



#### **A Reliable Display & Integration Partner**

Bifa provides a full range of custom service for LCD displays and touchscreen systems that require high-brightness, high-contrast LCD visibility, and accurate touch performance. Being a reliable solution partner, Bifa listens to customers closely and provide fast and flexible touch panel designs, integration and manufacturing services accordingly. Leverage our engineering technology and service, you can build up highly qualified display solution exactly tailored to your requirements faster time to market.

## **Custom LCD Displays and Touchscreen Solutions**



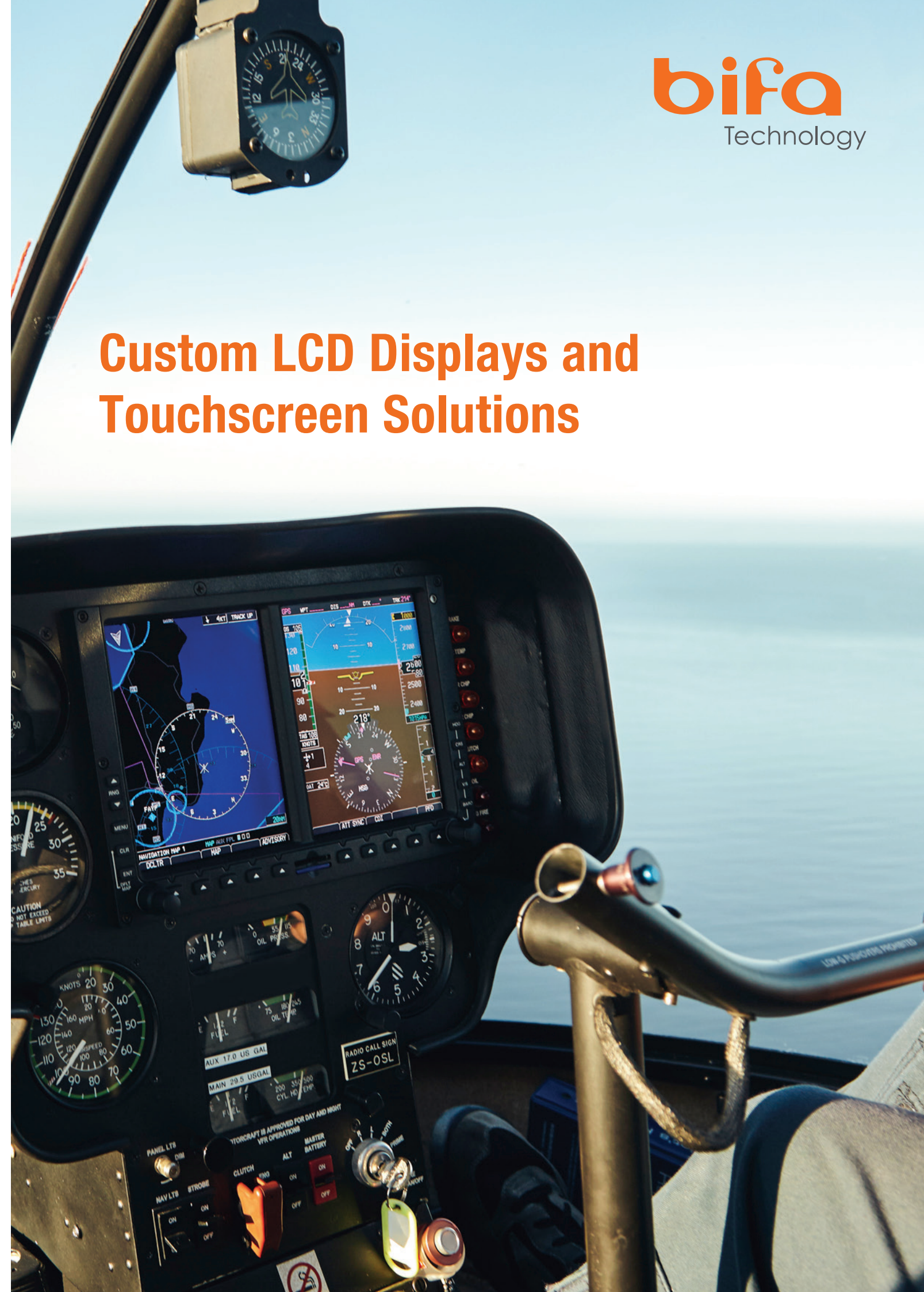




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The touchscreen is already the primary user-interface for industrial applications that require easy, fast and accurate operations. To help develop optimized user experiences, Bifa provides a variety of custom touch technologies and integration services to meet your specific machine and application needs.

