GUNZE USA

Touch Panel Guide Line

February 2009, Revision 2

INTRODUCTION

- Avoid using this panel for applications that may affect people's lives, such as medical equipment, space equipment, aircraft, submarine repeater, and other equipment for which extremely high reliability is required.

- If you are planning to use this panel for a control or safety system in transport equipment (train, automobile and vessel, etc), always contact our sales service center in advance. The quality level of this product is limited to general applications: Computer, OA equipment, FA equipment, communication equipment, measuring instrument, AV equipment, etc.

- This product contains glass; handle it with utmost care. Dropping and strong impact applied may break this product. Further, the glass perimeter edges are not chamfered. When handling this product, do not forget to wear gloves, and take care not to cut your hands or fingers.

- Be sure to check the touch panel wiring before applying voltage to it. In the case of an 8-wire analog touch panel in particular, if voltage is applied inadvertently and over current flows, heat and smoke may possibly generate. (i.e. a voltage is applied between xL and xL ref in an 8-wire metallic connector)

- At GUNZE T/P, a thin-film of metal-oxide and a print-coated metal is used as an electrode. Therefore, do not use T/P in an atmosphere that contains erosive gas.

Table of Contents

GENERAL INFORMATION

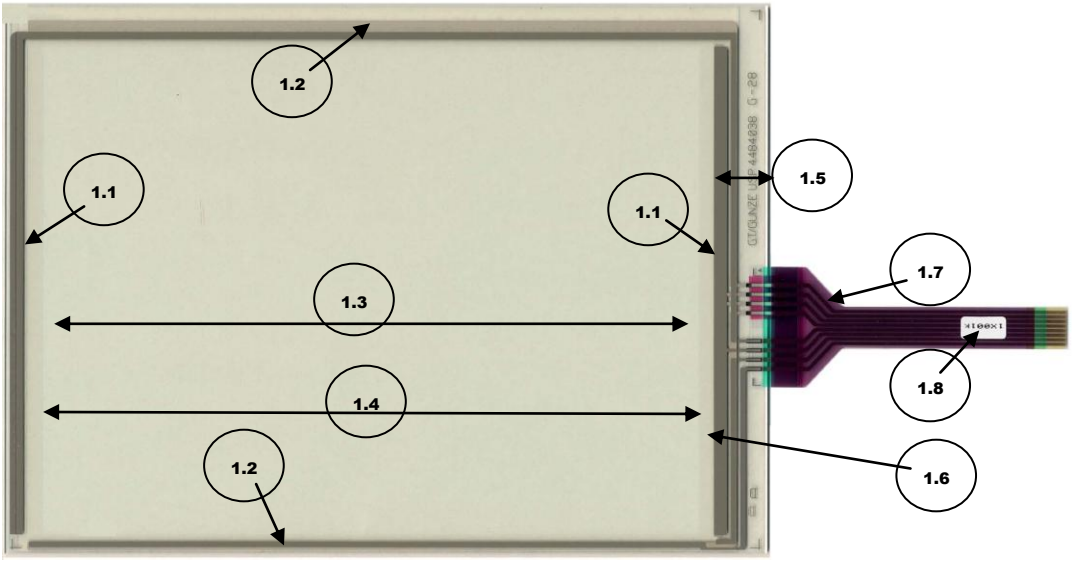
- For our standard product, the design appearance and materials are subject to changes due to product improvements. Where the engineering design changes might adversely affect the product specifications, our company will inform you of this information in advance.

- If you have any objection to the delivered product, immediately contact our salesperson.
  When returning the Touch-Panel to GUNZE, please take special care in packing to avoid breakage during transportation. Original GUNZE packaging is recommended.

- The specifications are established to guarantee the quality of touch panel itself. Before use, always read the "Touch Panel Guidelines," then be sure to evaluate the touch panel connected to your product.

- These specifications should be returned to our sales person with your confirmation signature. If we do not receive a copy of the signed specifications within 3 months, we will regard this as complete understanding and compliance with all guidelines.

