

CUSTOMER APPROVAL SHEET

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| Company Name | |
| MODEL | A050VW01 V2 |
| CUSTOMER APPROVED | Title : Name : |

- ☐ APPROVAL FOR SPECIFICATIONS ONLY (Spec. Ver.____)
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Product Specification

5.0" COLOR TFT-LCD MODULE

MODEL NAME: A050VW01 V2

< ☐ > Preliminary Specification

< > Final Specification

Note: The content of this specification is subject to change.

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Record of Revision

| Version | Revise Date | Page | Content |
|---------|-------------|------|--------------|
| 0.0 | 2008/11/21 | | First draft. |
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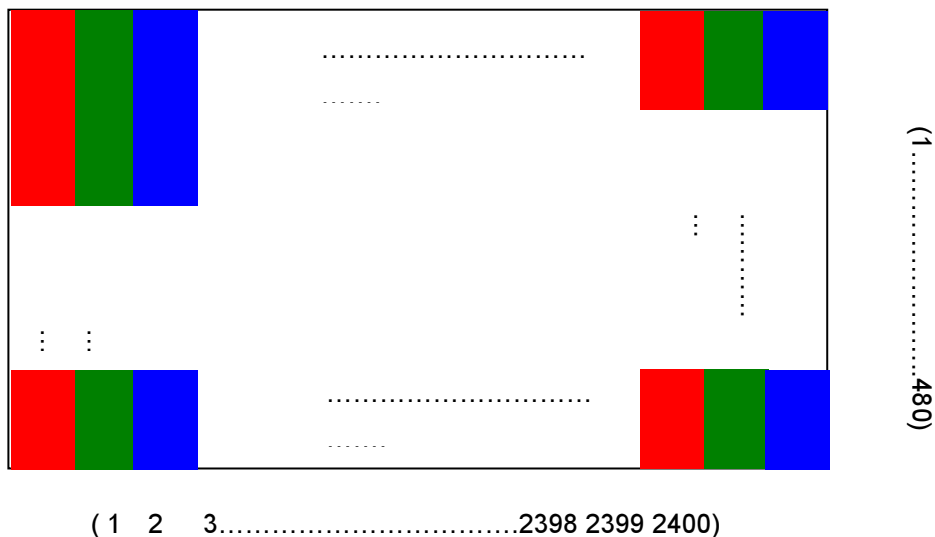
A. General Information

This product is for PND and MID applications.

| NO. | Item | Unit | Specification | Remark |
|-----|-----------------------------|------|------------------------------|--------|
| 1 | Screen Size | inch | 5.0(Diagonal) | |
| 2 | Display Resolution | dot | 800RGB(H)×480(V) | |
| 3 | Overall Dimension | mm | 119.6(H) × 76.5(V) × 5.85(T) | Note 1 |
| 4 | Active Area | mm | 108.0(H)×64.8(V) | |
| 5 | Pixel Pitch | mm | 0.045(H)×0.135(V) | |
| 6 | Color Configuration | -- | R. G. B. Stripe | Note 2 |
| 7 | Color Depth | -- | 16.7M Colors | Note 3 |
| 8 | NTSC Ratio | % | 50 | |
| 9 | Display Mode | -- | Normally White | |
| 10 | Panel surface Treatment | -- | Anti-Glare, 3H | |
| 11 | Weight | g | TBD | |
| 12 | Panel Power Consumption | W | TBD | Note 4 |
| 13 | Backlight Power Consumption | mW | 640 | |
| 14 | Viewing direction | | 6 o'clock (gray inversion) | |

Note 1: Refer next page to get further information.

Note 2: Below figure shows dot stripe arrangement.