Our custom service ranges from custom TFT LCDs, touch sensor, cover glass, bonding assembly and display enhancement in accordance with your application demands. Bifa team assures quality output through stringent process control at all stages of service and production. We help identify the right display components during the specification stage, and integrate the required display module into your product for rapid prototyping and time-to-market.

Your logo

Cover glass

Touch sensor  
(ITO layer, X axis)

Touch sensor  
(ITO layer, Y axis)

MESH / ITO GLASS  
(EMC Filter)

TFT LCD

HEATER

Optical adhesive

Optical adhesive

Optical adhesive

Optical adhesive

Cell

Backlight unit

Bifa provides custom integration service for touch LCD panels made of multiple layers of glass and optical lamination



## Expert Applications

### Medical and Healthcare

The touch LCDs are ideal for medical and healthcare applications due to the nature of no radiation, easy operation and quick responsive display. Bifa fulfills medical and patient-care applications with a wide selection of high performance cover glass, coating and display enhancement technologies to enable fine color/grey scale performance, infection prevention and fully operational displays.

### Aviation and Military

The LCD display could be one of the most important instruments for pilots to receive instant inflight safety and weather information for proper reaction during a flight ride. Bifa is familiar with specific displays that fulfill good visibility, high contrast ratio and wide viewing angle in extreme cockpit conditions.

### Air Flight Navigation

Bifa is also experienced with air traffic control applications with navigation LCD solutions. Our engineering team provides excellent bonding skills to eliminate screen reflection and glare, and also enhance clarity and contrast to increase visibility in either bright or dark ambient light conditions.

### Transportation

Facing constantly changing light conditions, in-car LCDs must be bright enough to match the cockpit illumination all the way during a train ride or a bus ride. Bifa provides advanced anti-reflective technology that enhances the monitor readability and reduces glare to maintain stable visibility in both low and bright light conditions.

### Point of Information/KIOSK

To increase durability and reliability for public point of information KIOSKS, Bifa is adept at adding various coating and surface treatment to enable comfortable user experiences and also better scratch and chemical resistance to improve the monitor's durability and lifespan.



## Custom Cover Glass

Adding extra layers on top of the touch screen can enhance the monitor durability, but also affect light reflections and transmittance, and touch performance. Bifa's custom cover glass service provides enhanced display clarity, touch responsiveness and surface protection against chemical or scratch damage. Our team also helps customers implement the following requirements:

- Specify glass dimensions, thickness and shape, including rounded corners.
- Add holes and cutouts for I/O interfaces
- Print logo and icons
- Use acrylic/polycarbonate film instead of glass
- A wide variety of glass and coating options

### Cover Glass and Coating Options

**The anti-bacterial glass** can kill 99.99% common disease-causing bacteria and molds to prevent infection spreading through the touch operation.

**Both anti-glare (AG) and anti-reflection (AR)** coating are ideal for mobile and outdoor applications by filtering out reflection and cutting down glare when light bounce off the surface.

**The antibacterial anti-reflective glass** is perfect for medical applications with germ-free & anti-reflective features.

**The AG touchpad glass** features silky surface and the most nature back and forth touch motion for ultimate user experience.

**Corning antimicrobial gorilla glass** can eliminate bacteria to ensure the best safety for medical and patient care applications. The thin and tough glass also reduces screen parallax and improves touch control accuracy for better visual quality.



## Custom Touch Sensor

Touchscreen is not only a part of the display system but also the primary input device too. Bifa provides various capacitive and resistive technologies to formulate different types of touch panels as needed.