1. Configuration and Terminology



1.1 Figure 1: Upper electrode
1.2. Figure 2: Lower electrode
1.3. Key Area
1.4. Viewing Area
1.5. Circuit Area
1.6. Do Not Input Area
  a. Input-Prohibited Area
  b. B-Zone
  c. Transparent Insulation Area
1.7. Flex tail (FPC or FFC)
1.8. Lot seal

Note: The picture shown is Gunze's standard touch panel, G-28.

Figure 1: Touch Panel Upper Electrode cross-section

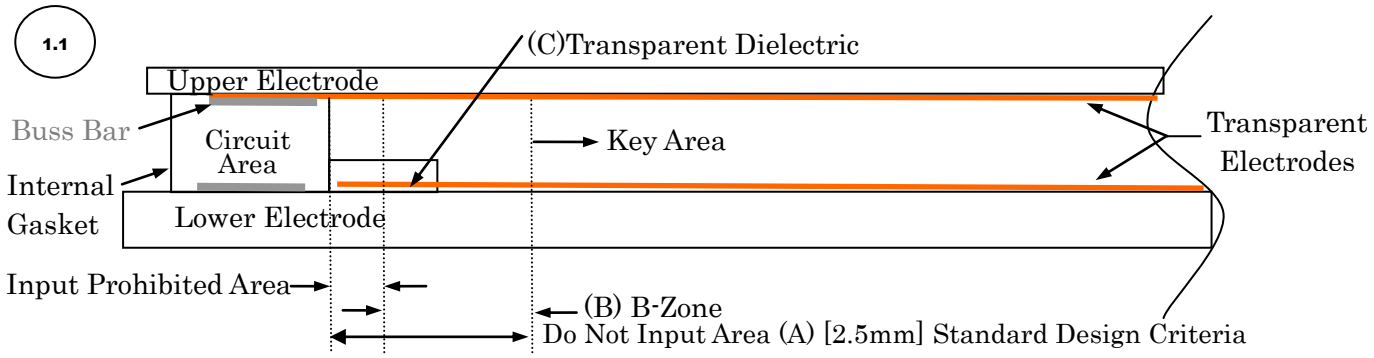
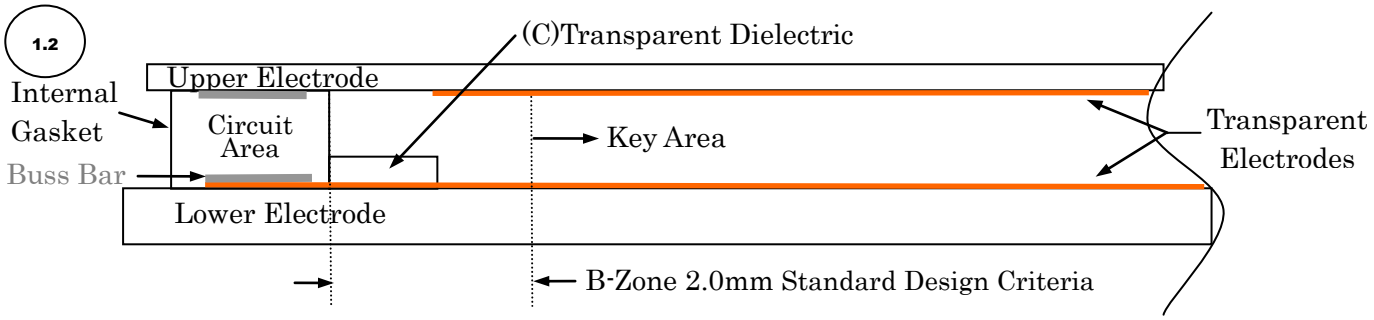


Figure 2: Touch Panel Lower Electrode cross-section



1.3 Key Area

The key area is such that the contents of the specifications are guaranteed for position data, detection precision, actuating force and other operations.