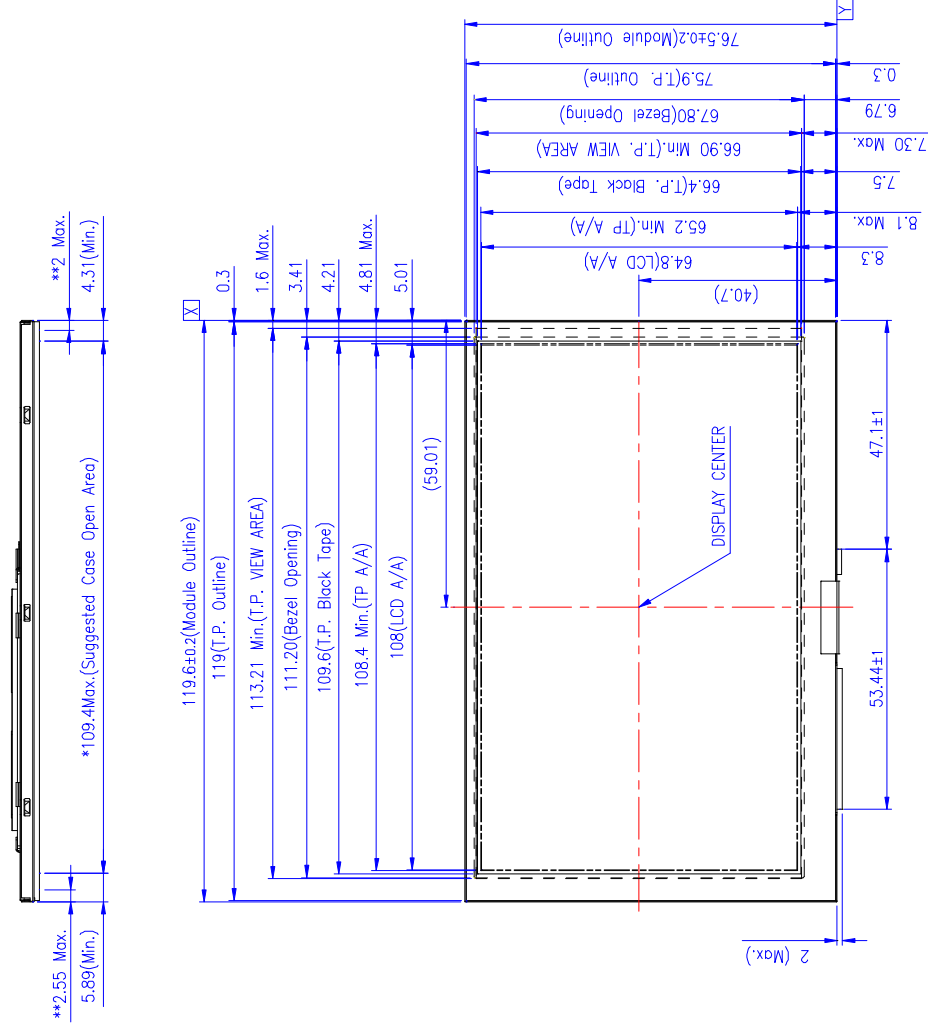


Note 3: The full color display depends on 24-bit data signal (pin 5~28).

Note 4: Please refer to Electrical Characteristics chapter.

B. Outline Dimension

1. TFT-LCD Module – Front View

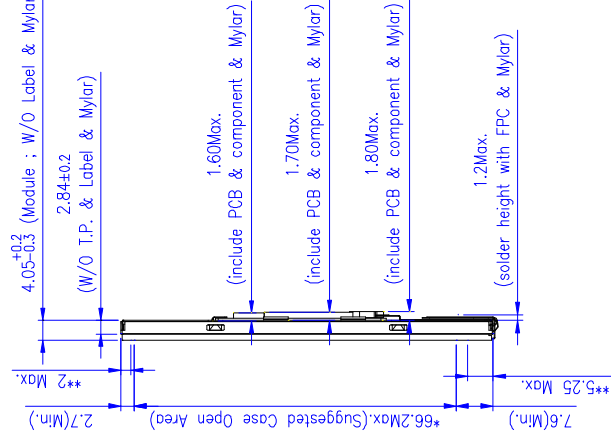


Note:

- General tolerance $\pm 0.3\text{mm}$.
- The bending radius of FPC should be larger than 0.6.
- * It means the case open should not be larger than this area.
- ** Suggested gasket (cushion) area

The dimensions in brackets () are for reference.