### Resistive Touchscreen

A resistive touchscreen comprises two layers of conductive ITO (indium tin oxide) film and ITO glass separated by transparent dot spacers. The resistive touch panel features thin, light, and lower power consumption. Also, it is pressure sensitive to have highly accurate and quick response to any input device, including finger, glove, stylus or pen. The resistive touchscreen constructs reliable and affordable solutions for restaurants, factories and hospitals due to high resistance to dust, oil, liquids and contaminants.

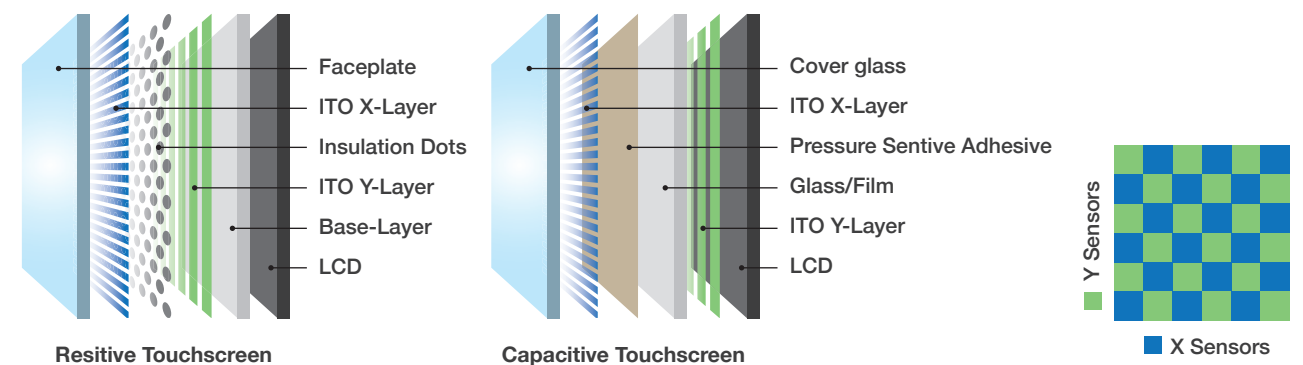
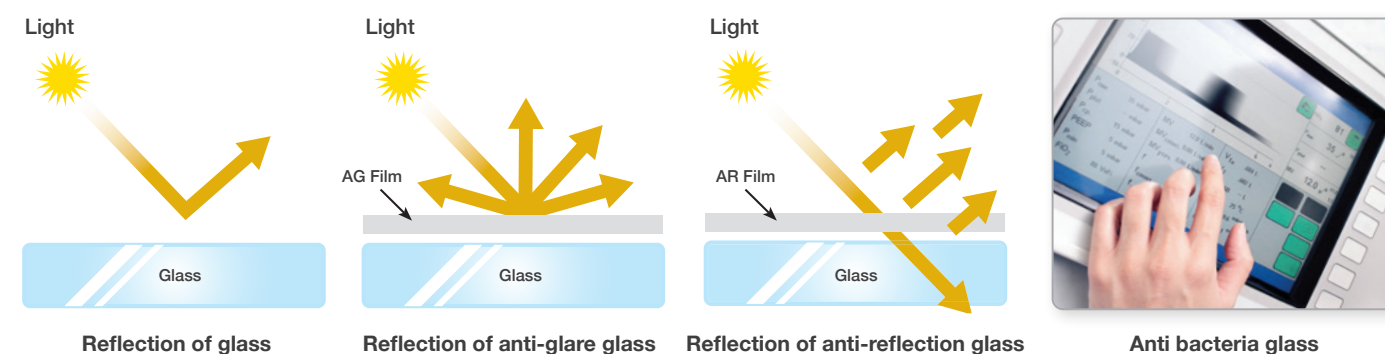
### Capacitive Touchscreen

A capacitive type touchscreen consists of one layer of insulation glass, coated with transparent and conductive indium tin oxide (ITO) on both surfaces. Unlike a resistive touchscreen, the capacitive touch displays rely on the electrical change caused by a light touch of a finger, capacitive stylus, or electric conductive glove.

The capacitive screens feature more sensitive and accurate touch performance as glass technology advances. The advancement also leads to sharper and brighter display performance for the capacitive screens.

