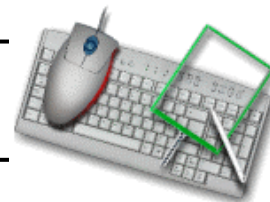




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LCM Assembly Techniques...

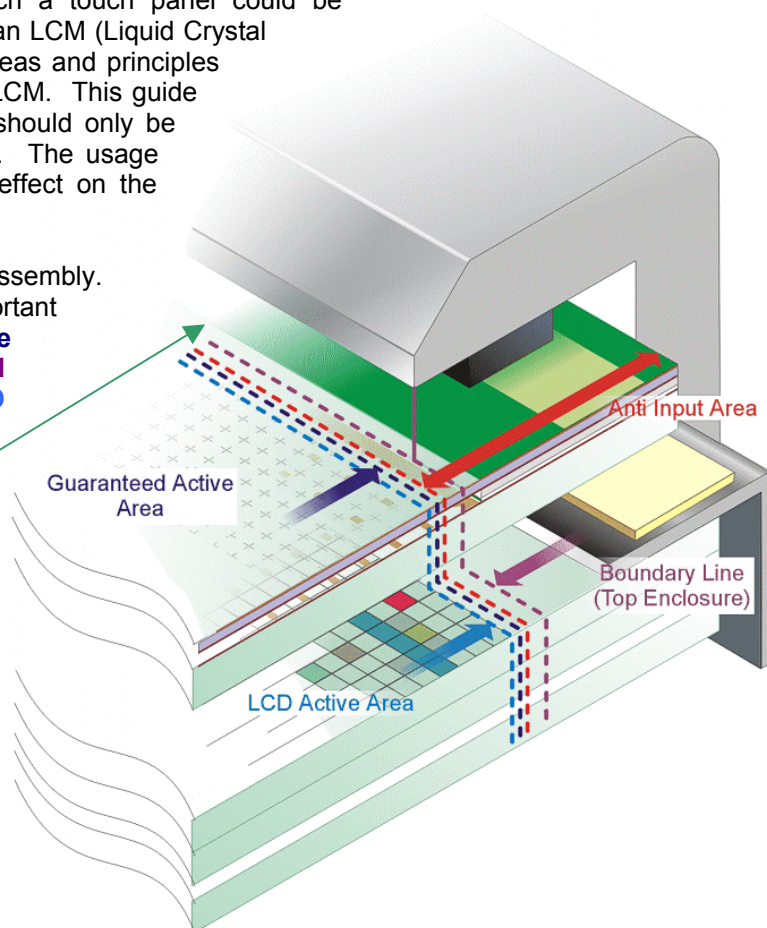
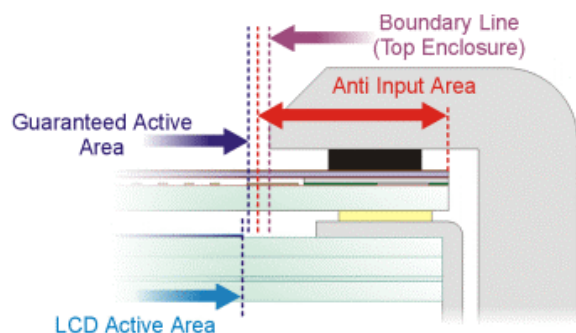


AN INTRODUCTION

The following pages show the basic methods by which a touch panel could be combined with an LCD (Liquid Crystal Display) to create an LCM (Liquid Crystal Module). This information is meant to show the basic ideas and principles that need to be applied and considered in designing an LCM. This guide does not cover all aspects of a completed design and should only be used as a basis upon which to begin making decisions. The usage environment and target market will have a far greater effect on the design decisions.