- Key Area carries out coordinate detection and calibration within this area.
- This area is designed so that it becomes slightly larger than the display area of the LCD because of the touch panel upper/lower electrode lamination tolerance.
- In a transparent resistive touch panel, the closer you are to the outside of the key area, structurally, the durability decreases.

1.4 Clear Dielectric/ Transparent Insulation Area

The Clear Dielectric area is provided to prevent incorrect input in the transparent conductive layer—intersection of the touch panel top/bottom electrodes.

Note:
Electrode Etching Technology – depending on the etching technology, the Active Area may extend up to the Clear Dielectric/Transparent Insulation Area.
Special Conditions - The dielectric design may only exist on the upper and lower section (Landscape mode) of the Touch Panel leaving the Active Area to be active up to the left and right side of the Gasket Adhesive.

1.5 Gasket Adhesive Area

This area is used to design the touch panel's main circuitry electrode buss bar routing, the pressure-sensitive adhesive material is used to laminate the top to bottom electrode. Typically, all external gasket adhesives should fall within this boundary.

1.6 Do Not Input Area

This area consists of the input-prohibited area and the B-Zone (Refer to Figures 1.1 & 1.2)

A: Input-prohibited area (See Detail A)

The input prohibited area is a region approx. ***0.5 mm*** inside the touch panel Gasket Area. Absolutely avoid all input in this area as there is a significant possibility that the transparent conductive layer (top electrode) may facture causing malfunctions. Also, be sure to protect this area with the bezel housing.

B: B-Zone (See Detail A)

The "B-zone" is an area approx. 1.5 to 2.0 mm wide in the outer perimeter of the key area. In this area, there is a great possibility that position data could not be detected due to top/bottom electrode lamination tolerance. Avoid using this area and offer some protection with the bezel housing.

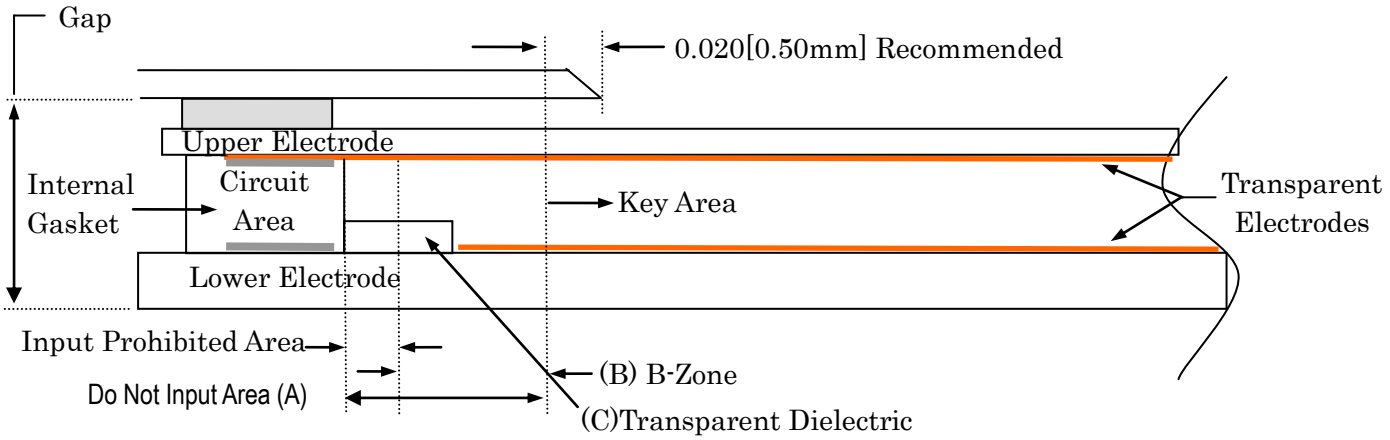
2 Bezel/Touch Panel Mechanical Design

2.1 Touch panel support

- Support the touch panel from the rear glass side.
- Avoid bonding the top electrode to the chassis, housing, etc (i.e. using a double-sided adhesive tape).
  - The film used for the top electrode, expands and contracts according to ambient environment. If this film is fixed, waviness due to film expansion and shrinkage could occur.
  - If stress is applied at the laminated part of the top/bottom electrodes, peeling or breaking of the transparent conductive layer may occur due to chassis strain or input pressure.

