

4 Wire Resistive Touch Screen Specifications

Rev. A

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1. Warranty

1.1 Warranty Period

1.1.1 Shall be capable of meeting all characteristics for a minimum period of 1 (one) year from the date of purchase when stored or used as specified under normal conditions within contents of these sheets. The warranty for the initial deflection such as appearance deflection is limited to 1 month.

1.2 Warranty Exceptions

Following conditions are not covered by the warranty and are subject to change.

- 1.2.1 Any malfunctions and damages during transportation and transfer by user.
- 1.2.2 Any malfunctions and damages caused by static electricity.
- 1.2.3 Any malfunctions and damages caused by a natural disaster or a fire.
- 1.2.4 Any malfunctions and damages caused by the failure of the associated equipment.
- 1.2.5 Any malfunctions and damages caused by an improper installation, usage and handling against the specifications and notes.
- 1.2.6 If the product is remodeled, disassembled or repaired by the user or unauthorized personnel.
- 1.2.7 If the product is glued onto the equipment and then uninstalled.
- 1.2.8. Custom products are NOT eligible for Warranty Replacement.

2. Features

Type: 4 Wire Analog Resistive type Touch Panel

Input Mode: Pen or Finger

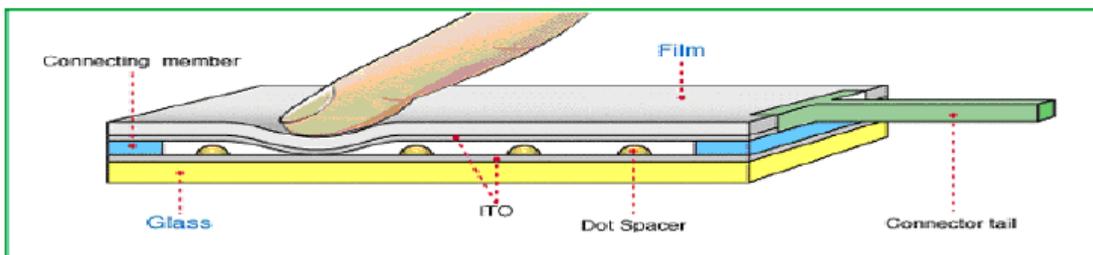
Structure: PETClear hard antiglare coating and anti Newton ring ITO Film, 188um

Glass.....ITO Glass, 1.8mm, 1.1mm

Spacer.....0.1mm

Dot Pitch....3.0mm x 3.0mm

Connector: FPC



3. General Specifications

Item	Specification	Unit
ITO Glass	1.1± 0.1	mm
PET (ITO Film)	175	um
Connector	FPC, 4Pin	

4. Environmental Specifications

- 4.1 The Maximum Voltage: 5V (DC), 1mA
- 4.2 Operating Temperature Range: from - 20°C to + 70°C
- 4.3 Storing Temperature Range: from - 30°C to + 80°C

5. Electrical Characteristics

- 5.1 Terminal Resistance:
 - Top Electrode: Less than 1kΩ
 - Bottom Electrode: Less than 1kΩ
- 5.2 Linearity: $\pm 1.5\%$ or less
- 5.3 Insulation Resistance: 10MΩ or more @ 25V (DC)
- 5.4 Chattering Time: 30msec or less

6. Mechanical Characteristics

- 6.1 Input Method: Pen or Finger
- 6.2 Operating Force: 40grams or less with Ø2mm Manuscript Pen
- 6.3 Top Surface Hardness: 3H (Pencil Test) & Hard Coated ITO PET
- 6.4 Light Transmission: $80 \pm 3\%$ at 550nm wave length

7. Durability Test

7.1 Durability against Writing Characters

Touch panel is drawn by R0.8 polyacetal test header, at the rate of 250g, speed 60mm per second, repeat one inch by 500K times in the same length (10-100mm).