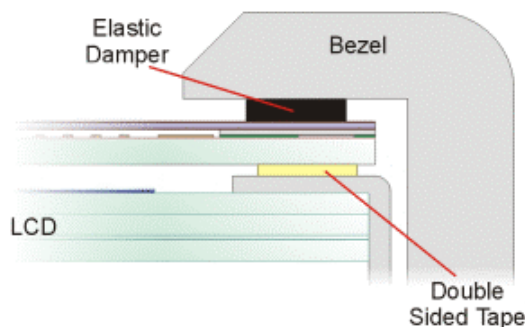
Shown opposite is a basic cut-away view of an LCM assembly. This view shows the relationship between the important measurements, namely, **Touch Panel Guaranteed Active Area**, **Touch Panel Anti Input Area**, **Touch Panel Boundary Line of the Top Enclosure** and **The LCD Active Area**.

The final dimension is the **Transparent View Area** of the touch panel, which must be smaller than the transparent area of the LCD to stop the LCD edges showing.



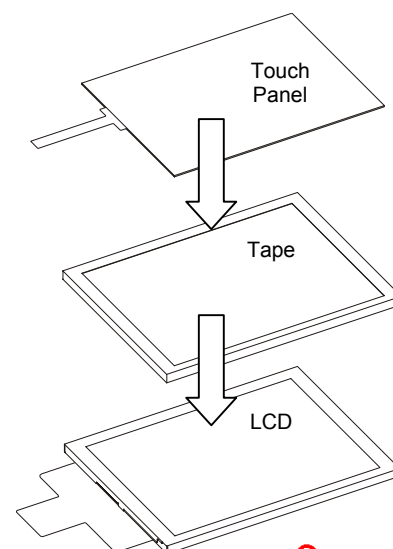
The LCD and Touch panel are fixed together in various ways depending on the mechanical strength required, however, the size of the panel and therefore the weight also affects the choice of assembly technique.

DOUBLE SIDED TAPE



As can be seen from the diagrams opposite the touch panel is fixed to the metal bezel of the LCD. The maximum tape area possible is recommended between LCD and touch panel, however a minimum of 3mm is needed on any one side.

The tape material specifications are sown on the last page of this document.



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EXAMPLES USING DOUBLE SIDED TAPE.

It is more common for smaller hand held units with smaller screens to use the method of doubled sided tape to hold the LCD and touch screen in place, but also the method of fixing the LCM to the bezel need not be so mechanically rigid.

In general the **Guaranteed Active Area** should be at least 0.5mm > **The LCD Active Area** to allow for calibration and alignment of the LCD and Touch Panel

