

DMC Co., Ltd.

Analog Resistive Touchscreen
LST Series(Ver.2) Product Specifications

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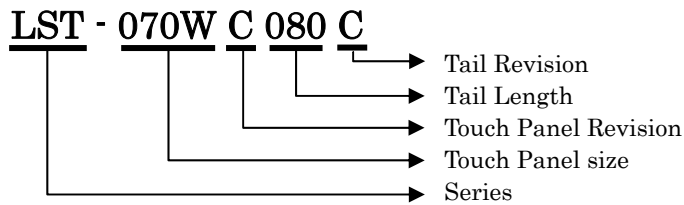
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1. Product Specifications

1-1. Product Applicable

§ This specification sheet is applied to the analog resistive touchscreen: LST Series,
Touch Panel Revision C and later.

1-2. Product Model



1-3. Structure

§Dimensions, structure, and shape shall be as specified in the drawings

1-4. Environmental Specifications

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

1-5. Mechanical Characteristics

Specification	Value	
Activation Force	0.03N to 0.3N	
Operating Life	Input (finger)	10,000,000 hits
	Character Input (pen)	100,000 characters
Light Transmittance (Film/Glass)	Typ. 79% (typical value at full wavelength)	
Top Surface Hardness	3H or over (by JIS pencil hardness)	
Tail Bending Endurance	R=1 bended at 180 degrees (figure 1) Bending Prohibited Area (figure 2)	≤10 times

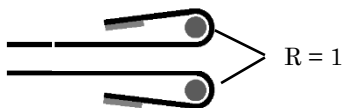


Figure 1 bended at 180 degrees

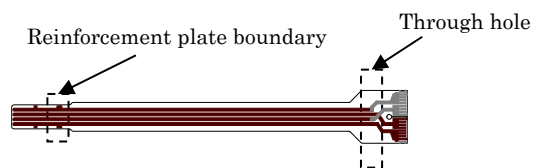


Figure 2 Bending Prohibited Area

1-6. Electrical Characteristics

Specification	Value			
Maximum Voltage	DC6V			
Maximum Current	Top Electrode		100mA	
	Bottom Electrode		100mA	
	Between the Top and Bottom		0.5mA	
Linearity	±2.0% or less (after 4-point calibration) *1			
Terminal Resistance	Aspect Ratio (Active Area)	4:3	Top Electrode	200~1kΩ
			Bottom Electrode	200~1kΩ
		16:9 (Wide Type)	Top Electrode	400~1.3kΩ
			Bottom Electrode	150~600Ω
Insulation Resistance	Neighboring Terminals		20MΩ or over at 25V	
	Active Area Electrodes		20MΩ or over at 25V	
Chattering	10msec or less at ON/OFF.			

*1 : The linearity value is guaranteed after calibration using our controller and driver

1-7. Appearance

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

Item	Width (mm)	Length (mm)	Acceptable Numbers	Total
Linear(Scratch/Dust) Over 0.1mm in diameter refer to the Circular.	$0.05 < W \leq 0.1$	$L \leq 4$	1pc in $\phi 30\text{mm}$	Within 5pcs /panel
	$0.03 < W \leq 0.05$	$L \leq 10$	2pcs in $\phi 20\text{mm}$	
	$W \leq 0.03$	$L \leq 20$	Acceptable	
Circular (Scratch/Dust)	$0.3 < D \leq 0.4$ *1		1pc in viewing area *1	
	$0.2 < D \leq 0.3$		2pcs in $\phi 30\text{mm}$	
	$D \leq 0.2$		Acceptable	

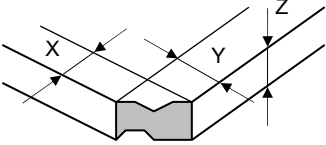
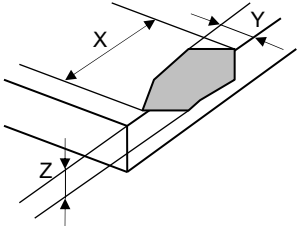
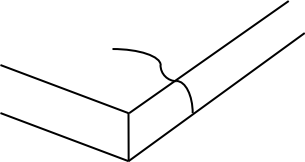
Applied only in the Viewing Area. Scratches or dusts in the outside of the Viewing Area are acceptable unless the electrical characteristics are affected.

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

§ Dirt

Acceptable if not noticeable on a black mat.