The measurement must satisfy the following:

- Resistance between Leads:
 - $200\Omega < X \text{ Axis} < 900\Omega$
 - $300\Omega < Y \text{ Axis} < 1000\Omega$
- Linearity: $\pm 1.5\%$ or less
- Insulation: 10MΩ or more @ 25V (DC)

7.2 Punching Life

Touch panel is hit 10 millions times with an Ø2mm Manuscript Pen; hitting rate is by 250g at 2 times per second. The measurement must satisfy the following:

- Resistance between Leads:
 - $200\Omega < X \text{ Axis} < 900\Omega$
 - $300\Omega < Y \text{ Axis} < 1000\Omega$
- Linearity: $\pm 1.5\%$ or less
- Insulation: 10MΩ or more @ 25V (DC)

7.3 Impact Resistance

Steel ball is dropped on the touch panel surface from 30 cm height at 1 time. No damage when Ø9mm.

7.4 ITO Connector Insert / Pull out Resistance

5 Times at least. The Requirements in 4.1 shall be satisfied.

7.5 Package Drop: No damage to the product

8. Reliability Test

8.1 Exposure to high temperature

Touch panel is put into a test machine at the condition of 60°C for 120 hours. Then it is left at the room temperature for 24 hours or more. The measurement must satisfy the following:

- Resistance between Leads:
 - $200\Omega < X \text{ Axis} < 900\Omega$
 - $300\Omega < Y \text{ Axis} < 1000\Omega$
- Linearity: $\pm 1.5\%$ or less
- Insulation: $10M\Omega$ or more @ 25V (DC)
- Operating Force: 40grams or less with $\varnothing 2\text{mm}$ Manuscript Pen.

8.2 Exposure to low temperature

Touch panel is put into a test machine at the condition of - 20°C for 120 hours. Then it is left at the room temperature for 24 hours or more. The measurement must satisfy the following:

- Resistance between Leads:
 - $200\Omega < X \text{ Axis} < 900\Omega$
 - $300\Omega < Y \text{ Axis} < 1000\Omega$
- Linearity: $\pm 1.5\%$ or less
- Insulation: $10M\Omega$ or more @ 25V (DC)
- Operating Force: 40grams or less with $\varnothing 2\text{mm}$ Manuscript Pen.

8.3 Exposure to constant temperature and humidity

Touch panel is put into a test machine at the condition of 60°C, 90%RH for 120 hours. Then it is left at the room temperature for 24 hours or more. The measurement must satisfy the following:

- Resistance between Leads:
 - $200\Omega < X \text{ Axis} < 900\Omega$
 - $300\Omega < Y \text{ Axis} < 1000\Omega$
- Linearity: $\pm 1.5\%$ or less
- Insulation: $10M\Omega$ or more @ 25V (DC)
- Operating Force: 40grams or less with $\varnothing 2\text{mm}$ Manuscript Pen.

9. Visual Inspection

The following are applied to the viewing area only. They are ignored in the non-viewing areas as long as the electrical performance of TP is Functional. W = Width, L = Length, D = Diameter, GT = Glass Thickness. Contamination that can be cleaned using a soft cloth with ethyl alcohol does not apply to these criteria. If the object is 3 times longer in one direction than in a perpendicular direction, then it is considered a linear foreign object. Extra dielectric dots are treated as a granular foreign object; extra silver or carbon is regarded as a defect.

9.1 Scratch

CRITERIA	DECISION
$W < 0.04\text{mm}$	In cases of $L \leq 20\text{mm}$ the scratch is ignored.
$0.04\text{mm} \leq W \leq 0.06\text{mm}$	In case of $L \leq 20\text{mm}$ where the scratch is $> 20\text{mm}$ in distance from any other scratch or foreign object, it is ignored. In case of $L \leq 20\text{mm}$ where the scratch is $> 20\text{mm}$ in distance from any other scratch or foreign object, the TP is defective. In case of $L > 20\text{mm}$ the TP is regarded as a defect.
$W > 0.06\text{mm}$	The TP is regarded as a defect.

