



Website: www.displaytech.com.hk

LCD Module

Product Specification

Product: DT070ATFT & DT070ATFT-TS
7.0" TFT Display Module (800RGBx480DOTS)

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3 November 2011.

1. REVISION RECORD

| VERSION | CHANGES | DATE |
|---------|---|-----------------|
| 1.0 | Initial revision | 21 July 2011 |
| 1.1 | Added DT070ATFT-TS mechanical drawing on page 5 | 25 July 2011 |
| 1.2 | Added "Power Consumption" section and changed the temperature range for -TS version | 3 November 2011 |
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2. Introduction

DT070ATFT and *DT070ATFT-TS* is a display module that contains a TFT display with a 480 * 800 RGB resolution. The driver used for this project is the Himax **HX8264 + HX8664** or compatible and can display 16.7M colors. The driver is mounted on the glass and the interconnection via FPC including components to drive the display module.

3. General Specifications

| Item | Specification | Unit |
|-----------------------------|-----------------------|------|
| LCD mode | Transmissive | --- |
| Resolution | 800(RGB) | Line |
| | 480 | Line |
| Diagonal Size | 7.0 | Inch |
| Overall Size | 164.90 | mm |
| | 100.00 | mm |
| Active area | 154.08 | mm |
| | 85.92 | mm |
| Optimum Viewing Direction | 12 o'clock | --- |
| Driver IC | Himax HX8264 + HX8664 | --- |
| Interface type | RGB 24-bit with TCON | --- |
| Colours | 16.7M | --- |
| Operation temperature range | -20~70 | °C |
| Storage temperature range | -30~80 | °C |

Remarks:

- (1) Recommended mating connector: Hirose FH19SC-50S-0.5SH, FH12S-50S-0.5SH; or Molex 0512965093, 0512965094; or equivalent
- (2) Color tune may be changed slightly by temperature and driving voltage.
- (3) RoHS compliant.

Component Life Cycle

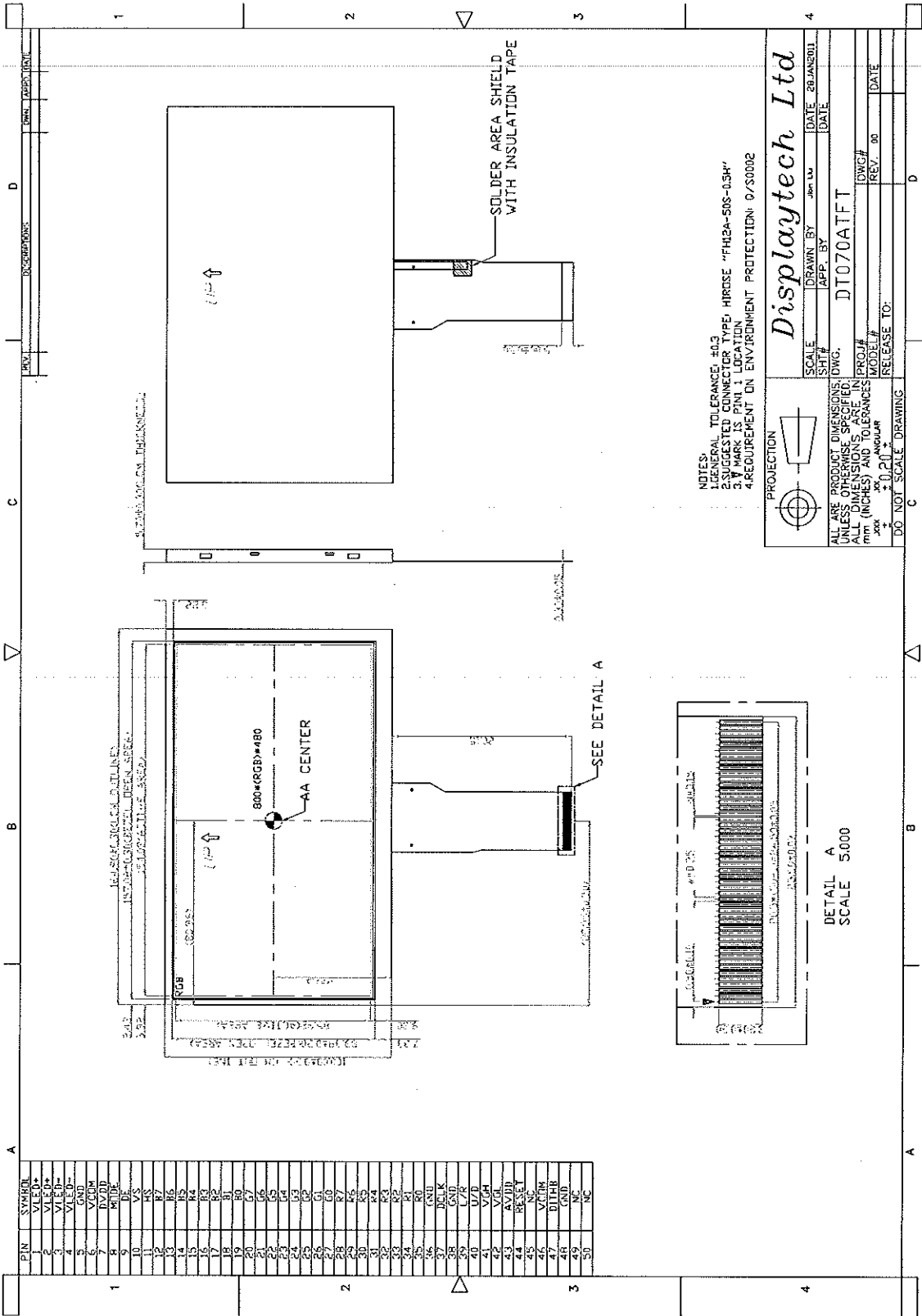
- 1) Storage Life: min. 1 Year
- 2) Operation Life (*1): min. 43×10^3 h (24hr/day x 7days/week x 52weeks/year x 5years).
(Not include backlight)
- 3) Storage and Operation Life Times are defined for a temperature of +25°C