§ Chip, crack (t = glass thickness) (applicable only for the glass)

Item	Size (mm)			Acceptable Numbers
Corner		X	≤ 3	2pcs /panel
		Y	≤ 3	
		Z	$\leq t$	
Side		X	≤ 5	2pcs /side
		Y	≤ 3	
		Z	$\leq t$	
Crack				Not acceptable

2. Testing Regulation

2-1. Testing Regulation

§ If the regulation is not specified, the test is performed under the supplier's standard testing condition.

§ Tests are performed under the room temperature unless specified. The room temperature is referred as follows:

Temperature: $20 \pm 5^{\circ}\text{C}$

Humidity: $65 \pm 10\% \text{RH}$

2-2. Environmental Specifications

§ Chemical Resistance Test

Condition: Tested 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 (Figure 1).

Judgement: Must satisfy the specification.

§ Operating Life Test (Finger)

Condition: Testing rod: Refer to Figure 1
Voltage: DC5V
Load: 3N
Cycle: 2 hits/sec

Judgement: Must satisfy the following:

Activation Force:	Must satisfy the specification.
Linearity:	Must satisfy the specification.
Terminal Resistance:	Must satisfy the specification.
Insulation Resistance:	Must satisfy the specification.

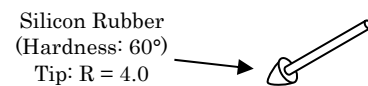


Figure 1. Testing rod 1

§ Operating Life Test (Pen)

Condition: Testing rod: Refer to Figure 2
Voltage: DC5V
Load: 2.5N
Input size: 10 x 10 mm
Input character: A to Z/minute

Judgement: Must satisfy the following:

Activation Force:	Must satisfy the specification.
Linearity:	Must satisfy the specification.
Terminal Resistance:	Must satisfy the specification.
Insulation Resistance:	Must satisfy the specification.

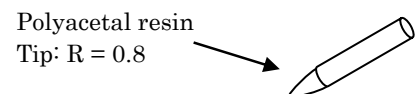


Figure 2. Testing rod 2

2-4. Electrical Characteristics**§ Terminal 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: A healthy adult with a visual acuity of 1.0 or higher (glasses, etc., are allowed) will inspect the product at 30 cm from the eyes.

Visual inspection will be performed using both transmitted and reflected light.

Judgement: Must satisfy the specification.

3. Reliability Condition

3-1. Temperature Condition

§ Temperature Condition Test

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

Cold Test: Tested after leaving the parts in $-40\pm 3^{\circ}\text{C}$ for 240 hours and in the room temperature for 2 hours.

Heat Test: Tested after leaving the parts in $80\pm 3^{\circ}\text{C}$ for 240 hours and in the room temperature for 2 hours.

Humidity Test: Tested after leaving the parts in the temperature $60\pm^{\circ}\text{C}$, 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 $-30\pm 3^{\circ}\text{C}$ for 1 hour and in the room temperature for 0.5 hours, then leaving the parts in the temperature $70\pm 3^{\circ}\text{C}$ for 1 hour and in the room temperature for 0.5 hours.

Judgement: Must satisfy the following:

Activation Force: Must satisfy the specification.

Linearity: Must satisfy the specification.

Terminal Resistance: Must satisfy the specification.

Insulation Resistance: Must satisfy the specification.

Appearance: Must satisfy the specification.

4. Recommended Connector

4-1. Recommended Connector

Part No.	Manufacturer	Pins	Pitch
04FMS-1.0SP-GB-TF(LF)(SN)	JST Mfg. Co., Ltd.	4 pins (Double-sided)	1.00mm

Or any other connector whose specifications are same as above.

5. Handling Notes

5-1. 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 operations 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.).

5-2. Handling Notes

- § Do not depress or scratch the product with any object with a sharp edge or hard end.
- § Do not apply pressure to the film surface when handling the product.
- § Do not put this product close to fire.
- § Do not wipe this product with too much load nor strongly rub this product locally. It may cause the product to malfunction.
- § Do not hit the product with a hard object.
- § Do not forcibly bend or fold the product. (Include tail and overlay, etc.)
- § 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 stack the products.
- § Do not use nor 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 the human body.
- § The edge of the glass is not rounded and may cause injury. It is recommended to wear gloves when touching the touchscreen.