2.2 Chassis (bezel) design

- It is advisable to design the bezel with the touch panel as a replaceable unit (for example, using a process that would allow removal of the panel at any point)

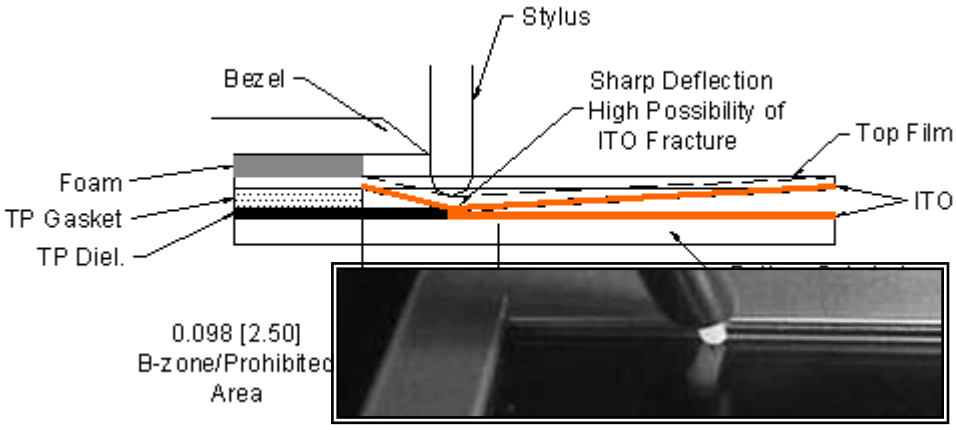


- Assuming input method at customer's end, design the bezel so that no bezel strain hinders the touch panel—a hand placed on the bezel, for example.
- Be careful not to press down the touch panel with the bezel, as it may cause false touches in the touch panel.
- Be careful not to compress the touch panel between the bezel and the LCD.
  - Position detection may be interrupted by film deflection.
  - The film used for the top electrode expands and contracts according to the ambient environment. If this film is compressed, waviness due to film expansion and shrinkage could occur. Allocate a gap between the film and bezel equal to the total thickness of the touch panel (including tolerances) plus the cushioning material thickness plus a factor, α, (approximately 0.1mm).

    $$\mathbf{Gap_{(film/chassis)} = t_{(touchpanel)} + t_{(foam)} + \alpha}$$

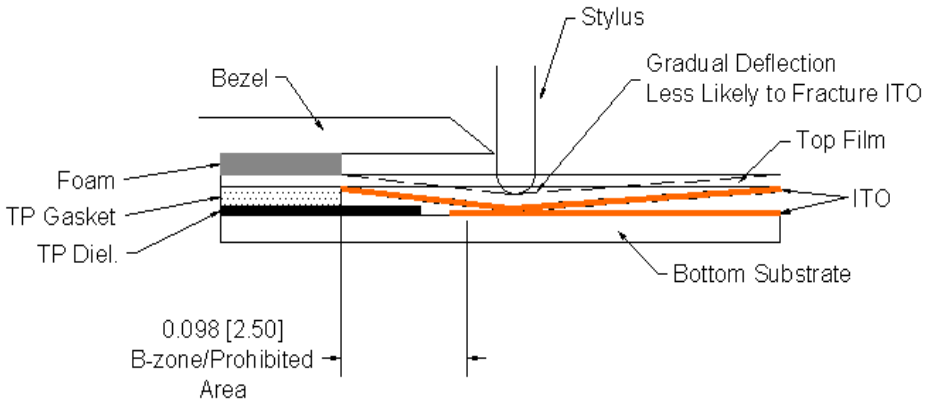
- When inserting a spacer (such as cushioning material, external gasket) between the touch panel and bezel to prevent dust from entering, note the following:
  - Attach the spacer to the chassis side; avoid bonding it to the touch panel.
  - Place the spacers on and within the circuit area (Internal Gasket) on the perimeter of the touch panel. Consider assembling tolerances so that no stress is applied onto the input-prohibited area.