### Projected Capacitive Touchscreen

Projected Capacitive Touchscreens (PCT) deliver highly accurate and multi-touch functionality with a matrix of conductive wires. The PCTs are widely installed in the most demanding devices like medical machines, smartphones, and tablet computers with pinpoint accuracy in tracking the motion of a finger over the screen.







## Custom Touch Controller

The touch controller is usually a micro-processor IC used to send touch signals from the touch sensor to the embedded system or computer. The IC-based controller can be set on a controller board inside the system, alternatively it can be located on a flexible printed circuit (FPC) affixed to the glass touch sensor.

### Anti-interference

Electrical noise can cause system shutdowns relating to signal transmission problems for medical applications. To reinforce your operational reliability and security, Bifa provides touch controllers well integrated with noise resistance technology to protect your display panels against noise interference generated by electrical devices, peripherals, and the environment.

### Glove Touch

Glove touch is a great benefit for medical and patient-care applications. Bifa provides superior high Signal and Noise Ratio (SNR) solution that detects touch signal through glove for your best convenience and operational efficiency.

## EMI protection / Custom EMI Shield

Electromagnetic interference (EMI), also known as radio frequency interference (RFI), is interference from external sources. This interference occurs when devices emit signals in close proximity to operating systems. Various devices such as telephones, Bluetooth speakers, microwaves, sensors, and others can cause EMI. Regardless of the industry you operate in, ensuring a reliable, uninterrupted display is paramount.

Shielding against EMI requires a combination of factors such as material impedance, conductivity, and shielding capability, and often requires a combination of specialized shielding designs and techniques to ensure that the effects of electromagnetic interference are effectively minimized or prevented.

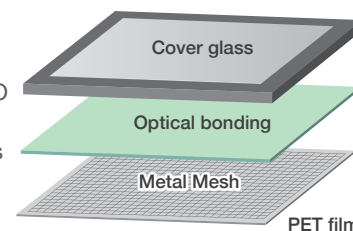
We continue to pioneer new approaches to combat EMI. The effects of EMI include power fluctuations and surges that adversely affect medical equipment and industrial controls. As a result, EMI shielding is critical and provides several benefits, including increased system reliability, uninterrupted operation of electronic displays and seamless system functionality.

Our EMI shielding can serve as a barrier to the electromagnetic interference that can cause your display to malfunction.

Several strategies can be used for EMI shielding in display technology.

### Metal mesh in touch panel / cover glass or lens

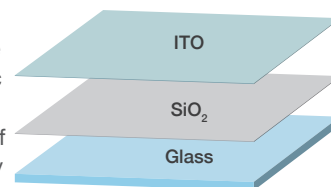
Metal mesh belongs to a kind of conductive material, its shape looks like a barbecue grill composed of very fine metal wires. This technology is different from the traditional ITO conductive layer, which uses silver, copper metallic materials or silver oxides to create a conductive metal mesh pattern on a PET film.



Moire patterns are interference patterns that occur when two similar but slightly offset patterns or grids overlap. These patterns can often appear as unwanted visual artifacts in various types of displays, such as LCDs, monitors, or printed materials. To minimize or eliminate unwanted moire effects, our engineer evaluated, fine-tuned, and configured the display on a case-by-case basis to optimize the display's performance to achieve better visual clarity and reduce interference for a better viewing experience.

### EMI Shielding – ITO Glass

ITO glass is a type of conductive glass substrate with electrostatic (EMI) shielding capabilities. It is produced by sputtering a layer of indium tin oxide (ITO), commonly abbreviated as ITO, onto a base of sodium calcium or silicon boron based glass in a vacuum environment. This manufacturing structure gives the glass its EMI shielding ability while maintaining high transparency and excellent optical performance, making it a material with high quality optical properties. This makes it well suited for many display applications that require EMI shielding. In addition, the EMI shielding effectiveness can be customized as needed to meet specific application requirements.



### EMI tape / Copper foil tape

Copper foil tapes, also known as EMI shielding tapes, consist of copper foil combined with an acrylic conductive adhesive and are available in various sizes. We use copper foil tape with the panel's laminated structure design to shield the electromagnetic interference generated by the LCD.