5. LVDS connector type: FI-JH30S-HF10



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C. Electrical Specifications

1. TFT LCD Panel Pin Assignment

Recommended connector : FI-JH30S-HF10

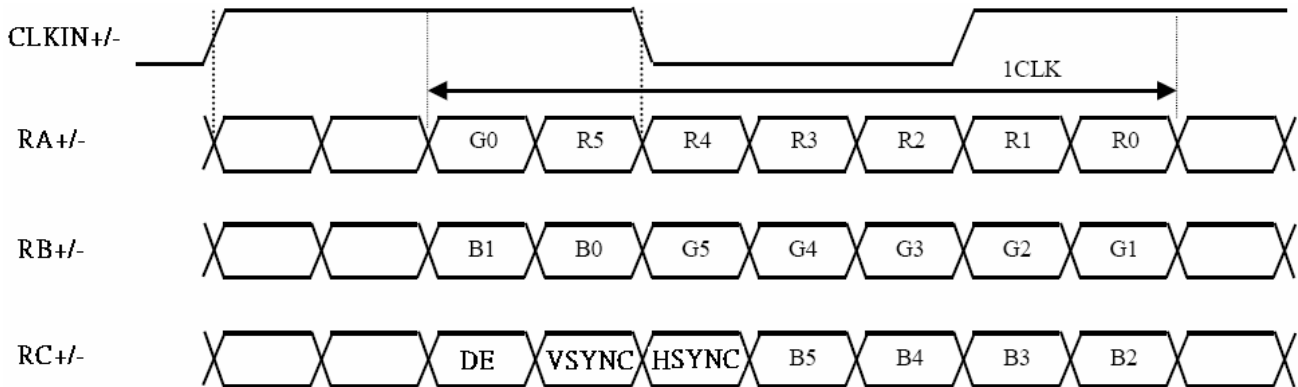
| Pin No. | Symbol | Type | Description | Remark |
|---------|-----------------|------|--|--------|
| 1 | GND | P | Power grounding | |
| 2 | VDD | P | Power supply, typical 3.3V. | |
| 3 | VDD | P | Power supply, typical 3.3V. | |
| 4 | VDD | P | Power supply, typical 3.3V. | |
| 5 | NC | - | Not connected | |
| 6 | NC | - | Not connected | |
| 7 | NC | - | Not connected | |
| 8 | RA- | I | Negative LVDS differential data input | |
| 9 | RA+ | I | Positive LVDS differential data input | |
| 10 | GND | P | Ground for digital circuit | |
| 11 | RB- | I | Negative LVDS differential data input | |
| 12 | RB+ | I | Positive LVDS differential data input | |
| 13 | GND | P | Power grounding | |
| 14 | RC- | I | Negative LVDS differential data input | |
| 15 | RC+ | I | Positive LVDS differential data input | |
| 16 | GND | P | Ground for digital circuit | |
| 17 | CLKIN- | I | Negative LVDS differential clock input | |
| 18 | CLKIN+ | I | Positive LVDS differential clock input | |
| 19 | GND | P | Power grounding | |
| 20 | GND | P | Power grounding | |
| 21 | VLED | I | LED driver power supply, typical 3.3V. | |
| 22 | VLED | I | LED driver power supply, typical 3.3V. | |
| 23 | GND | P | Ground for digital circuit | |
| 24 | EN_LED | I | LED On/Off control | |
| 25 | PWM_ Dimming | I | LED brightness dimming control | |
| 26 | GND | P | Power grounding | |
| 27 | TP_R | I/O | T/P right electrode (R) | |

| | | | | |
|----|------|-----|--------------------------|--|
| 28 | TP_B | I/O | T/P bottom electrode (B) | |
| 29 | TP_L | I/O | T/P left electrode (L) | |
| 30 | TP_U | I/O | T/P top electrode (U) | |

Note 1: I: Input; O: Output; P: Power.

Note 2: For correct power on sequence please refer to section 5 “Power On/Off Sequence”

Note 3: LVDS data mapping



2. Absolute Maximum Ratings

| Item | Symbol | Condition | Min. | Max. | Unit | Remark |
|----------------------|--------|-----------|------|---------|------|----------------|
| Power voltage | VDD | GND=0 | -0.3 | 4 | V | Note 1 |
| Input signal voltage | Data | GND=0 | -0.3 | VDD+0.3 | V | Digital signal |

Note 1: Functional operation should be restricted under ambient temperature (25°C).