-Zone and extend the bezel
e pen to scribe across the
s exposed to direct pen
in detecting position.



Incorrect Bezel Design

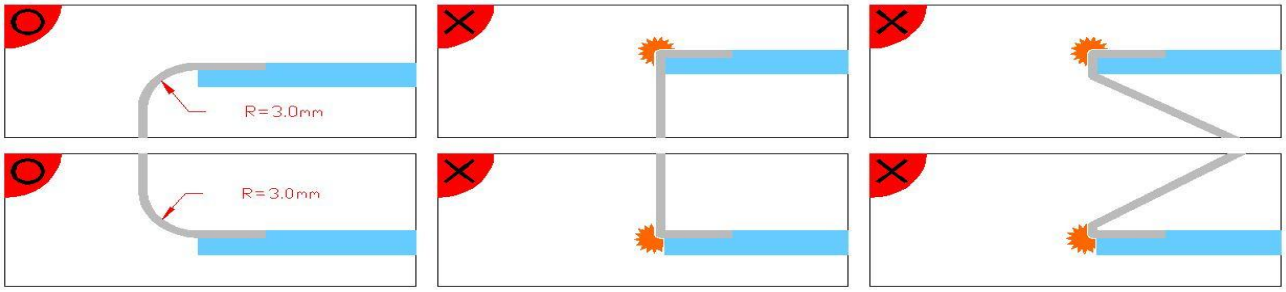
Desired Bezel Design



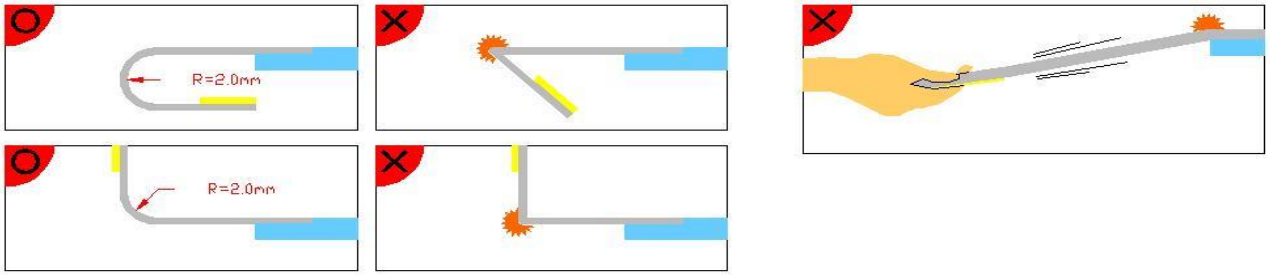
- Some touch panels are specified to provide a vent hole in order to equalize internal and external pressure. Do not cover the air holes and do not allow any liquid to come near or enter this vent.
- Avoid the pillowing state of the touch panel surface film that is caused by air pressure or the like from the equipment interior.
- Make sure not to induce strain or a twisting motion on to the touch panel due to bezel mounting or the like that may accrue damage.