Notes:

- *1. Operation life ends when one of the listed faults occurs:
- The on/off response-times reach 1.5 times of the max. value specified for a new display
 - The contrast is reduced to 0.5 of the original contrast value
 - Loss of function
 - The number of cosmetic defects exceeds the maximum defined

4. Mechanical Drawing

• DT070ATFT



- NOTES:
1. GENERAL TOLERANCE: ±0.3
 2. SUGGESTED CONNECTOR TYPE: HIROSE "FH2A-S06-05H"
 3. SUGGESTED MOUNTING LOCATION: SEE DETAIL A
 4. REQUIREMENT: ON ENVIRONMENT PROTECTION: 0/S0002

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SCALE: DRAWN BY: DATE: 26/JAN/01
 SHT#: APP. BY: DATE:

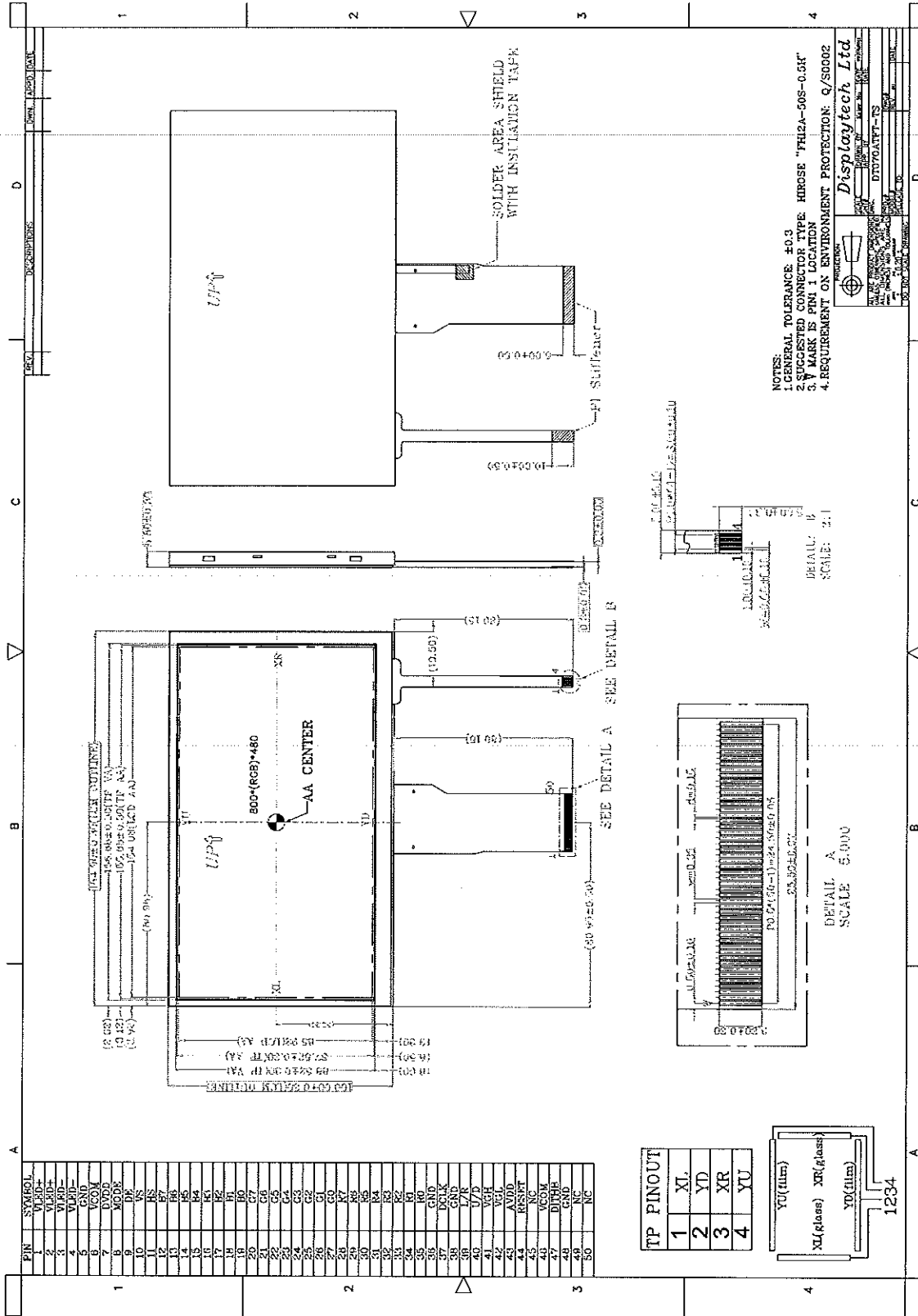
DT070ATFT

PROJ#: DWG#
 MODEL#: REV. 00
 RELEASE TO: DATE

DO NOT SCALE DRAWING

DETAIL A
SCALE 5:000

• DT070ATFT-TS



5. Interface Description

| Pin no | Symbol | I/O | Description |
|--------|--------|-----|---|
| 1~2 | VLED+ | --- | Power for LED backlight (anode) |
| 3~4 | VLED- | --- | Power for LED backlight (cathode) |
| 5 | GND | --- | Power ground 0V |
| 6 | VCOM | I | Common voltage input |
| 7 | DVDD | --- | Power for digital circuit |
