



Forward Thinkers in Touchscreen Technology

ULTRA Integration and Installation Guide

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Table of Contents

- Revision History 3
- 1. Scope..... 4
- 2. Installation Information 4
 - 2.1 General Mechanical Considerations 4
 - 2.1.1 Display Strength..... 4
 - 2.1.2 Mounting Location..... 4
 - 2.1.3 Gap Between Touchscreen and Display 4
 - 2.2 Assembly Considerations 5
 - 2.2.1 Rear Gasket 5
 - 2.2.2 Touchscreen..... 6
 - 2.2.3 Front Gasket..... 6
 - 2.2.4 Controller..... 8
- 3. Maintenance Information..... 8
 - 3.1 Storage 8
 - 3.2 Handling..... 9
 - 3.3 Cleaning 9
- 4. Definitions..... 9
 - 4.1 Overall Area 9
 - 4.2 Viewable Area 9
 - 4.3 Active Area 9
 - 4.4 Coversheet 9
 - 4.5 Gasket..... 10
 - 4.6 ITO 10
- 5. Diagrams..... 10
 - 5.1 Touchscreen Areas..... 10
 - 5.2 Touchscreen Stack-up..... 11
 - 5.3 Typical Final Stack-up..... 11
- ULTRA 5-wire Touchscreen Quick Reference Guide..... 12

Revision History

Revision #	Description	Date
1.0	First draft	05/11/09
1.1	Edit table of contents	01/05/10

1. Scope

The information in this document describes how to integrate your custom or standard display and bezel with an A D Metro ULTRA touchscreen. There are a number of items that are necessary to take into consideration when approaching this issue and each item is important to consider in order to achieve an optically, mechanically and electrically robust and effective touch solution. The information in this guide will help to give you an idea of the potential problems that can arise throughout the bezel design and touchscreen integrating process and afterwards during the long run, and how to avoid or minimize the chance of failures down the road.

2. Installation Information

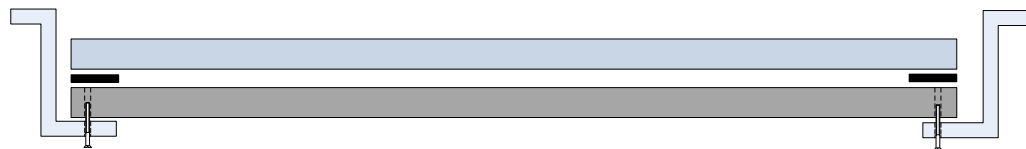
2.1 General Mechanical Considerations

2.1.1 Display Strength

In order to secure the touchscreen firmly in place, clamping or compressing forces must be exerted upon the touchscreen and the display itself. Many displays are unable to withstand high clamping forces, so if you are clamping, make sure to determine if your display can do this prior to bezel design or integration. If fixing to the display directly is not an option, then a separate mechanism should be used to hold the touchscreen and seal the border to your bezel.

2.1.2 Mounting Location

If the border touchscreen must cover the mounting holes of the display, use horizontal standoffs. These help to reduce the protrusion of the mounting screws. Ensure that the mounting holes are covered with a sufficiently thick foam gasket to protect the rear of the touchscreen from the tip of the screws.



2.1.3 Gap Between Touchscreen and Display

The touchscreen should generally always be separated from this surface and not pressed tightly against it. If placed too close, the touchscreen may flex through use

and contact with the display surface, possibly causing damage to the touchscreen and display alike and cause optical inclusions in the area of contact. The gap should not be too large, as it may introduce inaccuracies when operating at an angle. Aim for the smallest gap possible, so long as the sensor does not touch the display screen. A good guide to use is a gap equivalent to a 1/8" foam compressed 50%. It is possible to install the touchscreen directly against the surface of the display, but this must be done by optical bonding. Note though that while bonding the sensor to a display is an option, doing so may invalidate the warranty for many display manufacturers should there be any permanent damage.

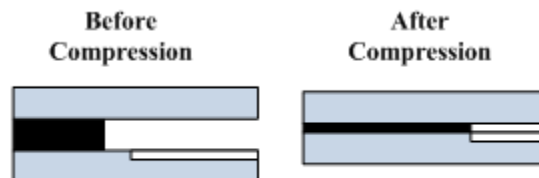
2.2 Assembly Considerations

2.2.1 Rear Gasket

The purpose of the rear gasket is to provide a seal between touchscreen and your display in order to keep out dust and other foreign material that may contaminate visibility or functionality, while not causing damage to the touchscreen or the housing of the display itself. The recommended solution is to use highly compressive foam. Ensure that your gasket material will not dissolve or otherwise be damaged by any chemicals that it may come into contact with in your application.

