Matrix Resistive Touchscreen Reference
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1. Product Specifications

1-1. Product Applicable
§ This specification is applied to the generic matrix resistive touchscreen.

1-2. Structure
§ Dimensions, structure, and shape are referred on the drawing attached.

1-3. Environmental Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Temperature</td>
<td>-20°C to 70°C (no condensation)</td>
</tr>
<tr>
<td>Operating Humidity</td>
<td>-20°C to 60°C Less than 90%RH (no condensation)</td>
</tr>
<tr>
<td></td>
<td>Exceeding 60°C 133.8g/m³ (no condensation)</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-40°C to 80°C (no condensation)</td>
</tr>
<tr>
<td>Storage Humidity</td>
<td>-20°C to 60°C Less than 95%RH (no condensation)</td>
</tr>
<tr>
<td></td>
<td>Exceeding 60°C 142.9g/m³ (no condensation)</td>
</tr>
<tr>
<td>Chemical Resistance (top surface)</td>
<td>Toluene, Trichloroethylene, Athetone, Alcohol,</td>
</tr>
<tr>
<td></td>
<td>Gasoline, Machine Oil, Ammonia, Glass Cleaner,</td>
</tr>
<tr>
<td></td>
<td>Mayonnaise, Ketchup, Wine, Salad Oil, Vinegar, Lipstick, etc.</td>
</tr>
</tbody>
</table>

1-4. Mechanical Characteristics

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activation Force</td>
<td>0.05N to 0.8N</td>
</tr>
<tr>
<td>Operating Life</td>
<td>Input (finger)</td>
</tr>
<tr>
<td></td>
<td>1,000,000 hits</td>
</tr>
<tr>
<td>Light Transmittance (film/glass)</td>
<td>Over 78% (typical value at full wavelength)</td>
</tr>
<tr>
<td>Surface Hardness</td>
<td>Over 2H (by JIS pencil hardness)</td>
</tr>
</tbody>
</table>

1-5. Electrical Characteristics

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Voltage</td>
<td>DC6V</td>
</tr>
<tr>
<td>Maximum Current</td>
<td>Top Electrode: 100mA</td>
</tr>
<tr>
<td></td>
<td>Bottom Electrode: 100mA</td>
</tr>
<tr>
<td></td>
<td>Between the Top and Bottom: 0.5mA</td>
</tr>
<tr>
<td>Contact Resistance</td>
<td>Less than 30kΩ</td>
</tr>
<tr>
<td>Insulation Resistance</td>
<td>Neighboring Terminals: Over 100MΩ at 25V</td>
</tr>
<tr>
<td></td>
<td>Active Area Electrodes: Over 100MΩ at 25V</td>
</tr>
<tr>
<td>Chattering</td>
<td>Less than 10msec at ON/OFF.</td>
</tr>
</tbody>
</table>
1-6. Appearance

§ Scratch, dust \((W = \text{width}, \ L = \text{length}, \ D = \text{average diameter} = (\text{longest + shortest}) / 2)\)

<table>
<thead>
<tr>
<th>Item</th>
<th>Width (mm)</th>
<th>Length (mm)</th>
<th>Acceptable Numbers</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linear(Scratch/Dust)</td>
<td>0.1 ≥ W &gt; 0.05</td>
<td>4 ≥ L</td>
<td>1pcs in ø30mm</td>
<td></td>
</tr>
<tr>
<td>Over 0.1mm in diameter refer to the Circular.</td>
<td>0.05 ≥ W &gt; 0.03</td>
<td>10 ≥ L</td>
<td>2pcs in ø20mm</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.03 ≥ W</td>
<td>20 ≥ L</td>
<td>Acceptable</td>
<td></td>
</tr>
<tr>
<td>Circular (Scratch/Dust)</td>
<td>0.4 ≥ D &gt; 0.3 *1</td>
<td>1pcs in viewing area *1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.3 ≥ D &gt; 0.2</td>
<td>2pcs in ø30mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.2 ≥ D</td>
<td>Acceptable</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Applied only in the Active Area. Scratches or dusts in the outside of the Active Area are acceptable unless the electrical characteristics are affected.

*1 Applied to the size of 14 inches or more.

§ Dirt

Acceptable if not noticeable on a black mat.

§ Chip, crack \((t = \text{glass thickness})\) (applicable only for the glass)

<table>
<thead>
<tr>
<th>Item</th>
<th>Size (mm)</th>
<th>Acceptable Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corner</td>
<td>X ≤ 3</td>
<td>2pcs /panel</td>
</tr>
<tr>
<td></td>
<td>Y ≤ 3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Z ≤ t</td>
<td></td>
</tr>
<tr>
<td>Side</td>
<td>X ≤ 5</td>
<td>2pcs /side</td>
</tr>
<tr>
<td></td>
<td>Y ≤ 3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Z ≤ t</td>
<td></td>
</tr>
<tr>
<td>Crack</td>
<td>Not acceptable</td>
<td></td>
</tr>
</tbody>
</table>

Applied only in the Active Area. Scratches or dusts in the outside of the Active Area are acceptable unless the electrical characteristics are affected.
2. Testing Regulation

2-1. Testing Regulation
§ If the regulation is not specified, the test is performed under the supplier’s regulation.
§ Tests are performed under the room temperature unless specified. The room temperature is referred as follows:

Temperature: 20°C±5°C
Humidity: 65%±10%RH

2-2. Environmental Specifications
§ Chemical Resistance Test
Condition: Test after leaving the chemical on the surface for 12 hours being wiped off by cloth.
Judgement: Must be no effect in appearance.