| 8 | MODE | I | DE/SYNC mode select ("H" = DE mode; "L" = SYNC mode) |
| 9 | DE | I | Data enable signal, active high to enable data |
| 10 | VS | I | Vertical sync input, negative polarity |
| 11 | HS | I | Horizontal sync input, negative polarity |
| 12 | B7 | I | Blue data (MSB) |
| 13~18 | B6~B1 | I | Blue data |
| 19 | B0 | I | Blue data (LSB) |
| 20 | G7 | I | Green data (MSB) |
| 21~26 | G6~G1 | I | Green data |
| 27 | G0 | I | Green data (LSB) |
| 28 | R7 | I | Red data (MSB) |
| 29~34 | R6~R1 | I | Red data |
| 35 | R0 | I | Red data (LSB) |
| 36 | GND | --- | Power ground 0V |
| 37 | DCLK | I | Clock for input data |
| 38 | GND | --- | Power ground 0V |
| 39 | L/R | I | Source left or right sequence control |
| 40 | U/D | I | Gate up or down scan control |
| 41 | VGH | --- | Positive power of TFT |
| 42 | VGL | --- | Negative power of TFT |
| 43 | AVDD | --- | Analog power supply |
| 44 | RESET | I | Global reset pin |
| 45 | NC | --- | No connection |
| 46 | VCOM | I | Common voltage input |
| 47 | DITHB | I | Dithering setting. "H" = 6bit resolution, "L" = 8bit resolution |
| 48 | GND | --- | Power ground 0V |
| 49 | NC | --- | No connection |
| 50 | NC | --- | No connection |

