices and equipment, as well as logo plates and metal bookmarks etc. We provide microfabricated products according to the customer’s application.

**Applications of “half-etching”**

Half-etching refers to etching one side of the metal surface to a given depth. As the etching shape is different from one side to the other, new functions are added to the metal filter, including removal of particles or changing the current speed.
EUROPE
- DRESDEN (GERMANY) TOPPAN PHOTOMASKS
- ADVANCED MASK TECHNOLOGY CENTER
- CORBIÉ (FRANCE) TOPPAN PHOTOMASKS

NORTH AMERICA
- SAN JOSE (U.S.A.) TOPPAN PHOTOMASKS
- ROUND ROCK (U.S.A.) TOPPAN PHOTOMASKS

ASIA PACIFIC
- KUNSHAN (CHINA) KUNSHAN GIANTPLUS OPTOELECTRONICS DISPLAY TECHNOLOGY
- SHENZHEN (CHINA) GIANTPLUS OPTOELECTRONICS DISPLAY
- ICHINOMIYA (KOREA) TOPPAN PHOTOMASKS
- SHANGHAI (CHINA) TOPPAN SMIC ELECTRONICS (SHANGHAI) TOPPAN PHOTOMASKS
- TAIPEI (TAIWAN) TOPPAN CHUNGHWA ELECTRONICS TAIPEI BRANCH
- TAOYUAN (TAIWAN) TOPPAN CHUNGHWA ELECTRONICS GIANTPLUS TECHNOLOGY TAOYUAN PLANT
- HSINCHU (TAIWAN) TOPPAN CHUNGHWA ELECTRONICS HSINCHU BRANCH GIANTPLUS TECHNOLOGY HSINCHU PLANT
- TOUFEI (TAIWAN) GIANTPLUS TECHNOLOGY
- MALAYSIA ORTUSTECH (MALAYSIA)
- SINGAPORE TOPPAN PHOTOMASKS

U.S.A.
- Manufacturing and sales of photomasks for semiconductors, sales of electronics products
  TOPPAN PHOTOMASKS, INC.
  Round Rock Site / SAN JOSE OFFICE

GERMANY
- Manufacturing and sales of photomasks for semiconductors
  TOPPAN PHOTOMASKS GERMANY GmbH
- Development and manufacturing of photomasks for semiconductors
  ADVANCED MASK TECHNOLOGY CENTER GmbH & CO. KG

FRANCE
- Manufacturing and sales of photomasks for semiconductors
  TOPPAN PHOTOMASKS FRANCE S.A.S.

TAIWAN
- Manufacturing and sales of photomasks for semiconductors, color filter arrays (on-chip color filters), sales of electronics products
  TOPPAN CHUNGHWA ELECTRONICS CO., LTD.
  Hsinchu Branch / Taipai Branch
- Development, manufacturing and sales of TFT LCDs
  GIANTPLUS TECHNOLOGY CO., LTD.
  Taicen Plant / Hsinchu Plant

KOREA
- Manufacturing and sales of photomasks for semiconductors, sales of electronics products
  TOPPAN PHOTOMASKS KOREA LTD.

CHINA
- Manufacturing and sales of color filter arrays (on-chip color filters)
  TOPPAN SMIC ELECTRONICS (SHANGHAI) CO., LTD.
- Manufacturing and sales of photomasks for semiconductors, sales of electronics products
  TOPPAN PHOTOMASKS COMPANY LIMITED, SHANGHAI
- Manufacturing and sales of small-and medium-sized TFT LCDs
  KUNSHAN GIANTPLUS OPTOELECTRONICS DISPLAY TECHNOLOGY CO., LTD.
- Manufacturing and sales of small-and medium-sized TFT LCDs
  SHENZHEN GIANTPLUS OPTOELECTRONICS DISPLAY CO., LTD.

SINGAPORE
- Sales of photomasks for semiconductors
  TOPPAN SEMICONDUCTOR SINGAPORE PTE. LIMITED.

MALAYSIA
- Manufacturing and sales of small-and medium-sized TFT LCDs
  ORTUSTECH (MALAYSIA) SDN. BHD.

On this page, the term "sales" is used as a general term covering all sales activities (including market research, customer service, and sales support, etc.)

Please refer to our website for further information such as addresses and contact details.

https://www.toppan.co.jp/electronics/english/profile/