Note 2: Maximum ratings are those values beyond which damages to the device may occur. Functional operation should be restricted to the limits in the Electrical Characteristics chapter.

3. Electrical DC Characteristics

a. Typical Operation Condition (AGND =GND = 0V)

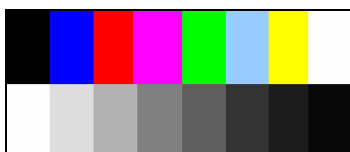
| Item | Symbol | Min. | Typ. | Max. | Unit | Remark |
|--------------------|--------|---------|------|------|------|--------|
| Power supply | VDD | 3.1 | 3.3 | 3.5 | V | |
| Power supply | VLED | 3.1 | 3.3 | 3.5 | V | |
| Input high voltage | VIH | 0.7*VDD | - | VDD | V | |
| Input low voltage | VIL | 0 | - | 0.8 | V | |

b. Current Consumption (AGND=GND=0V)

| Parameter | Symbol | Condition | Min. | Typ. | Max. | Unit | Remark |
|-----------------------|------------------------|-----------|------|------|------|------|-----------|
| Input Current for VDD | I_{VDD} | VDD=3.3V | - | 90 | 110 | mA | Note 1, 2 |
| | I_{VDD} (STANDBY) | VDD=3.3V | - | 10 | 50 | uA | Note 3 |

Note 1: Test Condition is under typical Electrical DC and AC characteristics.

Note 2: Test pattern is the following picture (color bar).



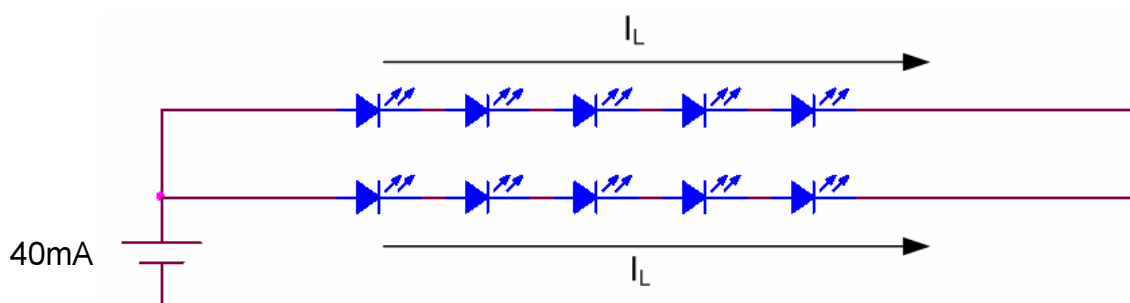
Note 3: In standby mode, all digital signals are stopped. Ex. DCLK, DE ...etc.

c. Backlight Driving Conditions

The backlight (LED module, Note 1) is suggested to drive by constant current with typical value.

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Remark |
|---------------|--------|--------|------|------|------|-----------|
| LED Current | I_L | -- | 20 | 22 | mA | Note 1 |
| Power | P_L | -- | 640 | 792 | mW | |
| LED Life Time | L_L | 10,000 | -- | -- | Hr | Note 2, 3 |

Note 1: LED backlight is two parallel strings and one LED for each string is as below figure. Suggest drive by 20mA for each LED string.



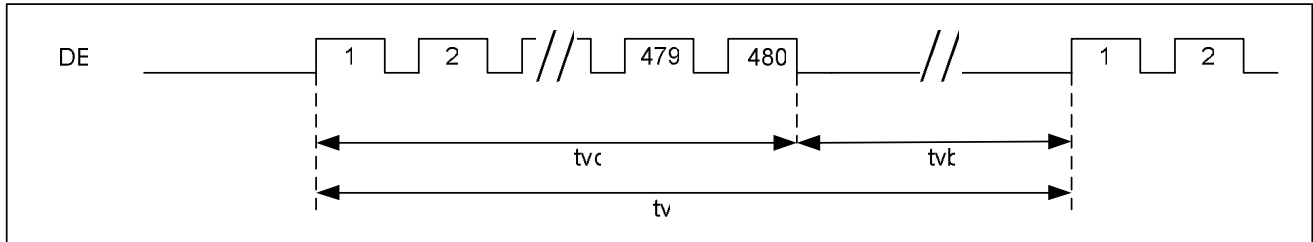
Note 2: Define "LED Lifetime": brightness is decreased to 50% of the initial value. LED Lifetime is restricted under normal condition, ambient temperature = 25°C and LED lightbar current = 20 mA.