• Touch Screen Interface (DT070ATFT-TS only)

| Pin no | Symbol | I/O | Description |
|--------|--------|-----|-------------------|
| 1 | XL | O | X+ channel output |
| 2 | YD | O | Y+ channel output |
| 3 | XR | O | X- channel output |
| 4 | YU | O | Y- channel output |

6. Absolute Maximum Ratings

(AGND=GND=0V; Ta=25°C)

| Item | Symbol | Min. | Max. | Unit |
|-----------------------|--------|--------|-------|------|
| Power voltage | VCC | -0.5 | + 5.0 | V |
| | AVDD | -0.5 | 13.5 | V |
| | VGH | -0.3 | +42 | V |
| | VGL | VGH-42 | +0.3 | V |
| Operating Temperature | TOP | -20 | +70 | °C |
| Storage Temperature | TST | -30 | +80 | °C |

Note:

- When temperature is below 0°C, the response time of liquid crystal (LC) will be slower and the color of panel will be darker.
- If module driving condition exceeds the absolute maximum ratings, permanent damaged may be resulted. If module is driven within the absolute maximum ratings but exceeded the DC characteristics, mal-function may be resulted.
- VDD/VCC > VSS

7. Electrical Characteristics

DC Characteristics

(AGND=GND=0V; Ta=25°C)

| Item | Symbol | Min. | Typ. | Max. | Unit |
|---------------------------------|------------|-------|----------|----------|------|
| Digital supply voltage | VCC | --- | 3.3 | --- | V |
| Analog supply voltage | AVDD | --- | 10.4 | --- | V |
| Gate On voltage | VGH | --- | 16 | --- | V |
| Gate Off voltage | VGL | --- | -7 | --- | V |
| Common electrode driving signal | VCOM | 3.5 | --- | 4.5 | V |
| Logic supply voltage | DVDD | (2.8) | 3.3 | (3.6) | V |
| Input signal voltage | Low level | VIL | 0 | 0.3xDVDD | |
| | High level | VIH | 0.7xDVDD | DVDD | V |
| Output signal voltage | Low level | VOL | --- | GND+0.4 | V |
| | High level | VOH | DVDD-0.4 | --- | V |

8. Power Consumption

(GND=VSS=0V; Ta=25°C)

| Item | Symbol | Condition | Typ | Max. | Unit |
|------------------------|---------------|------------|--------|--------|------|
| Digital Supply Current | IDVDD | DVDD=3.3 | 3.22 | 8.70 | mA |
| Analog Supply Current | IADVDD | AVDD=10.4V | 15.69 | 23.01 | mA |
| Gate On Current | IVGH | VGH=16.0V | 0.20 | 0.22 | mA |
| Gate Off Current | IVGL | VGL=-7.0V | 0.20 | 0.22 | mA |
| Power Consumption | Panel & Gamma | --- | 177.67 | 254.65 | mW |
| | Backlight | --- | 1.152 | 1.267 | W |
| | Total | --- | 1.330 | 1.522 | W |

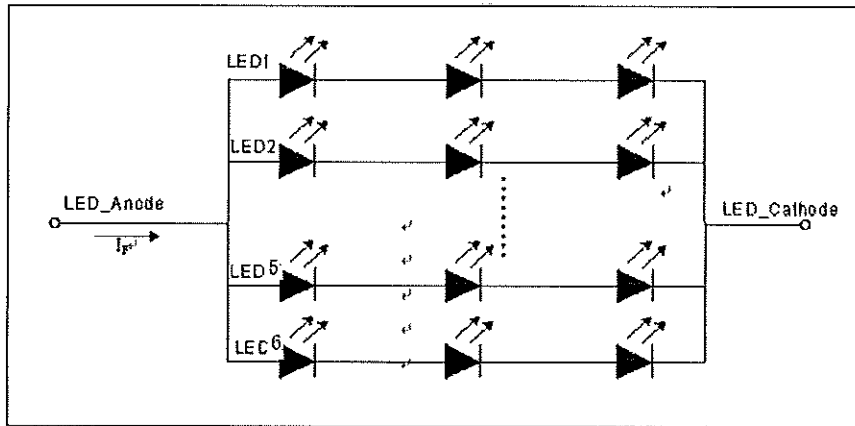
9. Display Controller /Power Supply Timing