2.3 Flexible Tail Flexible Printed Circuit (FPC) or Flexible Flat Cable (FFC)

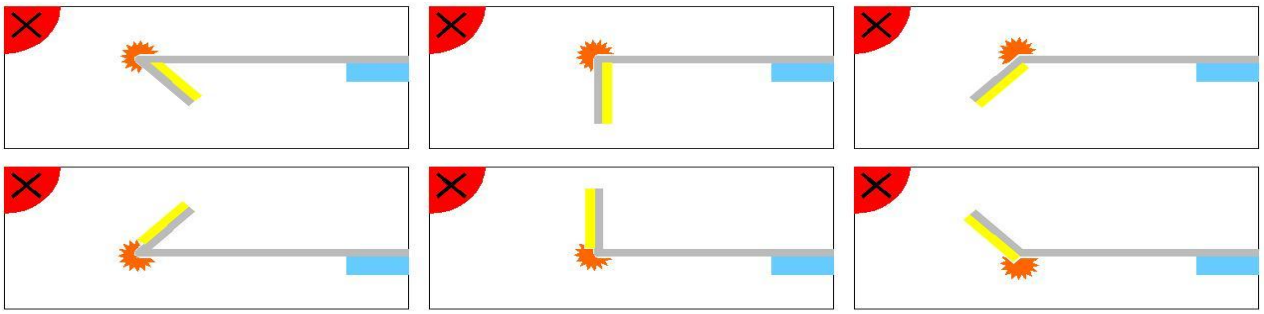
- Depending on your touch panel technology, some touch panel glass substrate is not chamfered. Do not allow the flexible printed circuit (FPC) to be pressed firmly against the glass edge.
- The area of the tail that is bonded to the touch panel body should have a bend radius R ≥ 3.0 mm to allow room for folding.



- The FPC/FFC, in general, should have a bend radius R > 2.0 mm so that the circuitry does not crease.



- On the connector side of the FPC/FFC:
  - Use ZIF (Zero Insertion Force) locking system connectors.
  - If the pressure of the connector contact to the FPC circuitry is too great, deflection in the circuitry could possibly cause contact failure. It is, therefore, necessary to assess the impact of the connector on the FPC as well as the influence of thermal stresses, etc. before selecting the connector.
  - After checking the applicable conductor, select the connector for the FPC/FFC.



In general, connectors for FPC are designed assuming metallic circuitry, and some connectors generate higher pressure in the contact area and are quite sharp. We offer a metal FFC option for our standard analog system touch panel. If there is a possibility a connector with our standard FPC will raise concerns, a metal (polyamide) FFC is recommended.