9.2 Granular Foreign Object

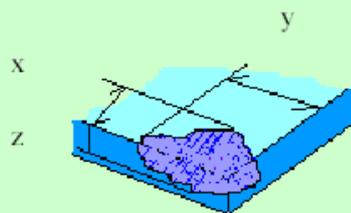
CRITERIA	DECISION
$D < 0.3\text{mm}$	Ignored
$0.3\text{mm} \leq D \leq 0.5\text{mm}$	In cases where the object is $> 20\text{mm}$ in distance from any other scratch or foreign object, it is ignored. In case where the object is $< 20\text{mm}$ in distance from any other scratch or foreign object, the TP is regarded as a defect.
$D > 0.5\text{mm}$	TP is Defective.

9.3 Linear Foreign Object

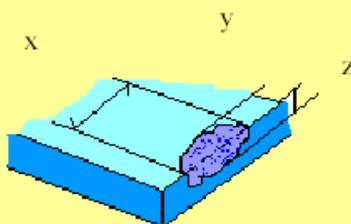
CRITERIA	DECISION
$W < 0.04\text{mm}$	In cases of $L \leq 4\text{mm}$ the object is ignored.
$0.04\text{mm} \leq W \leq 0.09\text{mm}$	In case of $L \leq 4\text{mm}$ where the object is $> 20\text{mm}$ in distance from any other scratch or foreign object, it is ignored. In case of $L \leq 4\text{mm}$ where the object is $< 20\text{mm}$ in distance from any other scratch or foreign object, the TP is defective. In case of $L > 4\text{mm}$ the TP is regarded as a defect.
$W > 0.09\text{mm}$	The TP is regarded as a defect.

9.4 Glass Fragment

Corner fragment: $X \leq 3.0\text{mm}$ and $Y \leq 3.0\text{mm}$ and $Z \leq \text{GT}$ it is ignored



Side fragment: $X \leq 6.0\text{mm}$ and $Y \leq 2.0\text{mm}$ and $Z \leq \text{GT}$ it is ignored



Progressive: TP is regarded as defect.



10. Test

10.1 Linearity: Direction $\pm 1.5\%$ or less

10.2 Open and short Circuit Test

10.3 Insulation Resistance: $10\text{M}\Omega$ or more @ 25V (DC)

10.4 Finished Product Functional Test

11. Handling Remarks

This product is intended for use in standard applications (computers, office automation, and other office equipment, industrial, communications, and measurement equipment, personal and household devices, etc.) Please avoid using this product for special applications where failure or abnormal operation may directly affect human lives, or cause physical injury or property damage, or where extremely high levels of reliability are required (such as aerospace systems, vehicle operating control, atomic energy controls, medical devices for life support, etc.)

11.1 Storage

11.1.1 When the product is stored, make sure it is stored in storage temperature and humidity ranges, eliminating any outside load.

11.1.2 When the product is stored, make sure it is packed in a proper packing box.

11.1.3 Do not use or store the product under a condition where the product will be exposed to water, organic solution or acid.

11.1.4 Do not expose the product to the direct sunlight.

11.2 Unpacking

11.2.1 When you handle the product, hold the product by its body. Do not hold by the FPC tail.

11.2.2 Before opening the box, check the "UP / DOWN" indicator.

11.3 Handling

11.3.1 When holding the product, hold the product outside of the viewing area in order to avoid damage to the touch panel.

11.3.2 Please pay the best attention not to create any stress to the heat-sealed FPC tail. Heavy stress may cause disconnection.

11.3.3 The edge of the glass is not rounded and may cause injury.

11.3.4 Do not depress or scratch the product with any object with a sharp edge to avoid scratch to the product's surface.

11.3.5 Do not forcibly bend or fold the product.

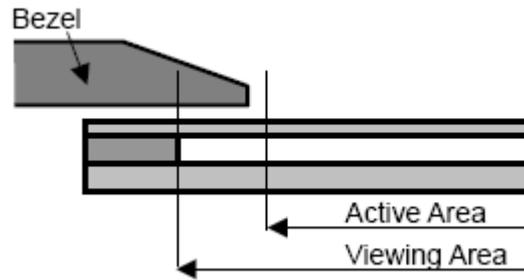
11.3.6 Do not put heavy objects on the product.