2-3. Mechanical Characteristics
§ Activation Force Test
Condition: Measured by depressing the point between the dots to the conduction by the testing rod.
Judgement: Must satisfy the specification.

§ Operating Life Test
Condition: Voltage: DC5V
Load: 3.0N
Cycle: 2 hits/sec
Judgement: Must satisfy the following:
_activation Force_: Must satisfy the specification.
_contact Resistance_: Must satisfy the specification.
_insulation Resistance_: Must satisfy the specification.
_appearance_: Must satisfy the specification.

2-4. Electrical Characteristics
§ Contact Resistance Test
Condition: Top and bottom electrodes are measured at the terminal.
Judgement: Must satisfy the specification.

§ Insulation Resistance Test
Neighboring Terminals: Measured by applying the reference voltage to the terminals
Active Area Electrodes: Measured by applying the reference voltage to the top and bottom electrodes.
Judgement: Must satisfy the specification.

2-5. Appearance
§ Appearance Test
Condition: Tested by an examiner with over 1.0 eyesight at 30cm away from the product under the transmittable light at over 60° the surface of the product.
Judgement: Must satisfy the specification.
3. Reliability Condition

3-1. Temperature Condition

§ Temperature Condition Test

Following test are performed in the condition with no dew condensation:

**Cold Test:** Tested after leaving the parts in -40°C±3°C for 240 hours and in the room temperature for 2 hours.

**Heat Test:** Tested after leaving the parts in 80°C±3°C for 240 hours and in the room temperature for 2 hours.

**Humidity Test:** Tested after leaving the parts in the temperature 60°C±3°C, humidity 90 to 95% for 240 hours and in the room temperature for 2 hours.

**Cycle Test:** Tested after 5 cycles of leaving the parts in the temperature -30°C±3°C for 1 hour and in the room temperature for 0.5 hours, then leaving the parts in the temperature 70°C±3°C for 1 hour and in the room temperature for 0.5 hours.

**Judgement:** Must satisfy the following:
- Activation Force: Must satisfy the specification.
- Contact Resistance: Must satisfy the specification.
- Insulation Resistance: Must satisfy the specification.
- Appearance: Must satisfy the specification.
4. Handling Notes

4-1. Precautions
§ 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.).

4-2. Handling Notes
§ Do not depress or scratch the product with any object with a sharp edge or hard end.
§ Do not put this product close to fire.
§ Do not wipe this product with too much load.
§ Do not strongly rub this product locally. It may affect the product’s functions.
§ Do not hit the product with a hard object.
§ Do not forcibly bend or fold the product.
§ When the product is stored, make sure it is packed in a packing box and stored in a storage temperature range, eliminating any outside load.
§ Do not use or store the product under a condition where the product will be exposed to water, organic solution or acid.
§ Do not use the product under the direct sunlight.
§ Do not disassemble the product.
§ When you handle the product, Hold the product by its body. Do not hold by the tail.
§ 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.
§ The edge of the glass is not rounded and may cause injury.

4-3. Construction Notes
§ The environmental specifications, mechanical characteristics, and electrical characteristics are only applied to the Active Area.
§ Do not use the touchscreen when the condensation occurs. The condensation inside of the touchscreen is a natural phenomenon and should disappear after the touchscreen is warmed up.

4-4. Electrical & Software Notice
§ 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.
4-5. Mounting Notes

§ Bezel Edge
Bezel edge must be positioned in the area between the Active Area and the Viewing Area. The bezel may press the touchscreen and cause input if the edge enters the Active Area.

§ Gap between the Bezel and Touchscreen
A gap of approximately 0.5mm is needed between the bezel and the top electrode. It may cause unexpected input if the gap is too narrow.

§ Cushion
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.

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

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

§ Mounting
Touchscreen must be held from the bottom such as the structure gluing the touchscreen onto the display. If the touchscreen is glued to the bezel, the adhesion between the top and bottom electrode is stressed and may come off.

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

§ Air Vent
Most of the touchscreens have the air vent to equalize the inside air pressure to the outside one. The air vent must be open and liquid contact must be avoided as the liquid may be absorbed if the liquid is accumulated near the air vent. The top electrode must not be swelled by the air pressure from inside of the case.
5. Warranty

5-1. Warranty Period
§ The warranty period is limited to 1 year from the date of shipping. The warranty for the initial defection such as appearance defection is limited to 1 month.
§ Any defected parts under proper use will be examined by the supplier and replaced by the new parts if the defection is considered to be caused by the supplier.
§ The replacement is subject to be included in the next lot.