5-3. Construction Notes

- § The environmental specifications, mechanical characteristics, and electrical characteristics are only applied to the Active Area.
- § Do not use the touch screen when the condensation occurs. The condensation inside of the touch screen is a natural phenomenon and should disappear after the touch screen is warmed up.
- § The resistive touchscreen maintains electrical insulation between the upper and lower electrodes by keeping an air gap between them. If the customer applies a protective or decorative film on the touchscreen the weight of the film may compromise the insulation between the upper and lower layers.
- § The upper electrode may not always be perfectly flat; bulging or denting may occur. This is not a defect. Refer to the section 1-5 Mechanical Characteristics for the operation force specification and the section 2-1 Testing Conditions for temperature and humidity specifications.

5-4. Electrical & Software Notice

The best performance can be obtained when used with the original analog resistive touchscreen controller, TSC Series. If the touchscreen controller or controller software is to be developed by the customer, 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 touchscreen 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 touchscreen outputs 2 points input as 1 point in between the 2 points. The controller software must not be designed to have the 2 points input function. It, however, is possible to have gesture function by 2-finger touch when it is used in combination with DMC's exclusive controller TSC-52/RU-F(-S#/L#), a PCB controller with the gesture function circuit, or TSC-52/IC(-S#/L#), a sole controller IC that is to be used in reference to the recommended circuit from DMC(Even with the above controllers, positioning accuracy is not guaranteed since its function is designed to be dedicated to gesture operation itself.).
- § For drawing applications, the line may be intermittent when the pen comes on the dot spacers. A software compensation is needed.

5-5. Mounting Notes

At mounting the touchscreen, refer to the separate document, [Resistive Touch Screen Mounting Guidance]. The appropriate structure differs according to touchscreen size, LCD, chassis design, usage environment and so on. Please conduct the evaluation with actual user's products at the trial stage and confirm that your structure is appropriate prior to fixing the structure design.

- § For touchscreens with a film-type upper electrode, the film may expand and contract due to temperature changes in the surrounding environment. If a cushioning material is placed between the inner bezel of the customer's enclosure and the touchscreen, it may fail to absorb this expansion and contraction, causing the film to warp and affect appearance and functionality. Avoid mounting methods that restrict film movement. Additionally, to prevent glass breakage and ensure the film can expand and contract freely, use elastic cushioning materials between the bezel and touchscreen.
- § Some touchscreens have exposed transparent electrodes at the edges. Ensure the design prevents contact with other conductive materials.
- § Do not bend the tail forcefully. This may cause insulation failure or disconnection. Avoid excessive stress, particularly at the boundary of the reinforcement plate near the connector insertion area and at the glass boundary near the base.

6. Warranty

6-1. Warranty Period

- § The warranty period is one year from the date of shipment by the supplier. However, replacements for initial defects are limited to within one month from the shipment date. (excluding transport)
- § Any supposedly defected products under proper use will be examined by the supplier and replaced with new products if the alleged defection is determined to be caused by the supplier. Additionally, failure analysis will only be conducted for products within the warranty period. For products exceeding the warranty period, the supplier may charge a fee for failure analysis.
- § The replacement is subject to be included in the next production lot.

6-2. Warranty Target

- § The warranty only covers the product itself and does not cover any secondly damage caused by using the product concerned. Onsite repairs or replacement is not supported.
- § We will do our best for delivery problems and product defects, but the warranty for the production line is not covered.
- § Resistive touch screens are structurally not repairable. All defective products are subject to replacement.

6-3. Disclaimer

Following conditions are not covered with the warranty and subject to charge.

- § Any malfunctions and damage during transportation and transfer by the user.
- § Any malfunctions and damage caused by a natural disaster or a fire.
- § Any malfunctions and damage caused by static electricity
- § Any malfunctions and damage 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 improper mounting.
- § Any malfunctions and damages caused by an improper usage and handling against the specifications and notes.

6-4. Tools

- § All the tools and design information, such as CAD data, printing screens, and die-cut plates are not to be provided by the client for proprietary and/or administrative reasons.

6-5. Changes

- § During the manufacturing process, any changes to dimensions, circuits, or tail positions may require modifications to production tools, which could incur additional development costs.
Please review drawings carefully when placing an order and approving designs.
- § Materials such as film, glass, ink, adhesives, packaging, and circuit routing may be subject to minor modifications that do not affect specifications, due to supplier circumstances or quality improvements.
- § Standard products are subject to change for improvement without notification.

6-6. RoHS Compliance

- § This product complies with RoHS

7. Revision History

Rev1 (May. 13, 2025)

Initial release

LST Series Product Specifications

Rev1, May 13, 2025

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