For example, a 3.8" Panel could have these dimensions:-

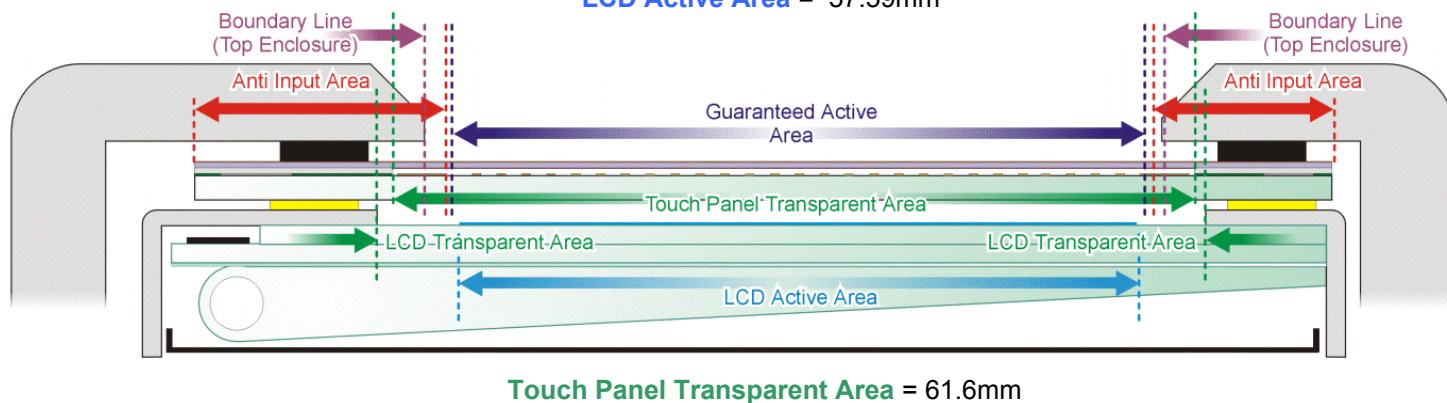
Left hand Anti Input Area = 6.4mm

Right hand Anti Input Area = 3.9mm

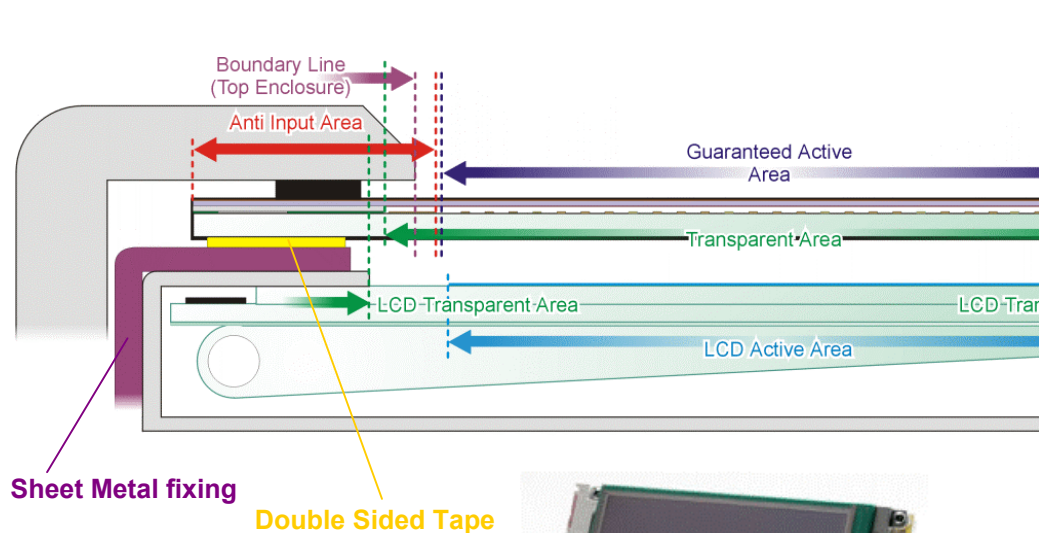
Boundary Line to Top enclosure = 60.2mm

Guaranteed Active Area = 58.6mm

LCD Active Area = 57.59mm



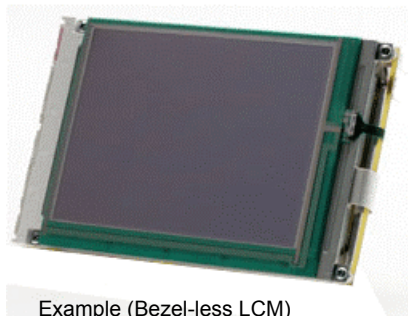
Even a 12.1" Panel design will use tape, but more rigidity may be needed and therefore a sheet metal frame may need to be placed between the LCD and the touch panel:-



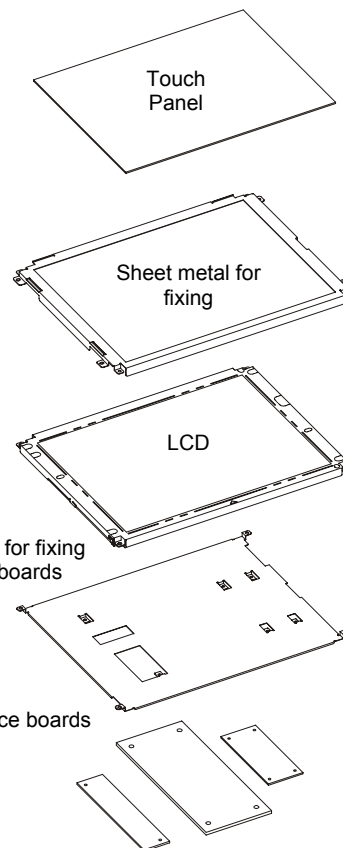
Sheet Metal fixing

Double Sided Tape

As discussed on the previous page, the usage environment and application will dictate what other methods can be used to fix the touch panel to the LCD and also how to fix the bezel. More examples follow....