5-2. Warranty Target
§ The warranty only covers the product itself and does not cover any damage to others caused by using this product. Onsite repair or replacement is not supported.
§ We will do our best for delivery problem and product defections, but the warranty for the production line is not covered.
§ Resistive touchscreens are structurally not repairable. All defections are subject to replacement.

5-3. Warranty Exceptions
Following conditions are not covered with the warranty and subject to charge.
§ Any malfunctions and damages during transportation and transfer by the user.
§ Any malfunctions and damages caused by a natural disaster or a fire.
§ Any malfunctions and damages caused by static electricity
§ Any malfunctions and damages caused by the failure of the associated equipment.
§ If the product is remodeled, disassembled or repaired by the user.
§ If the product is glued onto the equipment and uninstalled.
§ Any malfunctions and damages caused by an improper usage and handling against the specifications and notes.

5-4. Tools
§ To maintain the quality, the printing screens and the die-cut plates are generally limited to use up to 1 year. Reorders after 1 year from the initial order or from the last renewal are subject to the tooling charge for replacing the printing screens and the die-cut plates. Reorders for the discontinued standard parts are also subject to tooling charge.
§ All the tools, such as CAD data (except for the drawing for approval), block copies (films), printing screens, and die-cut plates are not to be provided for administrative purpose.

5-5. Changes
§ Because of the manufacturing process, changing the dimensions, circuit pattern, and the tail position requires replacing most of the tools and is subject to high tooling charge. Please be careful when ordering and approving the drawing.
§ Circuit pattern and the materials that does not affect the environmental, electrical, and mechanical characteristics such as film, glass, ink and glue are subject to change for the supplier’s reason or for improvement within the specifications.
§ Standard products are subject to change for improvement without notice.
6. History

Rev1 (April 15, 1998)
Initial release

Rev2 (June 1, 1999)
The overall revision by specification review.

Rev3 (April 1, 2002)
The address in the office was changed by the move.

Rev4 (September 3, 2002)
1-3. Operating Temperature is changed "0°C to 60°C" to "-20°C to 70°C".
1-3. Storing Temperature is changed "-20°C to 70°C" to "-40°C to 80°C"
1-4. Activation Force is changed "50g±30g" to "0.5N±0.3".
1-4. Light Transmission is changed 76% to 78%(TYP).
1-4. Operating Life is changed "1,000,000 hits" to "10,000,000 hits".

Rev4.1 (October 8, 2002)
1-4. Operating Life is changed "10,000,000 hits" to "1,000,000 hits".

Rev5 (June 28, 2004)
1-3. Operating Humidity is changed "Less than 90%RH (no condensation)" to "-20°C to 60°C Less than 90%RH (no condensation) Exceeding 60°C 133.8g/m³ (no condensation)".
1-3. Storing Humidity is changed "Less than 95%RH (no condensation)" to "-40°C to 60°C Less than 95%RH (no condensation), Exceeding 60°C 142.9g/m³ (no condensation)".
1-5. Maximum Voltage is changed "DC5V" to "DC6V".

Rev6 (September 23, 2006)
The specification item name was changed.

1-3. "Storing Temperature" to "Storage Temperature"
1-3. "Storing Humidity" to "Storage Humidity"
1-4. "Operating Load" to "Activation Force"
1-4. "Light Transmissivity" to "Light Transmittance"
1-4. "Top Surface Hardness" to "Surface Hardness"
2-3. "Operating Load Test" to "Activation Force Test"
2-3. "Operating Load" to "Activation Force"
3-1. "Operating Load" to "Activation Force"

4-5. § Cushion: Added an installation position of a cushion.

1-4. Operating Force is changed "0.5N±0.3N" to "0.05N to 0.8N".
4-5. § Cushion: Added an installation position of a cushion.
1. Appearance specification was revised. Characters of scratch/dust were classified into Circular and Linear. The total acceptable number of scratch/dust was added.

2-3. Unit of Load (g) changed to (N) to unify the unit

2-3. Operating Life Test (Finger) Activation Force, Within ±50% of the specification → Must satisfy the specification. (Clerical error was corrected)

2-3. Operating Life Test (Pen) Activation Force, Within ±50% of the specification → Must satisfy the specification. (Clerical error was corrected)

3-1. Temperature Condition Cold Test -30°C → -40°C (Clerical error was corrected)

3-1. Activation Force, Within ±50% of the specification. → Must satisfy the specification (Clerical error was corrected)

Rev7.1 (May 25, 2012)
Address has changed as Tokyo office had moved

Rev8 (Feb 13, 2013)
1-6. Appearance
   Tip → Chip (Scribal error corrected)

5-2. Handling Notes
   • Do not depress or scratch the product with any object with a sharp edge or end. → Do not depress or scratch the product with any object with a sharp edge or hard end. (Description changed)
   • Do not put this product close to fire. (Description added)
   • Do not wipe this product with too much load. (Description added)
   • Do not strongly rub this product locally. It may affect the product’s functions. (Description added)
   • Do not hit the product with a hard object. (Description added)