## Custom Heater for Display Solution

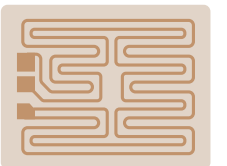
Extreme cold temperatures can pose a challenge to liquid crystal displays (LCDs). When exposed to colder climates, the liquid inside LCD screens becomes less agile, affecting their response speed. As a result, these conditions can cause portions of the LCD screen to darken or even cause the entire screen to go black. Exposure to extremely low temperatures for an extended period of time has the potential to cause permanent damage to the screen. In order to protect displays in the toughest weather conditions, there are a variety of solutions available for applications that require the use of displays in extreme environmental conditions. Heater is one of the option.

Heater is a small piece of flexible plastic or film which is placed on or below the LCD module. It is manufactured with a layer of conductive film on different base material. Heaters use the properties of electrically conductive materials to generate heat by applying electricity to heat the LCD screen. When the LCD screen is in a low-temperature environment, this heater helps to quickly raise the temperature of the screen to ensure proper operation and display.

The heater operates intermittently, activating only when the temperature exceeds a predetermined threshold. To regulate heater activation, a sensor is required to be integrated into the customer's product to trigger the heater when the ambient temperature reaches a critical level. When triggered, the heater is energized, creating a resistive heating effect that generates heat on the surface of the heater, which is then transferred to the LCD screen, raising its temperature to improve the alignment of the liquid crystal molecules, ensuring that the LCD can display images normally at different ambient temperatures.

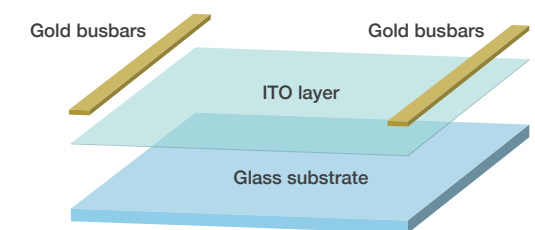
### Custom PET heater solution

The PET heater is a PET (polyethylene terephthalate) base material which covered with a conductive layer. When energized, these conductive materials generate heat that heats the entire film, providing temperature control and uniform heating. It helps prevent problems with condensation or curing of displays that can occur at low temperatures. It is light, thin, flexible and bendable, and has good durability for drop test.



### Custom ITO heater solution

The ITO heater is constructed on a conductive transparent film with a glass substrate. When energized, the ITO material is electrically conductive and generates heat to heat the entire surface, providing temperature control and uniform heating effects. This controls the temperature of the display panel and helps prevent condensation or curing of the display at low temperatures. Because ITO is a transparent material, the ITO heater is suitable for designs that require transparency.



## Our skilled team is here to help you

At Bifa, our team has extensive knowledge of various display technologies to meet a wide range of requirements, regardless of size. Whether you are in search of a ready-made display solution or require a customized approach, our team is dedicated to providing guidance and support every step of the way. Our goal is to collaborate closely with you to identify and tailor the perfect display solution that aligns with your specific requirements, ensuring top-notch quality while adhering to your budgetary constraints.

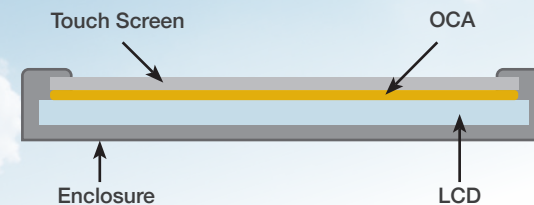


## Bonding and Integration

Bonding technology is a key factor that affects LCD display performance, durability and total cost of ownership. Bifa helps evaluate the suitability of various technologies to meet your project requirements.

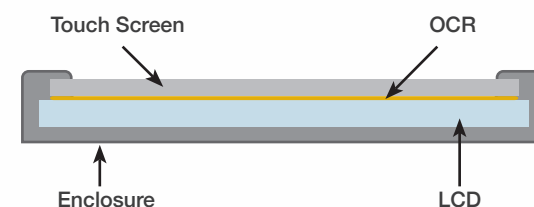
### Optically Clear Adhesive (OCA)

OCA is used to add film-type of optically clear adhesive between the cover glass and LCD display for display panel assembly. Such an optical bonding is especially significant in sunlight conditions. OCA offers superior clarity and excellent adhesion to eliminate surface-to-surface air gap and reflections from the viewing area to achieve better clarity, color contrast and wider viewing angles.