Using single or double sided adhesives are popular solutions that provide stability in gasket location and positioning and touchscreen alignment. Generally, although the clamping forces between display and touchscreen are sufficient to keep the gasket in place, rear gaskets with adhesives are very common. If deciding to use adhesive, select one that can stay firmly in place and is not easily removed, such as VHB. An adhesive-backed gasket may be placed on the back of the touchscreen or along the border of the display housing. It should also be unaffected by heat due to the display, which can cause the adhesive to peel.

Your gasket should be designed in such a way that it allows for material distortion due to compressing forces and does not affect the visibility of the display or the touchscreen's active areas. Anywhere that any metal, glass or plastic parts meet without being mounted there should be a gasket to both protect the materials and to maintain a dust-proof seal for the air gap.

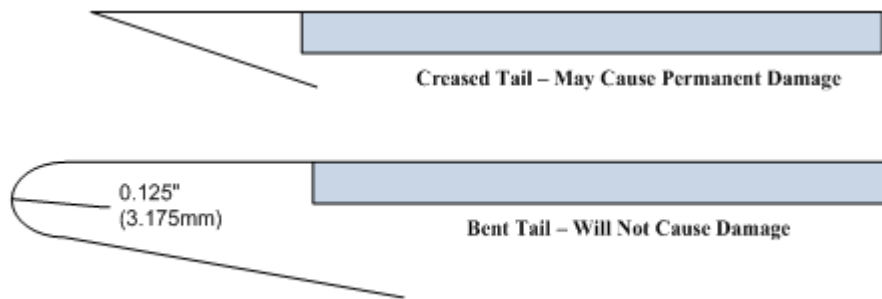


Ensure gasket has room to compress without overlapping the display's active area

2.2.2 Touchscreen

ULTRA uses resistive touchscreen technology and as a result is not sensitive to EMI or RFI from outside sources. However, the touchscreen cable should avoid being run near an inverter or other circuit board prone to vibration containing lead cutoffs. These sharp edges may over time rub through the cable and short out the cable circuitry.

The cable is meant to be used as an electrical connection only. Therefore, never trim or otherwise modify the cable, and never carry or support the touchscreen by its tail. Do not crease the cable at any point along its length. Bending the cable is allowed, but no more than 0.125" (3.175mm).



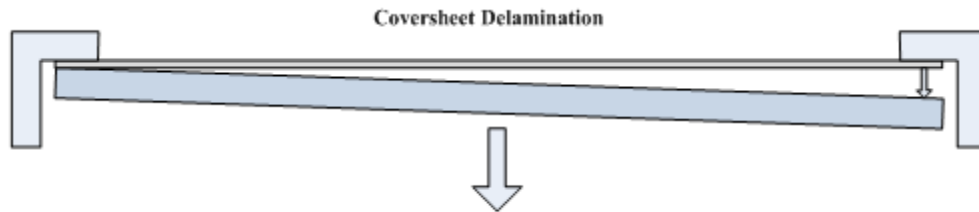
Align your touchscreen with your display as desired prior to finalizing your assembly design. When designing, use adhesive that can be easily removed in order to allow for any required corrections in placement or positioning. The active area of the touchscreen should be centered with the active area of the display. If possible, let the inner silver traces be covered by the bezel to provide greater optical clarity and cosmetic appeal.

2.2.3 Front Gasket

The front gasket is located between the front of the touchscreen and the back of your bezel. Like the rear gasket, it provides a seal against contaminants and helps to make a sturdy assembly. Foam is again recommended as front gasket material. However, extra factors must be taken into consideration when designing the bezel, since the front of the touchscreen is where all touch activations occur, which makes it a rather sensitive area.