Note 3: If it uses larger LED lightbar voltage/ current more than 20mA, it maybe decreases the LED lifetime.

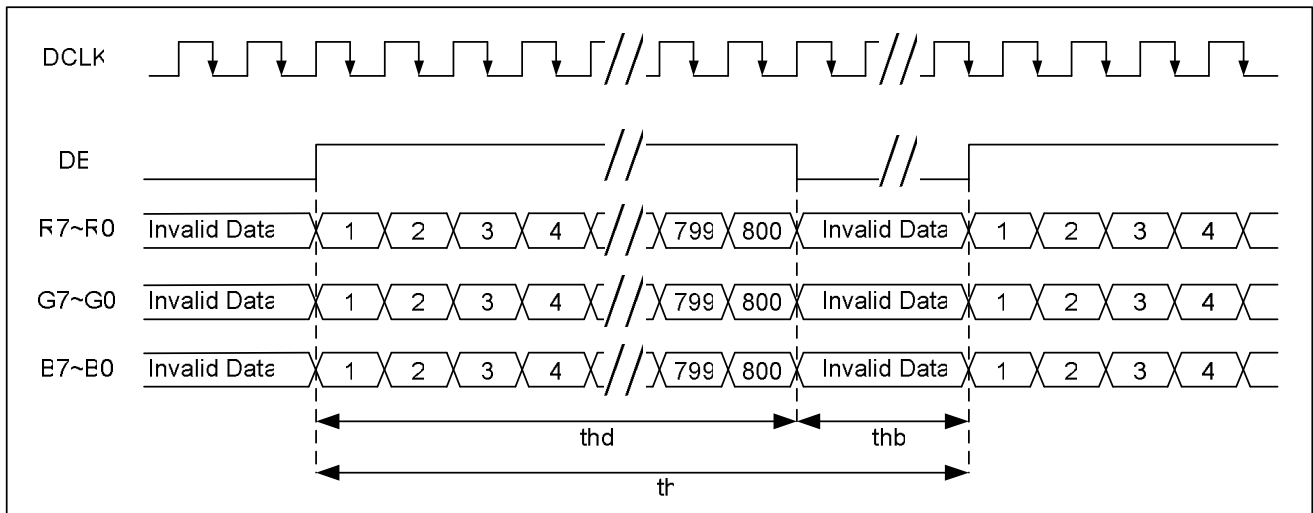
4. Electrical AC Characteristics

a. Timing Diagram

1. Vertical Timing of Input



2. Horizontal Timing of Input



c. Timing Parameters

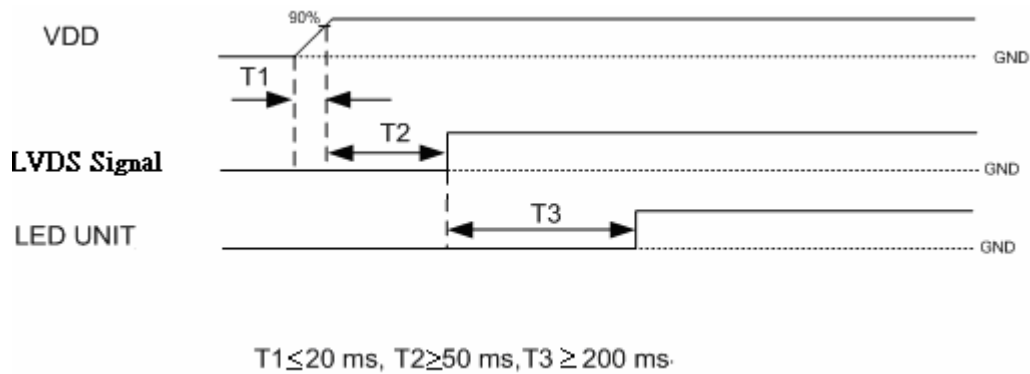
| PARAMETER | Symbol | Min | Typ | Max | Unit |
|---------------------------|--------------|-----|-------|------|------|
| Clock cycle | $1/t_{DCLK}$ | - | 30 | 50 | MHz |
| Horizontal cycle | $1/t_h$ | - | 32.33 | - | KHz |
| Vertical cycle | $1/t_v$ | - | 61.58 | - | Hz |
| Horizontal Signal | | | | | |
| Horizontal cycle *1 | t_h | 880 | 928 | 1100 | DCLK |
| Horizontal display period | t_{hd} | - | 800 | - | DCLK |
| Horizontal blank | t_{hb} | 80 | 128 | 300 | DCLK |
| Vertical Signal | | | | | |
| Vertical cycle | t_v | 500 | 525 | 680 | H |
| Vertical display period | t_{vd} | - | 480 | - | H |
| Vertical blank | t_{vb} | 20 | 45 | 200 | H |