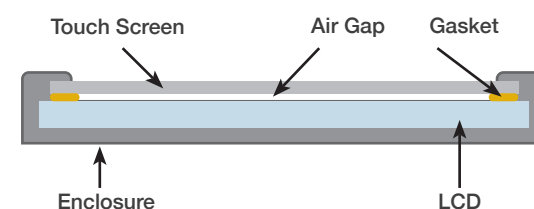
### Optically Clear Resin (OCR)

OCR, or LOCA is one of optical binding technologies widely used for smartphones and tablet devices. The liquid type bonding adhesive is re-workable and suitable for use on curve or uneven surfaces. The technology allows thinner and lighter panel construction required for futuristic display designs.



### Air Gap Bonding

Air gap bonding provides the most economic method for touch panel attachment with a yield rate up to 98%. The adhesive is applied to the inactive border around the viewing area between the display and touch panel. In the result it lacks support between the screen and LCD, which is prone to breakage and moisture. The internal reflecting between layers can lead to poor optical performance.



## Brand TFT LCD and Custom TFT LCD



Bifa establishes close partnership with leading TFT LCD manufacturers providing all your needs for various display applications. Specific features can be ordered to produce, including high brightness, high contrast ratio, wide viewing angle, wide temperature operation, longer lamp life, lower power consumption, wide dimming range, and night vision. We also adopt advanced technologies such as free-form, curved, and transparent LCD, to fulfill any of your display ideas.

**bifa** **INNOLUX**

**JDI** **AUO**  
Japan Display Inc.

**BOE** **TIANMA**

**SAMSUNG** **LG Display**

## Military Cables

Bifa provides a wide variety of military cable assemblies and wiring harnesses. The military cable assemblies consist of flat ribbon cables, RF coaxial, smart cables, data com, hybrid communication cables, over-molded military cables or ruggedized military cable assemblies.

We also offer service to integrate custom military cable assemblies and wiring harnesses into enclosures, boxes or chassis as needed. Custom service for enclosure modification is available upon request.





## Success story

### Healthcare



#### Custom Touchscreen for Fluid Management Systems

Efficient fluid management is essential to improve clinical efficiency. A global healthcare solutions provider sought a high-quality touch LCD solution to support its medical fluid management system. The responsive touch screen could help clinicians quickly spot problems and take corresponding measures as needed.

##### Project Requirements

- 10.4-inch LCD TFT
- Projected capacitive touch panel
- Cover glass with logo printing
- System reliability

##### Bifa Solution

Bifa initiated the project with a glass-film-film construction to complete all required functionality. The team adopted a chemically strengthened cover glass with logo printing to ensure scratch resistant surface and brand awareness. We then used optical bonding to combine the touch panel and the protective glass to ensure the optimal display performance while eliminating air gaps and light reflections.

The projected capacitive touchscreen offered multi-touch capability that allows efficiently medical operation. A bracket was provided to hold the entire touchscreen monitor. When the completed touchscreens were delivered to integrate into the medical fluid management system, the users were satisfied with the enhanced visibility, durability and overall reliability.

##### Why Bifa

- Custom service for touch LCD monitor integration
- Advanced optical technology
- Custom cables for CoF and LVDS display
- 3.3 V display voltage (typical 3.5V)
- Eliminated EMI noise
- Product quality assurance

### Aviation



#### Avionic Display Integration

There are many different buttons, dashboards and displays in the cockpit for pilot to control, adjustment and observation the flight status. An avionic solution provider would like to develop displays to be integrated with their system which will be installed in flight cockpit and discussed with us.