Example (Bezel-less LCM)





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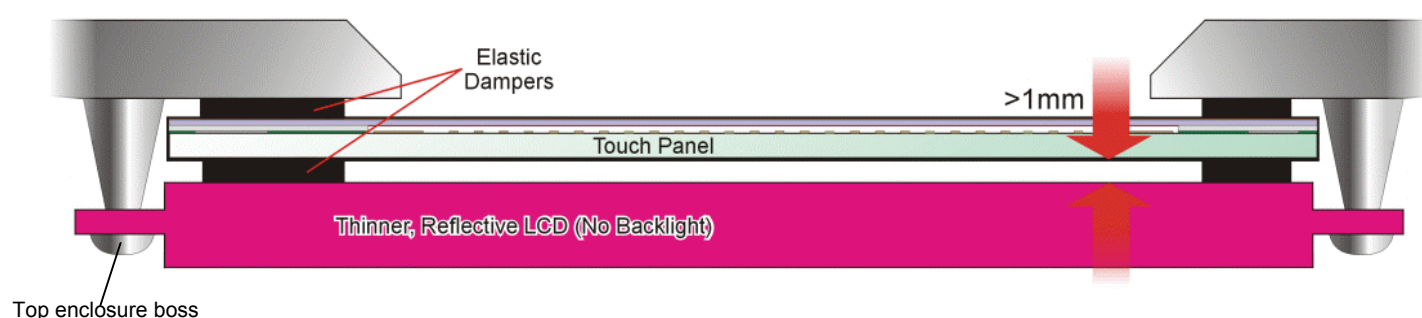
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■ ALTERNATIVE EXAMPLES – PDA and MOBILE designs.

Where the emphasis in a design is to provide the smallest, lightest solution, alternative methods may be used. For example a PDA could be designed as shown below where elastic rubber dampers are used between the LCD and Touch Panel and also between the Touch Panel and Bezel. In this case a design rule to be applied is that the minimum distance between the LCD and the Touch Panel should be 1mm. Other constraints are:-



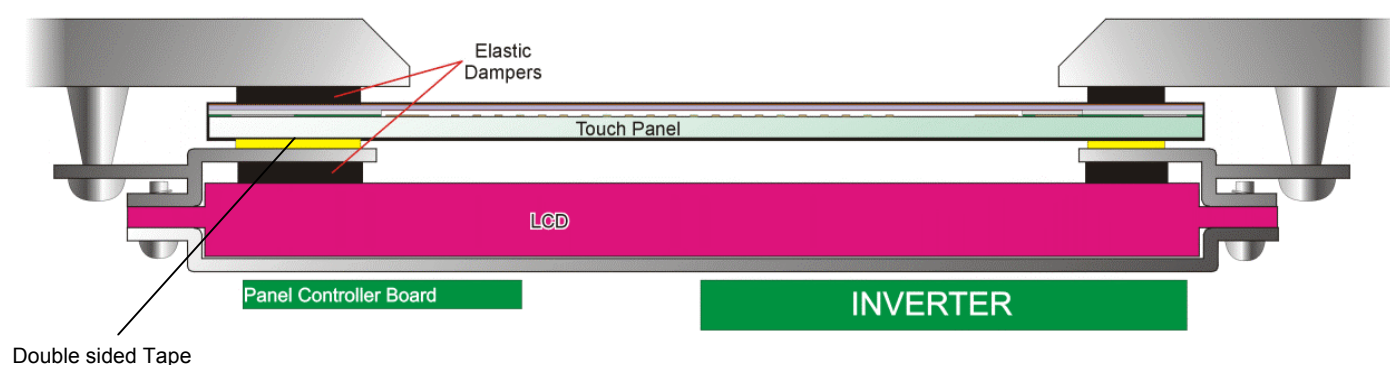
- ◆ Do not bond the Bezel directly to the touch panel film surface. This may cause unnecessary stress on the PET film.
- ◆ Do respect a clearance zone around the edge of the touch panel as the edges and corners are conductive (ITO layers).
- ◆ Ensure any rubber damper does not touch the view area to avoid miss input.
- ◆ Special design consideration should be taken for waterproof designs.