11.3.7 Clean the product with a soft cloth or a soft cloth with neutral detergent or alcohol. When contaminated by chemicals, wipe them off immediately with caution not to cause injury to human body.

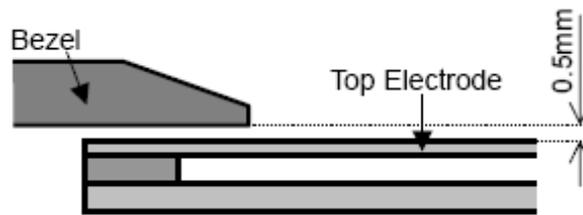
11.4 Mounting

11.4.1 After protective film is released and then laminated to the product's surface again, please make sure there is no dirt on the product's surface.

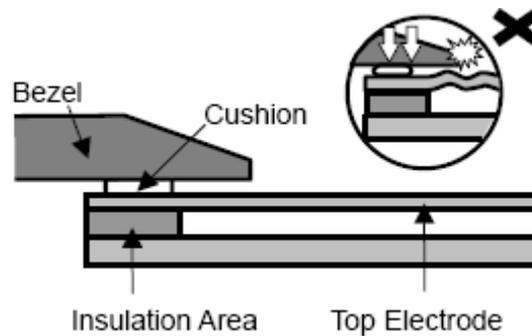
11.4.2 While designing the mounting bezel, try to minimize the stress of the bezel edge on the touch panel. Bezel edge must be positioned in the area between the Active Area and the Viewing Area. The bezel may press the touch screen and cause input if the edge enters the Active Area.



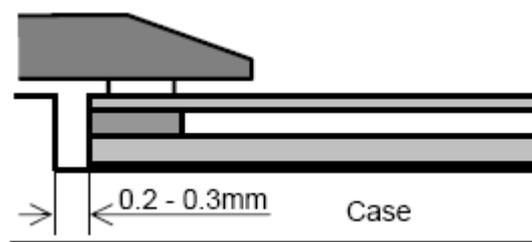
11.4.3 A gap of approximately 0.5mm is needed between the bezel and the top electrode on the touch screen. It may cause unexpected input if the gap is too narrow.



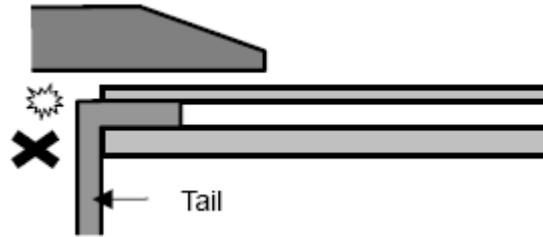
11.4.4 If a cushion is used between the bezel and the top electrode, the cushion must be free enough to absorb the expansion and contraction difference between the bezel and the top electrode. If the cushion is squashed too hard, the expansion and the contraction difference may cause the distortion to the top electrode. The cushion must be positioned within the insulation area.



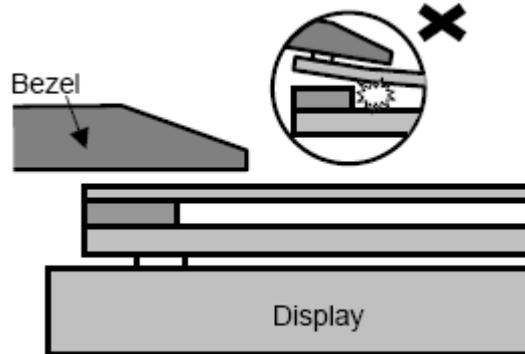
11.4.5 There is a tolerance of 0.2 to 0.3mm for the dimensions of the touch screen and the tail. A gap must be made to absorb the tolerance in the case and the connector.



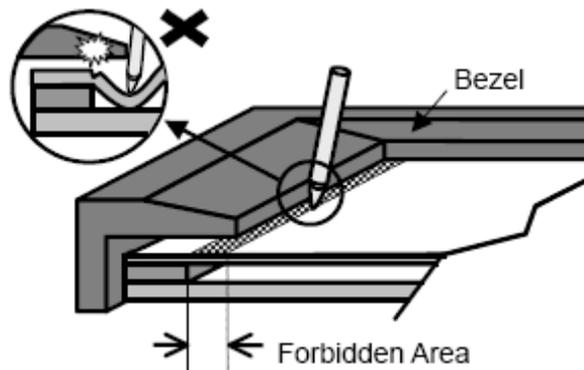
11.4.6 The FPC tail must not be forcibly stressed or bent too hard to avoid the conduction in the insulated area and wire breaking.