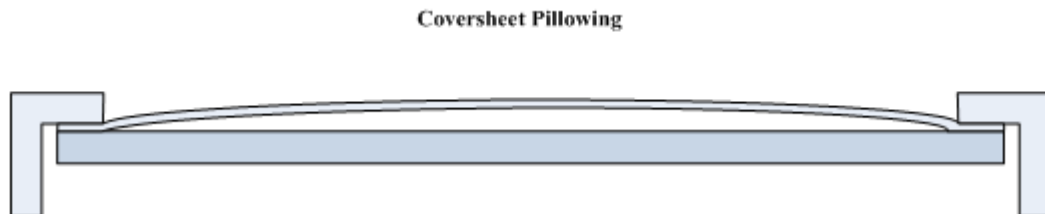
The most important thing to recognize is that, unlike the rear gasket, the front gasket should not be stuck to the surface of the touchscreen. The gasket should only ever be attached to the underside of the bezel. Most of the weight of the touchscreen lies in the glass substrate, so in any position other than face down, if the bezel is stuck to the touchscreen via adhesive with no support for its substrate, the weight of the substrate may cause the coversheet to delaminate. While giving the substrate constant support

would help, the sensor would still run the risk of a full delamination should the bezel ever be removed from the assembly or picked up by the bezel frame.



Even only a partial delamination can be harmful. Even if the sensor does not look like it has delaminated due to no additional backer support, small cracks in the lamination may occur, which means the sensor may no longer have its airtight seal. Moreover, a conductor is placed between the glass substrate and the coversheet to serve as a conduit for electricity to be delivered to surface of the coversheet covered with ITO. If the coversheet delaminates only slightly on one side, should it separate completely from the conductor, no electricity will be delivered to the coversheet and thus activations may not even occur.

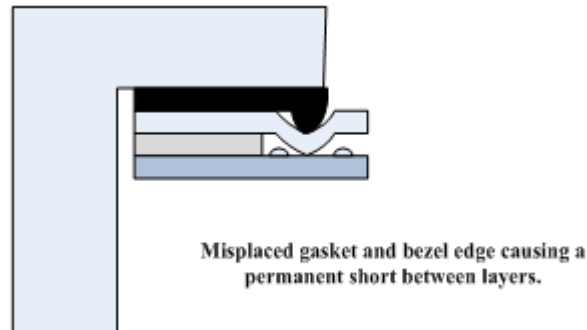
The touchscreen coversheet is designed to allow slight expansions in order to compensate for environmental changes and changes in temperature. For this reason, it is important not to use any high stick adhesives to allow for these expansions and contractions; else the coversheet may become distorted or pillowed.



Finally, similar to the rear gasket, ensure that the dimensions and placement of the gasket and bezel opening are selected in such a way that it allows for material compression which will not result in the gasket being squeezed into the active area of the touchscreen. Not only will it reduce the cosmetic appeal, but it runs the additional risk of the foam gasket to cause a constant short between the two touchscreen layers.

Moreover, if the bezel edge is placed too close to the active area, not only will it obstruct the visibility of the display, but over time there may be in this area a buildup

of dirt, dust or other contaminants which may cause a false activation if packed tightly enough.



2.2.4 Controller

Before ULTRA can begin functioning, the controller for the touchscreen must be installed. The placement and installation of the controller is much more flexible since there are fewer restrictions as far as where the controller can be placed or its orientation.

The controller should be fixed in secure location, such as the inside of the monitor or display casing, with adhesive, glue, plastic fasteners or mounting screws. The controller should be placed in such a way that the touchscreen cable can easily connect to it and have some degree of slack to it. The touchscreen cable should not be significantly creased or bent in order to connect with the controller.

Finally, the controller is an exposed circuit board, and as such must be placed in a environment within its operational specifications.

3. Maintenance Information

3.1 Storage

When not using ULTRA for extended periods of time, ensure that the touchscreen is stored in an environment ranging from -40°C to 70°C . Store the touchscreens in their original packaging if possible, as the packaging is designed to protect its surfaces from dust and finger prints

Multiple sensors may be stacked on one another, but only with sufficient spacers for cushioning and no more than 10 at a time. Do not place any heavy objects on a touchscreen that might cause damage to the sensor.

3.2 Handling

When picking up or moving the touchscreen, use two hands to support it evenly and always be gentle when picking it up or putting it down. Use gloves to avoid getting fingerprints on the sensor's surfaces. Never carry the touchscreen by its tail; it is meant to be used as an electrical connection only. Avoid dropping the touchscreen or striking it against any hard surfaces, as the glass substrate runs the risk of cracking, chipping, or breaking completely.