5. Power On/Off Characteristics

a. Recommended Power On Sequence

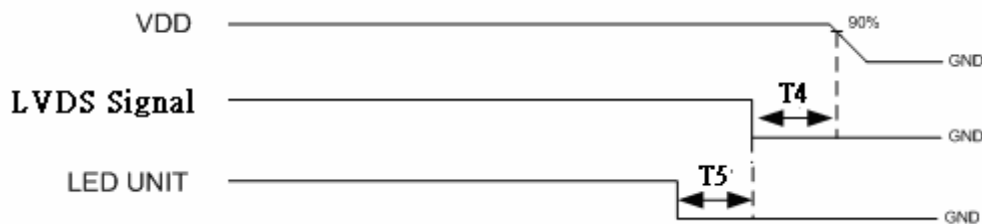
The LCD adopts high voltage driver IC, so it could be permanently damaged under a wrong power on/off sequence. The suggested LCD power sequence is below:

Power on sequence: VDD→LVDS signal→LED ON



b. Recommended Power Off Sequence

Power off sequence: LED Off→LVDS Signal→VDD.



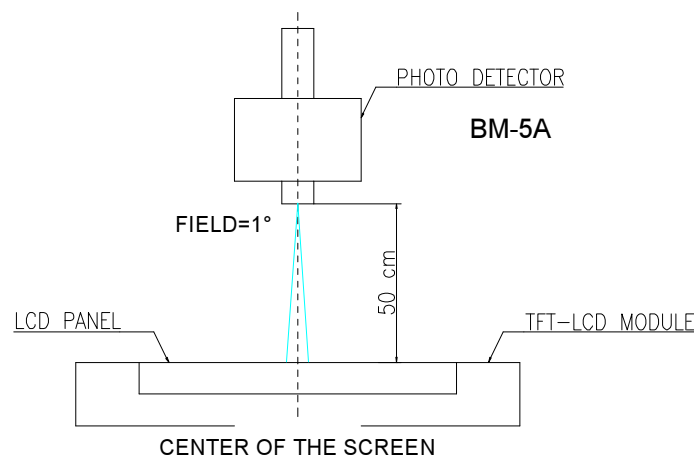
D. Optical Specification

All optical specification is measured under typical condition (Note 1, 2)

| Item | Symbol | Condition | Min. | Typ. | Max. | Unit | Remark |
|----------------|--------------|----------------------------|------------------|-------|-------|----------|--------|
| Response Time | | | | | | | |
| Rise | T_r | $\theta=0^\circ$ | -- | 15 | 20 | ms | Note 3 |
| Fall | T_f | | -- | 20 | 25 | ms | |
| Contrast ratio | CR | At optimized viewing angle | 250 | 300 | -- | | Note 4 |
| Viewing Angle | | | | | | | |
| Top | | | -- | 45 | -- | | |
| Bottom | | $CR \geq 10$ | -- | 55 | -- | deg. | Note 5 |
| Left | | | -- | 60 | -- | | |
| Right | | | -- | 60 | -- | | |
| Brightness | Y_L | $\theta=0^\circ$ | TBD | 250 | -- | cd/m^2 | Note 6 |
| Chromaticity | White | X | $\theta=0^\circ$ | 0.26 | 0.31 | 0.36 | |
| | | Y | $\theta=0^\circ$ | 0.28 | 0.33 | 0.38 | |
| | Red | X | $\theta=0^\circ$ | 0.585 | 0.635 | 0.685 | |
| | | Y | $\theta=0^\circ$ | 0.300 | 0.350 | 0.400 | |
| | Green | X | $\theta=0^\circ$ | 0.285 | 0.335 | 0.385 | |
| | | Y | $\theta=0^\circ$ | 0.485 | 0.535 | 0.585 | |
| | Blue | X | $\theta=0^\circ$ | 0.095 | 0.145 | 0.195 | |
| | | Y | $\theta=0^\circ$ | 0.050 | 0.100 | 0.150 | |
| Uniformity | ΔY_L | % | 70 | 75 | -- | % | Note 7 |