##### Project requirements

- 6 pieces of 2.4-inch TFT LCD
- Brightness 500 nits
- Gorilla cover glass with cutout and ITO coating
- AG and AR coatings
- Optical bonding 6 TFTs with cover glass
- EMI shielding to avoid electromagnetic noise

##### Bifa Solution

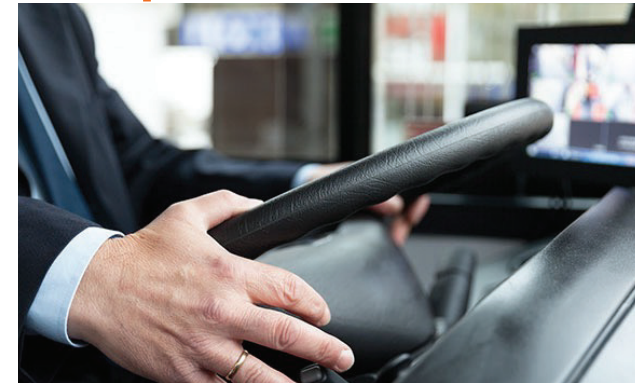
Against constantly changing light conditions and placed together with many other electrical components of cockpit, ensuring good visibility and anti-interference are important points of this project.

In order to ensure perfect visibility and long durability, we purposed its cover glass made by scratch resistant Gorilla glass with AG and AR coating to reduce reflection, optical bonded it with TFT panel to get the best visibility. Last and the most important, EMI shielding is applied in this project as an anti-interference solution.

##### Why Bifa

- Abundant expertise in creating customized display solutions.
- Effective communication, direct and rapid engineering service.
- Support small quantity samples and small MOQ for pilot run.

### Transportation



#### A Multi-touch Monitor for On-board Control Terminal

With thousands of daily commuters and tourists, a bus company in a European capital city intended to improve their operations for better efficiency and safety. The company decided to improve the on-board control terminal with an intuitive touch screen that provide a friendly vehicle status interface to assist the drivers during their route completion process. The customer required a keyless vehicle access function, which could provide convenience for the driver and allow the vehicle owner to safely grant other users access to the vehicle.

##### Project requirements

- 10.1-inch custom TFT LCD
- Capacitive touch interface
- Keypad entry with integrated RFID reader

##### Bifa Solution

In order to meet the operating efficiency and safety required by the smart transportation system, Bifa designed and delivered a tailored-made touch monitor that includes a capacitive touch LCD, an integrated RFID reader and a keypad membrane.

The capacitive touch screen supports multi-touch to make convenience for operation. A protective film is laminated on the panel surface to ensure reliability and performance. The team also integrated a directional keypad with a RFID reader to facilitate the keyless vehicle access control. Every unit, including touch LCD, RFID and keypad, was fully tested before delivery to ensure quality and functionality.

##### Why Bifa

- A wide range of technologies and customized services can design and integrate various functions as required
- Proficient in professional communication to speed up time to market
- Quality assurance and delivery

### KIOSK



#### Custom LCD Monitors for Video Assistant Referee Application

Football is a high-speed sport. Ball tracking and motion recognition bring challenges for referees to observe and make decisions. Our client decided to deploy a Video Assistant Referee (VAR) system, which requires high-definition video technology to provide playback clips for referee decision-making. However, the display conditions to review the video at football stadium are also demanding.

##### Project requirements

- Sunlight readability
- Full HD resolution
- Smooth and stable user experience

##### Bifa Solution

To adapt to the fast-paced and passionate football scene, Bifa built a 24-inch full HD 1920 x 1080 resolution TFT LCD monitor to meet the key footage playback of the VAR system.

The LCD enclosure was finished with IP65 waterproof and dust-proof protection to keep the screen stable, safe and dry. The LCD display delivered high brightness of up to 1100 nits to ensure readability in the sun, thereby providing superior visibility for referees in outdoor sports activities.

##### Bifa Offers

- 24-inch TFT LCD panel
- 1920 x 1080 full high-definition (FHD) resolution
- High brightness up to 1100 nits
- IP65 protection
- Mechanism design of chassis and hood

##### Why Bifa

- Professionally in providing integrated and customized turnkey service and reducing time to market.
- Carefully listen to customer's needs and provide tailored display solutions.
- Improving quality of our products continuously.