See Display Controller Specification: Himax HX8264 + HX8664

10.Backlight specification

(Vcc=3.3V, Vss=0V, Ta=25°C)

| Item | Symbol | Min | Typ | Max | Unit | Note |
|-----------------------------|--------|-----|-------|-------|------|---------|
| Supply voltage | Vf | --- | 9.6 | --- | V | 18 LEDs |
| Forward current | If | --- | 20 | 25 | mA | |
| Backlight power consumption | WBL | --- | 1.152 | 1.267 | W | |



Notes:

- 1) The LED's driving condition is defined for each LED backlight (3 LEDs in series per line, and 6 lines per module).
- 2) In operation, constant forward current should be supplied, the forward voltage is for reference only.

11.Optical Characteristics

(Vcc=3.3V, Vss=0V, Ta=25°C)

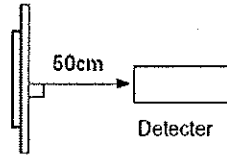
| Item | Symbol | Condition | Min | Typ | Max | Unit | Note |
|------------------------|------------|------------------|-------|-------|-------|-------------------|------|
| Luminance | L | $\theta=0^\circ$ | 200 | 250 | --- | cd/m ² | 1, 2 |
| Uniformity | U | $\Phi=0^\circ$ | --- | 75 | --- | % | 1, 2 |
| Viewing Angle | θT | $Cr \geq 10$ | 50 | 60 | --- | deg | 3 |
| | θB | | 60 | 70 | --- | | |
| | θL | | 60 | 70 | --- | | |
| | θR | | 60 | 70 | --- | | |
| Contrast ratio | Cr | $\theta=0^\circ$ | 400 | 500 | --- | --- | 1, 4 |
| Response Time | Tr | $\theta=0^\circ$ | --- | 25 | --- | ms | 1, 5 |
| | Tf | | | | | | |
| CIE (x,y) Chromaticity | White | x | 0.267 | 0.317 | 0.367 | --- | 1, 6 |
| | | y | 0.284 | 0.334 | 0.384 | | |
| | Red | x | 0.567 | 0.617 | 0.667 | | |
| | | y | 0.305 | 0.355 | 0.405 | | |
| | Green | x | 0.289 | 0.339 | 0.389 | | |
| | | y | 0.483 | 0.533 | 0.583 | | |
| | Blue | x | 0.092 | 0.142 | 0.192 | | |
| | | y | 0.049 | 0.099 | 0.149 | | |
| NTSC Ratio | S | $\theta=0^\circ$ | --- | 50 | --- | % | |

Note 1: The data are measured after LEDs are turned on for 5 minutes. LCM displays full white.
The brightness is the average value of 9 measured spots. Measurement equipment PR-705 (Φ8mm)

Measuring condition:

- Measuring surroundings: Dark room.
- Measuring temperature: $T_a=25^{\circ}\text{C}$.
- Adjust operating voltage to get optimum contrast at the center of the display.

Measured value at the center point of LCD panel after more than 5 minutes while backlight turning on.

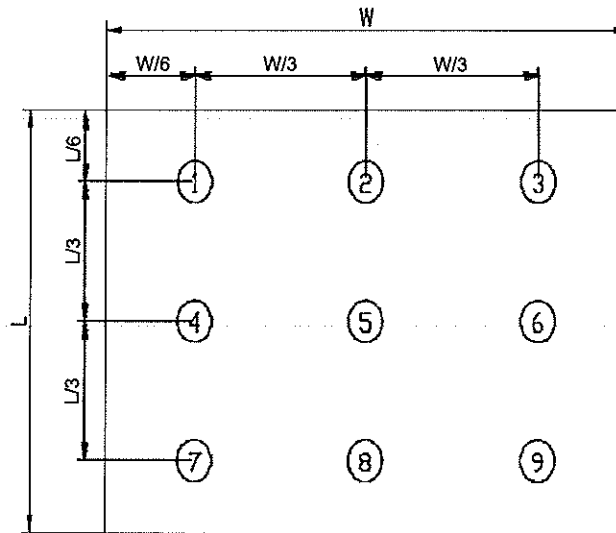


Note 2: The luminance uniformity is calculated by using following formula.