3.3 Cleaning

ULTRA touchscreens are laminated with a thin sheet of borosilicate glass. Therefore, if touch surface or the back substrate needs to be cleaned, any cleaning agent may be used so long as it does not degrade or attack glass quality. Extra care must be taken however if any part of the surface not covered by this layer of glass becomes dirty, as that portion is made of polyester and not glass. Select cleaning reagents accordingly to account for this. Use a soft, lint free cloth to avoid getting scratches or other marks on the surface of the touchscreen.

4. Definitions

4.1 Overall Area

Refers to the full area of the sensor, usually delimited by the dimensions of the glass substrate.

4.2 Viewable Area

Refers to the section of the sensor outside the active area that is transparent. This area is not obstructed by silver traces, cables, or other objects and the display is clearly visible through it.

4.3 Active Area

Refers to the section of the sensor where touch activations may occur. Lies within the viewable area.

4.4 Coversheet

Refers to the surface, the top layer of the sensor, constituting borosilicate armor glass laminated onto PET polyester.

4.5 Gasket

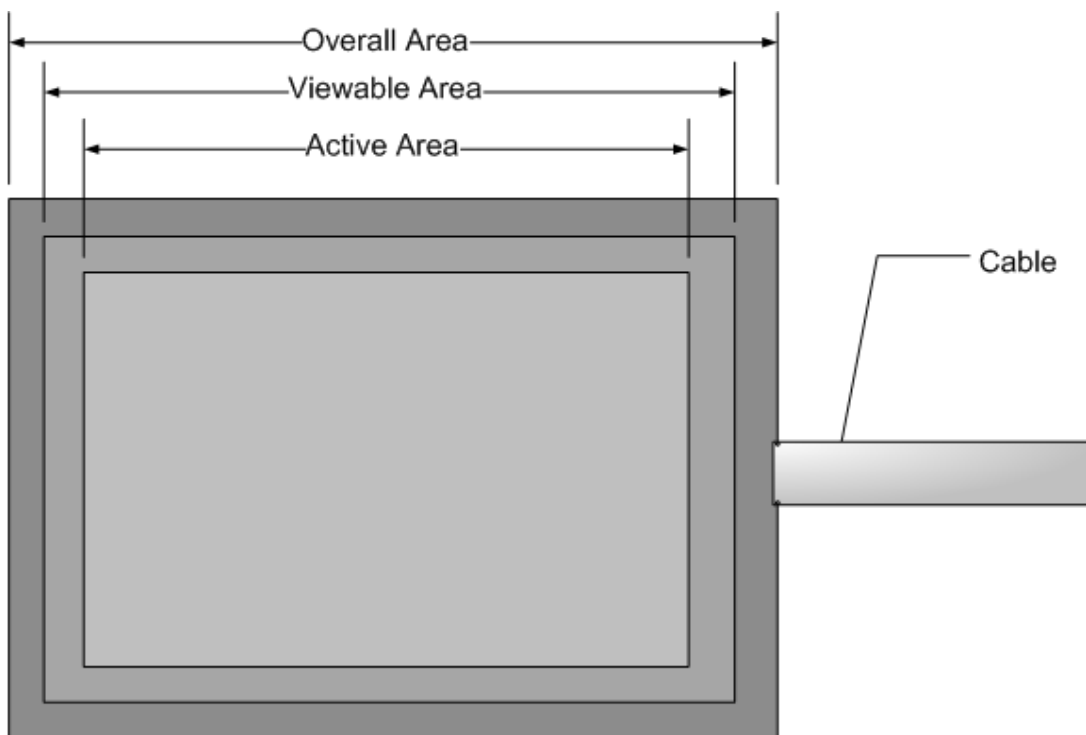
Usually made of foam, serves as a separator between LCD and sensor, and between sensor and bezel. Compresses when clamped between layers, ensuring a tight seal and minimizing damages.