Note 1: Measured under Ambient temperature $\approx 25^\circ C$, and LED lightbar current $I_L = 20mA$ in the dark room.

Note 2: To be measured on the center area of panel with a viewing cone of 1° by Topcon luminance meter BM-5A, after 15 minutes operation.

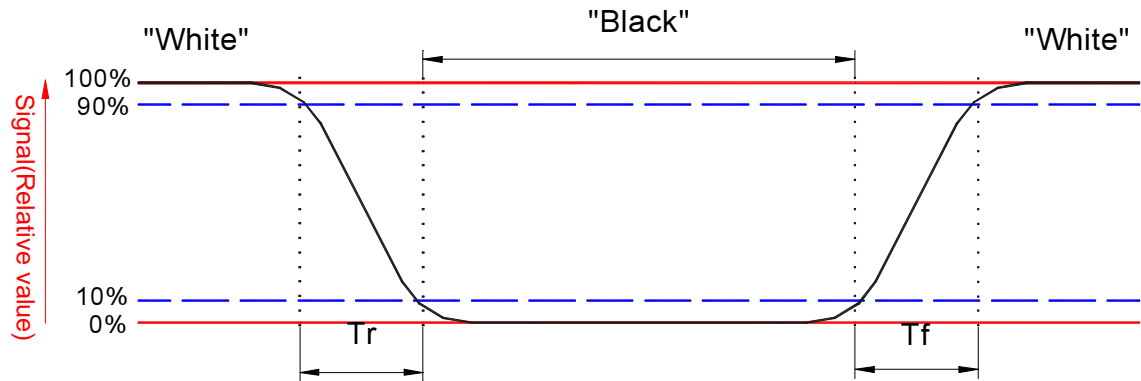


Note 3: Definition of response time:

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.

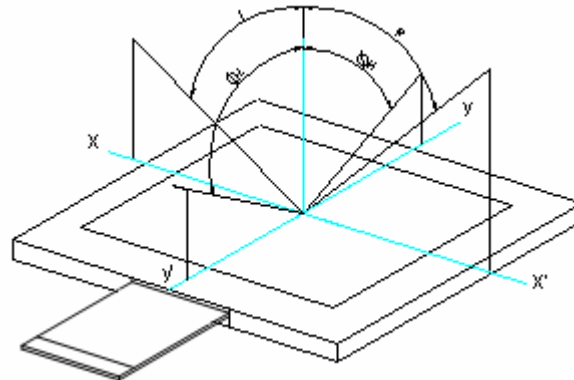


Note 4. Definition of contrast ratio:

Contrast ratio is calculated with the following formula.

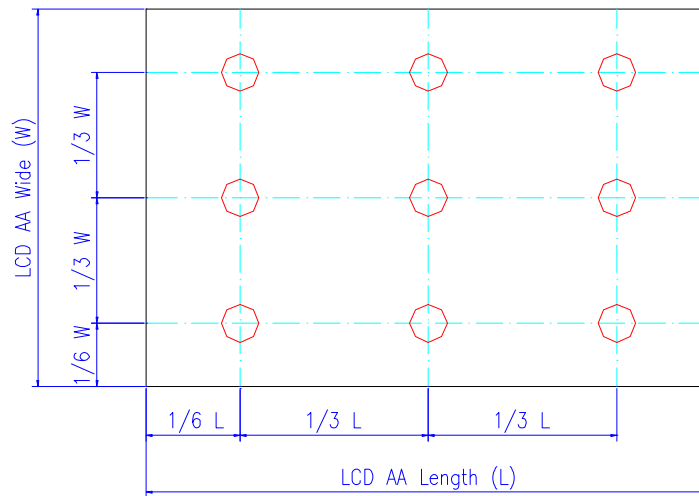
$$\text{Contrast ratio (CR)} = \frac{\text{Photo detector output when LCD is at "White" status}}{\text{Photo detector output when LCD is at "Black" status}}$$

Note 5. Definition of viewing angle, θ , Refer to figure as below.