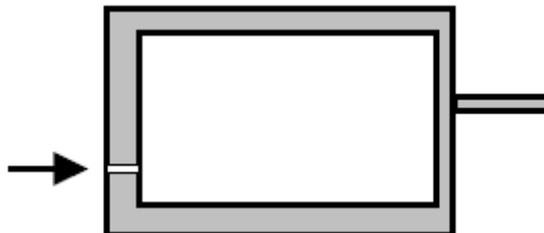
11.4.7 Touch screen must be held from the bottom such as the structure gluing the touch screen onto the display. If the touch screen is glued to the bezel, the adhesion between the top and bottom electrodes is stressed and may come off.



11.4.8 The area within 2mm from the insulation area is structurally weak for the pressure, especially for pen use. The film may be forcibly bent and may cause deflection. This forbidden area must be protected by the bezel and input must be avoided.



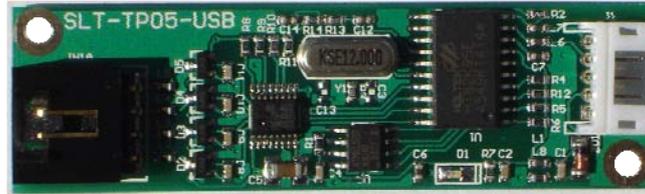
11.4.9 Most of the touch screens have the air vent to equalize air pressures inside and outside. Please design your mounting bezel so that the air vent is open to avoid absorption of the liquid accumulated near the air vent.



11.5 Recommended Hardware & Software

The best performance can be obtained when used with the original 4 wire analog resistive touchscreen controller, SLT-TP05 Series and the accompanied TouchKit Software.

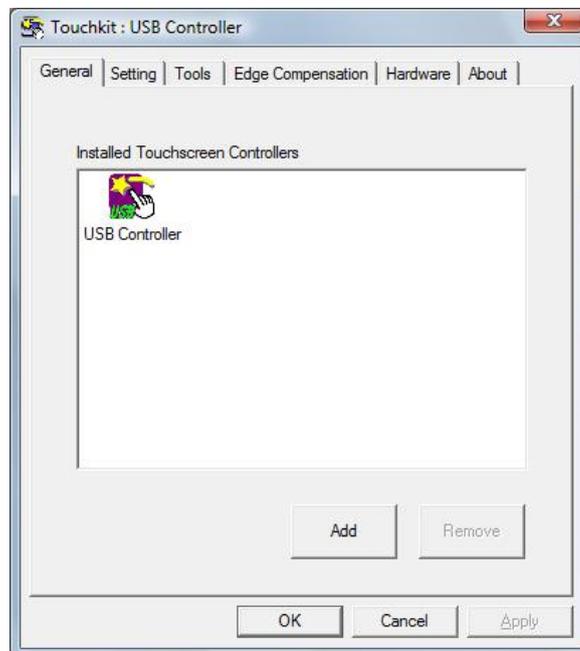
SLT-TP05-USB TouchScreen Controller



SLT-TP05-RS232 TouchScreen Controller



TouchKit Software



If the touchscreen controller or controller software is to be developed by the user, please note the following:

- There is a contact resistance between the top and bottom electrodes and it changes by the pressure of a finger or a pen. The data must be read after the contact resistance becomes stabilized.
- The terminal resistance of the analog resistive touch screen varies by the individual, time, and environment. The controller software must have the calibration function to adjust the input position and the display position.
- The analog resistive touch screen outputs 2 point input as 1 point in between the 2 points. The controller software must not be designed to have the 2 point input function.
- For drawing applications, the line may be intermittent when the pen comes on the dot spacers. Software compensation is needed.

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