4.6 ITO

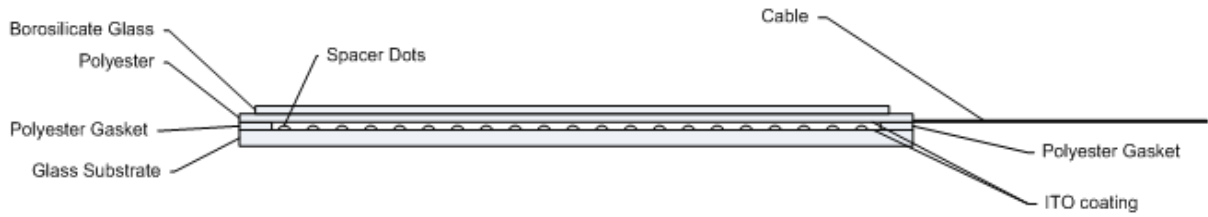
Short for Indium Tin Oxide, ITO is a clear conductive coating located on the surfaces between the layers and act as a circuit pressure is applied to the sensor surface.

5. Diagrams

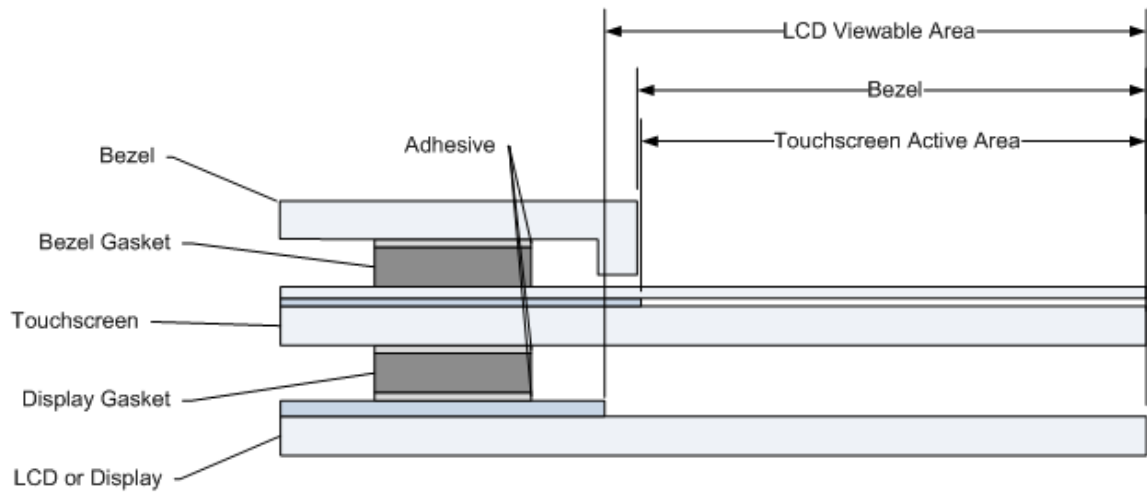
5.1 Touchscreen Areas



5.2 Touchscreen Stack-up



5.3 Typical Final Stack-up



ULTRA 5-wire Touchscreen Quick Reference Guide

Bezel

The bezel should be designed in such a way that the inner window edges do not exert any pressure onto the active area of the touchscreen, as this will cause false activations. When clamped, ensure that the bezel is stable and that the touchscreen is held firmly in place. Avoid having the bezel apply excess pressure on the touchscreen, as its glass may crack. Only apply as much as is necessary to keep the touchscreen from moving within the bezel.

Bezel Gasket

Use a material which is soft and can compress under pressure without breaking. Foam gasket compressed from 50-70% is ideal. When compressed, the gasket may extend further across the touchscreen than in its uncompressed state. Therefore, ensure that the gasket is selected and placed in such a position that when compressed the foam will not extend into the active area. Do not secure the gasket to the touchscreen with adhesive tape on the side facing the touchscreen, as delamination of the touchscreen's topsheet may occur due to the weight of the sensor. To keep the sensor in place, a mechanical clamp is the recommended solution.

Touchscreen

The touchscreen may have its edges covered so long as nothing encroaches onto the sensor's active area. The touchscreen's cable is intended to be used as an electrical connection only. Do not significantly crease the tail connection or carry the sensor by its cable. The minimum recommended bend radius is 0.125" (3.175mm). Avoid having the sensor cable run over high voltage wires or devices.

Display Gasket

Use a material which is soft and can compress under pressure without breaking. Highly compressing foam is ideal. Adhesive tape may be used to secure the gasket to the bottom of

the touchscreen and the front of the display if desired. Select gasket width such that the compressed gasket will not be viewable when observing the complete assembly.

Display

Ensure the display is strong enough to withstand the clamping forces of the bezel and touchscreen assembly. A separate mechanism may need to be used if your display does not allow clamping forces.