■ ALTERNATIVE EXAMPLES – SHEET METAL FIXINGS AND LARGER PANELS.

In designs with larger LCD Panels the LCD and also the Touch Panel can be quite heavy and therefore a much stronger construction is recommended (12" Panels and above). The same elastic damper construction detailed earlier is recommended between Bezel and Touch Panel. The touch panel itself may be taped to the top metal fixings, but a further elastic damper is recommended between the LCD and these fixings.

The bottom metal fixings can be fixed with screws to the top metal fixings and if Inverters and control boards are necessary, these can be incorporated into the bottom fixings. (3D view shown on the previous page)



- ◆ Do not bond the Bezel directly to the touch panel film surface. This may cause unnecessary stress on the PET film.
- ◆ Do respect a clearance zone around the edge of the touch panel as the edges are conductive (ITO layers).
- ◆ Special design consideration should be taken for waterproof designs.
- ◆ For larger panels, the touch panel is usually a 7 wire type. The elastic Damper should allow for the added thickness of the diodes (See the following page)



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THE 7-WIRE PANEL – DIODE PROTECTION

The surface mount diodes on the 7-wire panel do have a profile above the surface of the glass (t2-t1 in the drawing opposite). This does not mean however that the sealing gasket has to follow the profile of these diodes. This is **only necessary** where the overall thickness allowed by the design does not allow for a 2mm elastic damper to be used.