$$L = L(\text{Min.}) / L(\text{Max.}) \times 100 (\%)$$

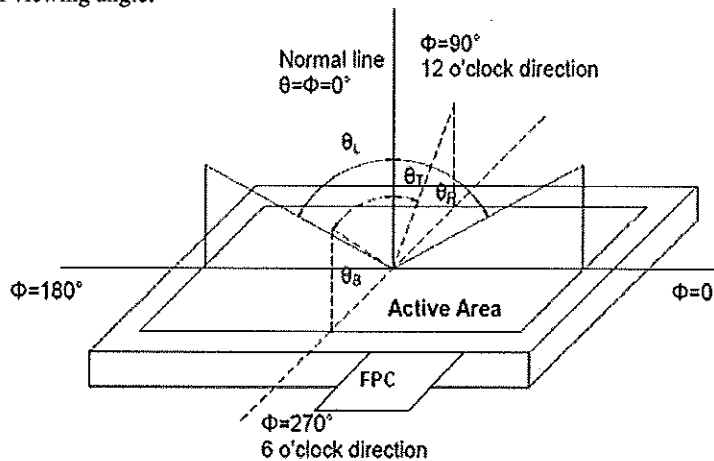
$L(\text{Max.})$ = Maximum brightness in 9 measured spots

$L(\text{Min.})$ = Minimum brightness in 9 measured spots.



Measurement equipment PR-705 (Φ8mm)

Note 3: The definition of viewing angle:



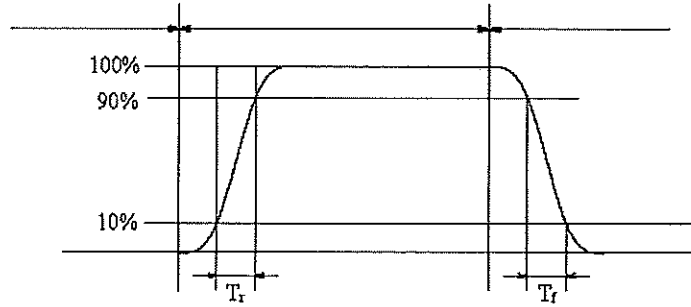
Note 4: The definition of contrast ratio (Test LCM using PR-705):

$$\text{Contrast Ratio (CR)} = \frac{\text{Luminance When LCD is at "White" state}}{\text{Luminance When LCD is at "Black" state}}$$

(Contrast Ratio is measured in optimum common electrode voltage)

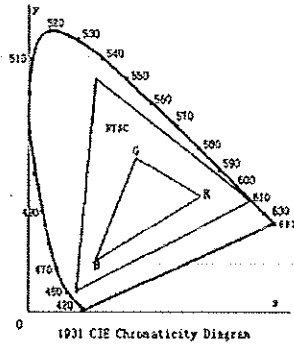
Note 5: Definition of Response time. (Test LCD using DMS501):

The output signals of photo detector are measured when the input signals are changed from "black" to "white" (falling time) and from "white" to "black" (rising time), respectively. The response time is defined as the time interval between the 10% and 90% of amplitudes. Refer to figure as below.



The definition of response time

Note 6: Definition of Color of CIE Coordinate and NTSC Ratio.



Color gamut:

$$S = \frac{\text{area of RGB triangle}}{\text{area of NTSC triangle}} \times 100\%$$

12. Safety Precaution

Handling precautions:

- This device is susceptible to Electro-Static Discharge (ESD) damage. Observe Anti-Static precautions.

Power supply precautions:

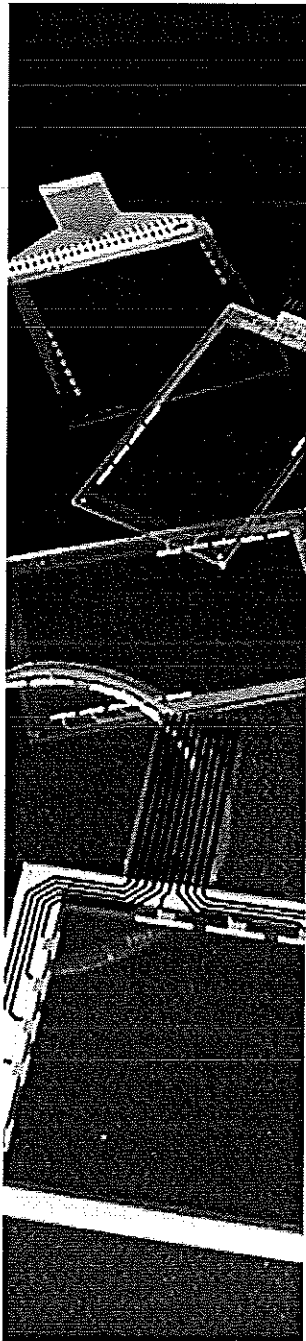
- Identify and, at all times, observe absolute maximum ratings for both logic and LC drivers. Note that there is some variance between models.
- Prevent the application of reverse polarity to VCC and GND, however briefly.
- Use a clean power source free from transients. Power up conditions are occasionally “jolting” and may exceed the maximum ratings of the modules.
- The VCC power of the module should also supply the power to all devices that may access the display. Don’t allow the data bus to be driven when the logic supply to the module is turned off.

Operating precautions:

- DO NOT plug or unplug the module when the system is powered up.
- Minimize the cable length between the module and host MPU.
- Operate the module within the limits of the modules temperature specifications.

Mechanical/Environmental precautions:

- Improper soldering is the major cause of module difficulty. Use of flux cleaner is not recommended as they may seep under the elastomeric connection and cause display failure.
- Mount the module so that it is free from torque and mechanical stress.
- Surface of the LCD panel should not be touched or scratched. The display front surface is an easily scratched, plastic polarizer. Avoid contact and clean only when necessary with soft, absorbent cotton dampened with petroleum benzene.
- Always employ anti-static procedure while handling the module.
- Prevent moisture build-up upon the module and observe the environmental constraints for storage temperature and humidity.
- Do not store in direct sunlight
- If leakage of the liquid crystal material should occur, avoid contact with this material, particularly ingestion. If the body or clothing becomes contaminated by the liquid crystal material, wash thoroughly with water and soap



DMC Co., Ltd.

Matrix Resistive Touchscreen Reference

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

| Specification | Value |
|--------------------------------------|---|
| Operating Temperature | -20°C to 70°C (no condensation) |
| Operating Humidity | Less than 90%RH (no condensation) |
| Storing Temperature | -40°C to 80°C (no condensation) |
| Storing Humidity | Less than 95%RH (no condensation) |
| Chemical Resistance (top surface) | Toluene, Trichloroethylene, Athetone, Alcohol, Gasoline, Machine Oil, Ammonia, Glass Cleaner, Mayonnaise, Ketchup, Wine, Salad Oil, Vinegar, Lipstick, etc. |

1-4. Mechanical Characteristics

| Specification | Value |
|-----------------------------------|---|
| Operating Load | 0.5N±0.3N |
| Operating Life | Input (finger) 1,000,000 hits |
| Light Transmissivity (film/glass) | Over 78% (typical value at full wavelength) |
| Top Surface Hardness | Over 2H (by JIS pencil hardness) |

1-5. Electrical Characteristics

| Specification | Value |
|-----------------------|--|
| Maximum Voltage | DC5V |
| Maximum Current | Top Electrode 100mA |
| | Bottom Electrode 100mA |
| | Between the Top and Bottom 0.5mA |
| Contact Resistance | Less than 30kΩ |
| Insulation Resistance | Neighboring Terminals Over 100MΩ at 25V |
| | Active Area Electrodes Over 100MΩ at 25V |
| Chattering | Less than 10msec at ON/OFF. |

1-6. Appearance

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

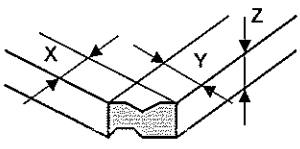
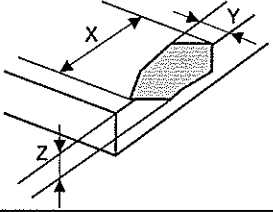
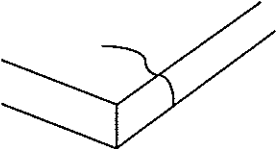
| Item | Size (mm) | Length (mm) | Acceptable Numbers |
|-----------------|----------------------|-------------|----------------------------|
| Scratch | $0.1 \geq W > 0.08$ | $4 \geq L$ | 1pcs in $\phi 30\text{mm}$ |
| | $0.08 \geq W > 0.05$ | $6 \geq L$ | 2pcs in $\phi 20\text{mm}$ |
| | $0.05 \geq W > 0.03$ | $10 \geq L$ | 2pcs in $\phi 20\text{mm}$ |
| | $0.03 \geq W$ | $20 \geq L$ | Acceptable |
| Dust (Linear) | $0.1 \geq W > 0.05$ | $5 \geq L$ | 2pcs in $\phi 30\text{mm}$ |
| | $0.05 \geq W$ | Acceptable | Acceptable |
| Dust (Circular) | $0.3 \geq D > 0.2$ | | 2pcs in $\phi 30\text{mm}$ |
| | $0.2 \geq D$ | | Acceptable |