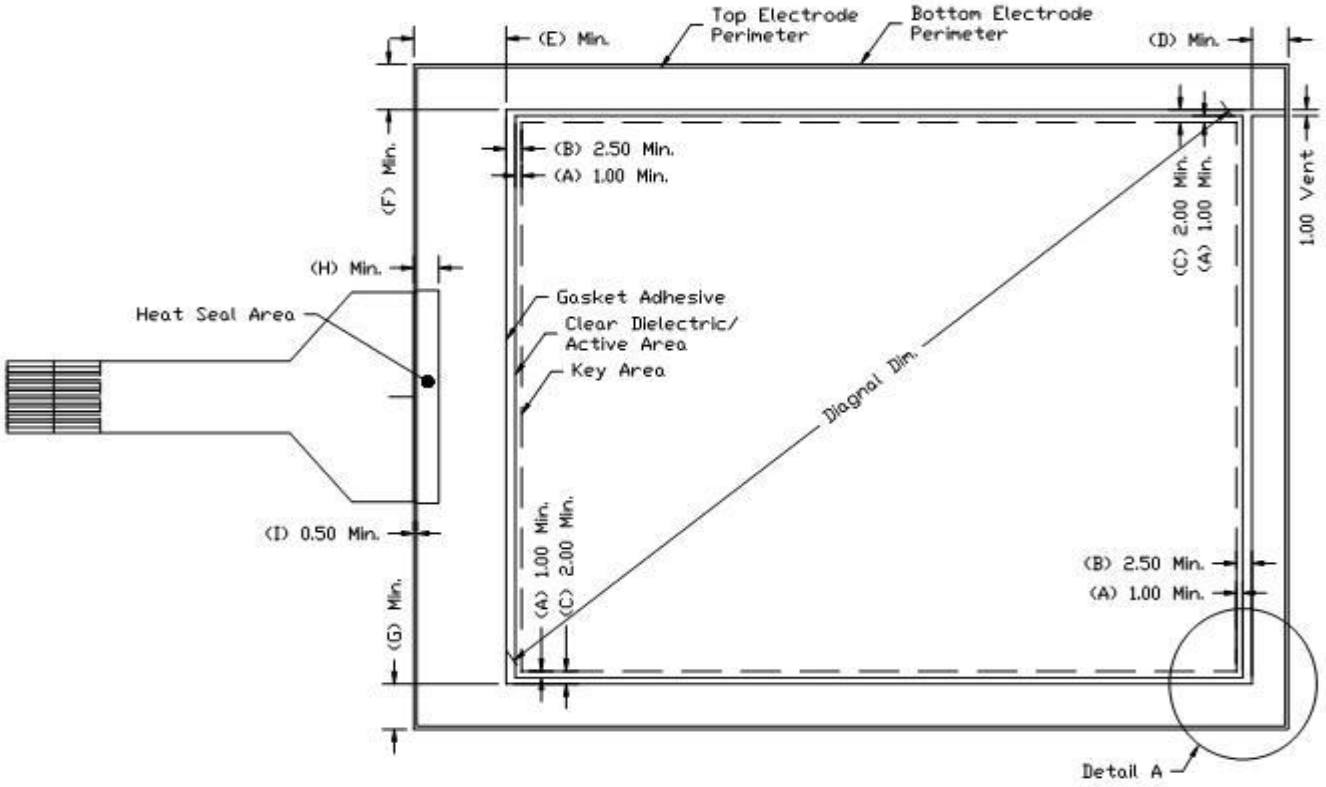
2.4 Assembly to LCD

- The touch panel itself may flex due to a high input force. Be sure to provide a gap to prevent any contact with the surface of LCD.
- Avoid allowing the touch panel to have uneven levels of external adhesive. This unevenness may lead to positional deviation at input.

2.5 Miscellaneous

- The transparent conductive layer may be in the top or bottom electrode of the touch panel. To prevent malfunctions, design the touch panel so that the insulation in this vicinity is maintained.

2.6 Touch Panel Design Reference



Diagonal Dim.		A	B	C	D	E	F	G	H	I
Inches		mm	mm	mm	mm	mm	mm	mm	mm	mm
2.0 - 4.0		1.00	2.50	2.00	2.00	5.50	2.50	2.50	3.25	0.50
4.0 - 6.0		1.00	2.50	2.00	3.00	6.75	4.25	4.25	3.50	0.50
6.0 - 7.0		1.00	2.50	2.00	4.50	7.50	4.50	4.50	3.50	0.50
7.0 - 8.5		1.00	2.50	2.00	5.00	8.50	5.00	5.00	3.50	0.50
8.5 - 11.0		1.00	2.50	2.00	5.50	9.00	6.00	6.00	3.50	0.50
11.0 - 13.0		1.00	2.50	2.00	6.00	9.50	7.00	7.00	4.00	0.50
13.0 - 15.0		1.00	2.50	2.00	6.50	10.00	7.50	7.50	4.50	0.50
15.0 - 17.0		1.00	2.50	2.00	7.50	10.50	8.00	8.00	4.50	0.50
**** Dimensions are to be used as a Reference Guide, dimensions may change to a smaller value to acquire project.**										

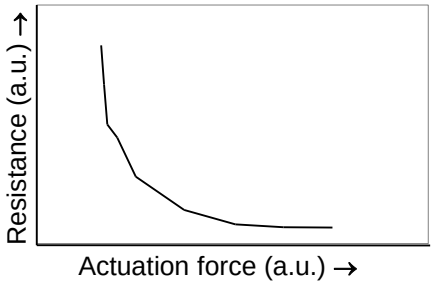
3 Circuit Design

In the resistive touch panel, there are two types of detection methods—analog and matrix.