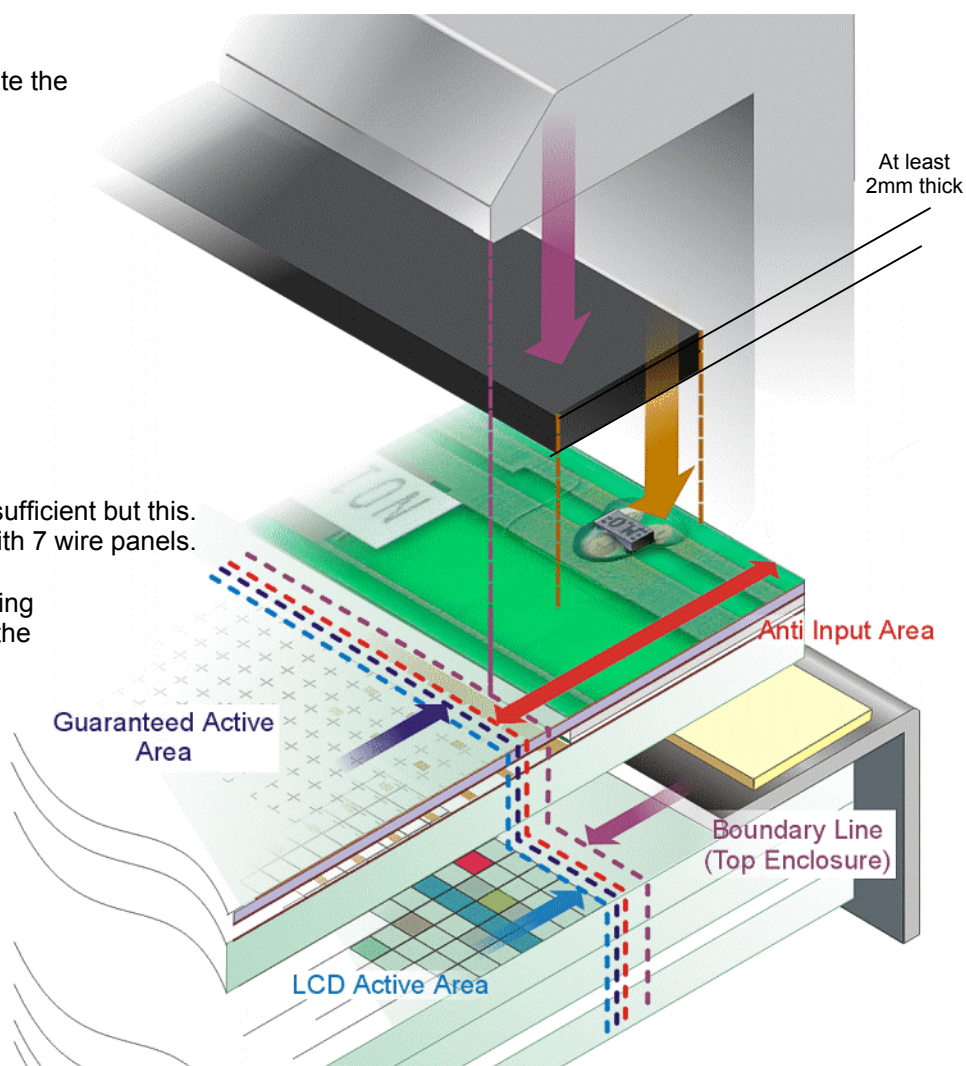
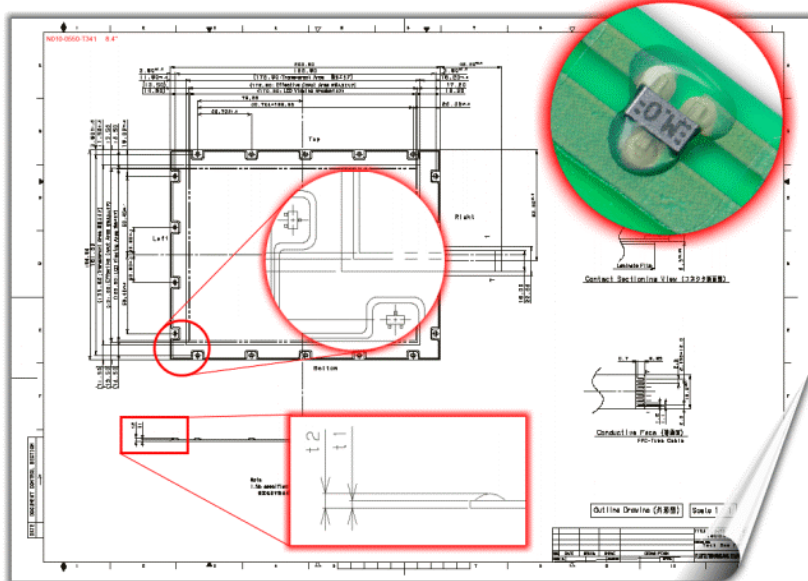
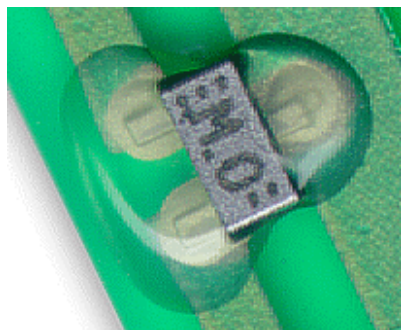


In the example 8.4" panel drawing opposite the above example profile is **NOT** necessary.



A **simple elastic seal** with this profile is sufficient but this. Must be at least **2mm** thick when used with 7 wire panels.

Each diode is fixed in position with a sealing compound so compressive forces from the bezel do not affect the performance.





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MATERIAL INFORMATION & CONNECTORS.

These materials are recommended examples and thicknesses for the design guidelines detailed in this brochure.

◆ FPC Connectors

The 4 wire panels use this connector : - SFW4R-1ST
The 7 wire panels use this connector : - SFW15R-1ST