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

§ Dirt

Acceptable if not noticeable on a black mat.

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

| Item | Size (mm) | Acceptable Numbers |
|--------|---|--------------------|
| Corner |  | X 3 |
| | | Y 3 |
| | | Z t |
| Side |  | X 5 |
| | | Y 3 |
| | | Z t |
| Crack |  | 0pcs (acceptable) |

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: Tested after leaving the chemical on the surface for 12 hours being wiped off by cloth.

Judgement: Must be no effect in appearance.

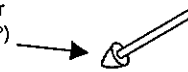
2-3. Mechanical Characteristics

§ Operating Load Test

Condition: Measured by depressing the point between the dots to the conduction by the testing rod.

Judgement: Must satisfy the specification.

Silicon Rubber
(Hardness: 60°)
Tip: R = 4.0



§ Operating Life Test

Condition: Voltage: DC5V
Load: 300g
Cycle: 2 hits/sec

Judgement: Must satisfy the following:

| | |
|------------------------|-----------------------------------|
| Operating Load: | Within ±50% of 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 $-30^{\circ}\text{C}\pm 3^{\circ}\text{C}$ for 240 hours and in the room temperature for 2 hours.

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

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

Judgement: Must satisfy the following:

Operating Load: Within $\pm 50\%$ of 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 end.

§ 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.

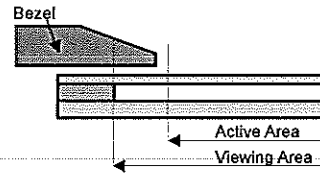
4-4. Electrical & Software Notice

§ 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

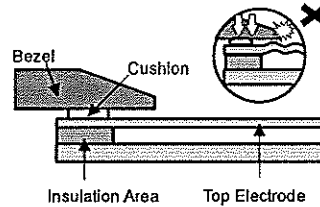
A gap of approximately 0.5mm is needed between the bezel and the top electrode. It may cause unexpected input if the gap is too narrow.



§ Cushion

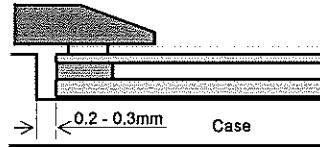
If a cushion is used between the bezel and the top electrode, the cushion must be free enough to absorb the expansion and contraction difference between the bezel and the top electrode. If the cushion is squashed too hard, the expansion and the contraction difference may cause the distortion to the top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

The cushion must be positioned within the insulation area.



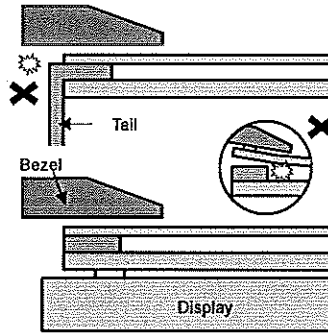
§ Tolerance

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.



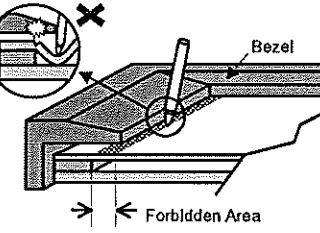
§ Tail

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



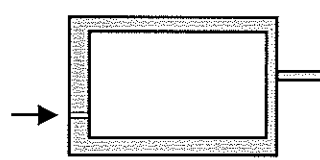
§ Mounting

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 weak 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 deflection such as appearance deflection 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 deflection 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 deflections, but the warranty for the production line is not covered.
- § Resistive touchscreens are structurally not repairable. All deflections 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.

Matrix Resistive Touchscreen Reference
Rev. 4.1, October 8, 2002
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