3.1 General

- Design your circuit for detection after checking the specifications of current passing through the contact between the top and bottom surfaces.
- Contact resistance occurs between the top and bottom electrodes of the touch panel, and changes according to pen or finger pressure. Read the data only after the contact resistance has satisfactorily stabilized.

Example: Input at the pressure of maximum operation starting force



Resistance (upper/lower) vs. Pressure

3.2 Analog Touch Panel

Our analog touch panel is designed to obtain its best performance if used in combination with our analog touch panel controller "AHL Series".

If you choose to design the control and detection circuit, take note of the following:

- Adopt a constant voltage system circuit.
- The analog touch panel corresponds to a capacitor in an equivalent circuit.
  With due consideration given to the capacitance value, design you detector circuit and low-pass filter, etc.
- Under high humidity, the insulation resistance between the top and bottom electrode decreases due to the influence of the environment. To prevent any wrong input, consider this in your design, including software design.
- Pay special attention so that positional corrections can be made in the product conditions at the customer's end.

4 Software Design

For software development of analog type touch panel in particular, take note of the following points:

- Be sure to design the software such that positional correction (calibration) takes place after assembling the touch panel and LCD.

- Be sure to include “user calibration menu” in the software.
  The detecting position may vary due to changes in ambient environment (temperature and humidity) and time. Be sure to set up the “user calibration menu” for the controller and software so that positional correction (calibration) is possible even in the product condition at the customer's end.

- If 2 points are pressed at the same time, the analog type touch panel will judge that a point on the straight line that connects those two points was depressed. Avoid designing software that allows simultaneous input of 2 points.

- As the number of calibration points increases, the input precision will improve. Four or more points are recommended.

- Errors found at A/D conversion process of Interface I/C chip also influences the touch panel linearity. Be aware of this when the input keys are setup on the screen.

5 Touch Panel Handling

During touch panel handling, consider the following items:

- The glass substrate is not chamfered.
  - Since the glass substrate has some sharp edges, use finger cots or gloves, etc., and handle with special care.
  - Note that if the flexible connector is pressed against the glass edge, electrode disconnection or burnout may occur.
- Do not lift up the product by the tail, as this will damage the heat-bonded area.
  - Hold the panel from other than the viewing area of the main body.
  - Do not hold the flexible printed circuit to maintain product reliability.
  - Avoid handing the flexible printed circuit in such a way that a crease is created.
- When re-adhering the release liner, check for stains. These stains can be transferred to the touch panel.
- If the touch panel is stored with the release liner attached for a long period, the pressure sensitive adhesive of the release liner may stick to the touch panel causing stains. Lightly wipe the stains with a soft cloth moistened in ethanol.
- Do not apply water or chemicals other than alcohol to the touch panel. In general, do not allow liquid to come into contact the touch panel face.
- Some touch panels are constructed with a vent hole to equalize internal and external pressure. Always keep water and other liquids away from this vent hole.
- Always remove the touch panel for maintenance after sufficient cooling.
  If moisture forms in the tail connector area or around the exposed silver area due to condensation, migration of silver particles may lead to short circuit failure.
- When cleaning the surface, make sure compressed air is not applied near or around the vent opening of the touch panel.

6 Touch Panel Storage

- Store the touch panel indoors in the packaging in which it was delivered at 10°C ≤ T ≤ 40°C. and ~60% humidity. The glue of touch panel protecting film may possibly be transferred as stains.

- Do not store the touch panel in a high temperature or humidity for long periods and avoid storage in an environment where condensation could arise.

7 Operation

- After checking the touch panel delivery specifications, observe the input method.

NOTE:
Never use an inappropriate devise for a stylus pen (i.e. a mechanical pencil or ballpoint pen, screw driver…etc.). Use of inappropriate devises will lead to film damage and possible malfunctions.

Document changes:

Date	Revision	Note/Change
January 2008	0	First Draft
February 2008	1	Original Release
February 2009	2	Corrected spelling on 2 Illustration section 2.2 and Section 7 Note