FCI ELECTRONICS & FCI INTERCONNECTIONS

Framatome Connectors France

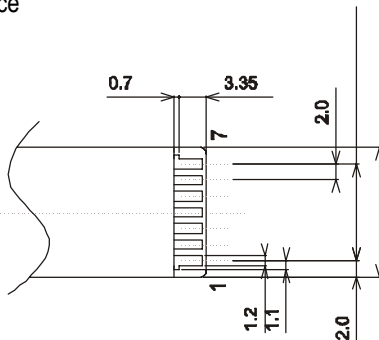
145, rue Yves Le Coz

78035 VERSAILLES CEDEX

Tel : 33-1 39 49 21 83

Fax: 33-1 39 49 20 00

fra@fciconnect.geis.com



Conductive Face

FPC-Type Cable

◆ Rubber Damper

INOAC LE-20 t=2.0

URL: <http://www.inoac.co.jp/>

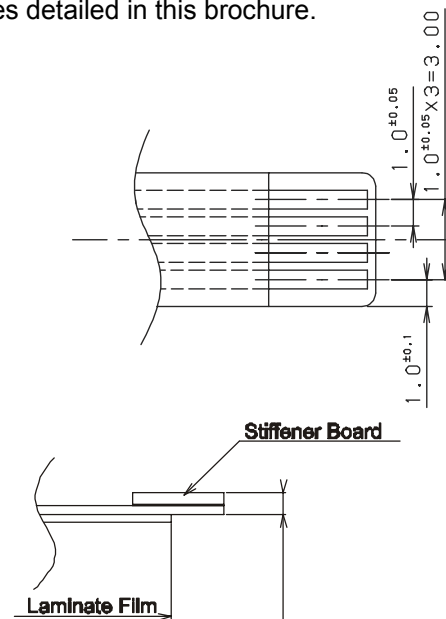
◆ Double Sided Tape

Teraoka No.769X t=0.1

URL: <http://www.teraokatape.co.jp/e/index-e.html>

NITTO DENKO No.541 t=0.75

URL: <http://www.nitto.com/>

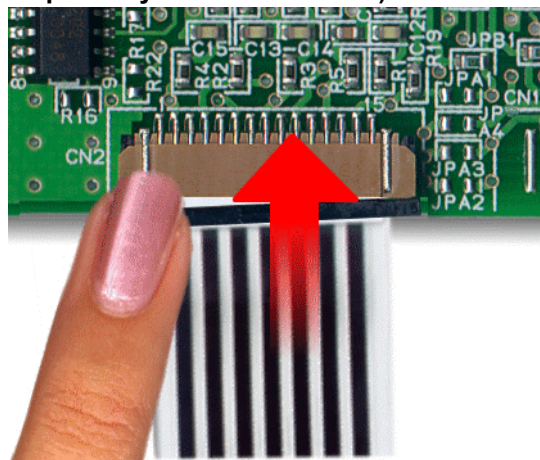
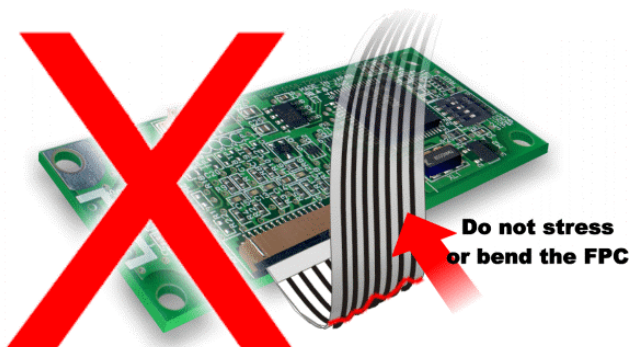


Contact Sectioning View

WARINGS & CAUTIONS.

Some general cautions are detailed here, in respect of handling and usage of touch panels and control boards.

- ◆ As touch panels are made of glass, please be careful in handling. You must wear gloves when handling which also prevents unnecessary fingerprints from getting into the panel.
- ◆ Do not subject panels to unnecessary shocks or stresses.
- ◆ Do not lift a Touch panel by it's FPC cable.
- ◆ Do not add any stress to the film. (For example don't transfer the panel by film with vacuum)
- ◆ Please use a dry cloth or soft cloth with neutral detergent (after wringing dry). Do not use any organic solvents, acids or alkali solutions.
- ◆ Do not pile Touch panel on top of each other.
- ◆ Do not put heavy objects onto the Touch panel.
- ◆ Do not bend the FPC cable of the Touch panel. Insert the cable into the connector in a stress free way as shown opposite.



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