

## Bergquist Offers A Variety Of Shielding Solutions

### Shielding Options

There are a variety of shielding options which can be applied to a resistive touch sensor. In order to determine what type and degree of shielding is required this document discusses a variety of Bergquist 5-Wire shield solutions for:

- EMI - Electro-Magnetic Interference
- RFI - Radio Frequency Interference
- ESD - Electro-Static Discharge

### EMI Electro-Magnetic Interference

#### What is EMI?

Almost all electronic components create electro-magnetic interference due to the fact that a voltage generates an electromagnetic field. The higher the voltages and frequencies, the more EMI will be generated. A critical EMI source for instance is an LC-display backlight or the backlight inverter, which switches high AC voltages.

#### How to shield for EMI?

In order to prevent EMI from penetrating beyond the unit's housing, low resistance shields are implemented. Many electronic housings are therefore metal, or conductively coated plastic. By enclosing all electronic components with a grounded casing (a Faraday's cage) EMI pollution can be most easily dealt with.

#### Applying an EMI shield to a touch screen

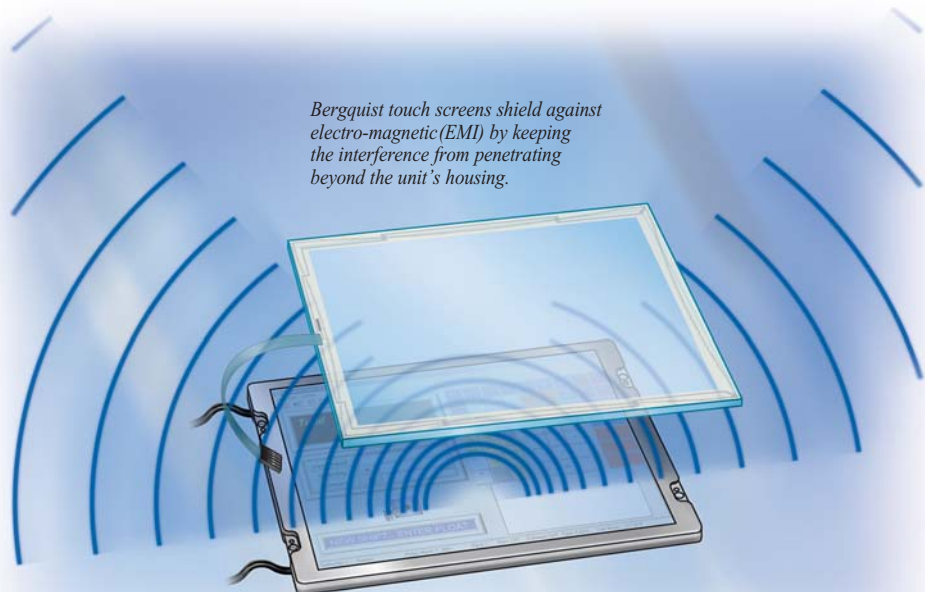
The cut-out for the display and touch screen creates a significant

gap in a shielded enclosure, which needs to be closed by applying a grounded surface to the screen. A thin high resistance coating is typically ineffective for EMI shielding purposes and therefore rules out the use of conductively coated plastics, such as polyester.

In addition to this the shield needs to be connected to the grounded housing in multiple locations, in order to provide for a seamless enclosure.

#### The Bergquist EMI Solution

For EMI shielding purposes we recommend using a separate conductive coating on the back of the glass which is available in a variety of resistive values, ranging from  $4\Omega^2$  to  $80\Omega^2$ . This stable coating is then connected to the grounded housing or bezel by means of conductive, self adhering copper tape.



*Bergquist touch screens shield against electro-magnetic (EMI) by keeping the interference from penetrating beyond the unit's housing.*

## Shield Your Touch Screen From Destructive Interference

### RFI Radio Frequency Interference

#### What is RFI?

Radio frequency interference has similar effects and shielding requirements to EMI. Unlike EMI however, RFI describes the effect that high frequency radio signals may have on electronic components, units or how a variety of RFI emitting products may affect each other.

General sources for RFI are high frequency generating applications. Typical examples are to be found in mobile and wireless telecommunication.

#### How to shield for RFI?

Like an EMI shield, the ideal RFI shield is a complete enclosure of all electronic components with a grounded, low resistance, conductive housing. What makes the choice for a suitable RFI shield more complex is that all conductive components, such as traces on a printed circuit board are potential antennas which will be able to be influenced by or transmit RFI.

#### Applying an RFI shield to a touch screen

The ideal place for an RFI shield on a touch screen would be on the front surface. Although conductively coated plastics

are available, these tend to be of relatively high resistance and therefore not suitable for RFI shielding purposes.

This leaves the option of using a low resistance shield on the back of the sensor. The shield alone will not protect from RFI being transmitted through the active layers of the sensor via touch screen controller and tail (which are able to pick up RFI from within the unit).

As a result, in addition to the grounded shield on the back of the sensor the touch screen controller, the tail will need to be protected by a grounded shield.

#### The Bergquist Solution

Contact us for our RF-Shield solutions, which include a transparent, low resistance coating on the back of the sensor; in conjunction with a shielded tail and a shielded touch screen controller. The conductive rear side of the sensor is ideally connected seamlessly with a grounded conductive bezel or housing.

### ESD Electro-Static Discharge

#### What is ESD?

Modern electronic components are increasingly sensitive to electrostatic discharge events and can easily be destroyed as a result. Electrostatic charges are generated by friction on non-conductive and non-grounded materials. Although typically of extremely low current, voltages of several thousand volts are easily achieved.

#### How to shield for ESD

As every ESD voltage will take the path of least resistance an ESD shield can be easily defined: Any contact of sensitive electronic components with electrostatically charged objects (such as the human operator) is to be prevented through means of conductive, grounded material. Any housing that is conductively coated and grounded is an ideal ESD shield.

#### Applying an ESD shield to a touch screen

In order to provide for an effective, affordable ESD shield one needs to understand how electrostatic charges discharge on a resistive touch sensor.

As the polyester top sheet of the touch sensor proves to be an excellent insulator, electrostatic discharges do not penetrate through this material itself. In fact, the discharge will ionise the air in its path as it travels to the low resistance rim. In most cases this will be the tail area of the sensor where the top film is mounted to the glass by means of a spacer adhesive. The spacer adhesive has low insulating capabilities.

In order to adequately protect against ESD it is necessary to prevent ESD from reaching the sensitive perimeter and tail area of the touch screen.

#### The Bergquist Solution

Where protection against ESD beyond the touch screen controller protection is required we offer the addition of SDSP (Static Discharge Sensor Protection). SDSP consists of a conductive frame, on the surface of the perimeter of the resistive touch sensor. This conductive perimeter prevents electrostatic discharges from reaching the sensitive circuitry on the inside of the sensor and the controller.