Note 6: Measured at the center area of the panel when all the input terminals of LCD panel are electrically opened.

Note 7: Luminance Uniformity of these 9 points is defined as below:



$$\text{Uniformity} = \frac{\text{minimum luminance in 9 points (1-9)}}{\text{maximum luminance in 9 points (1-9)}}$$

E. Touch Screen Panel Specifications

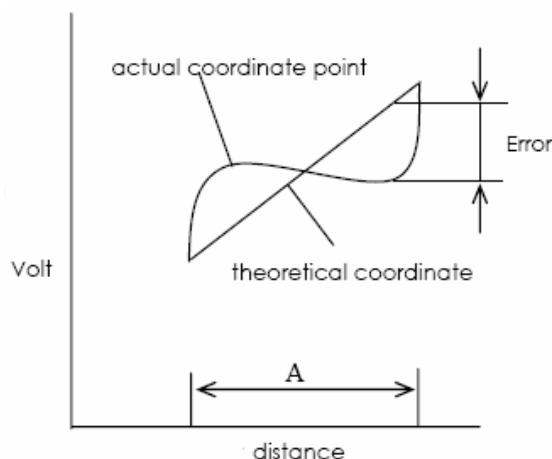
1. FPC Pin Assignment

| Pin No. | Symbol | I/O | Description |
|---------|--------|-----|----------------------------------|
| 1 | X1 | I/O | Touch panel right electrode (R) |
| 2 | Y2 | I/O | Touch panel bottom electrode (B) |
| 3 | X2 | I/O | Touch panel left electrode (L) |
| 4 | Y1 | I/O | Touch panel top electrode (U) |

2. Electrical Characteristics

| Item | | Min. | Typ | Max. | Unit | Remark |
|-----------------------|-----------|-------|-----|------|------------|--------------|
| Rate DC Voltage | | -- | -- | 7 | V | |
| Resistance | X (Film) | 300 | -- | 1100 | Ω | At connector |
| | Y (Glass) | 100 | -- | 700 | | |
| Linearity | | -1.5% | | 1.5% | -- | Note 1 |
| Response Time | | | | 30 | ms | |
| Insulation Resistance | | 20 | | | M Ω | DC 25V |

Note 1: Measurement condition of Linearity: difference between actual voltage & theoretical voltage is an error at any points. Linearity is the value of the max. error voltage divided by voltage difference on active area.

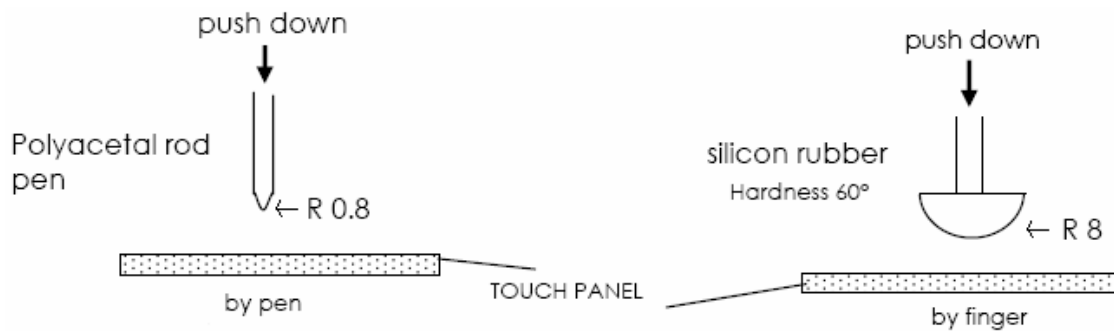


3. Mechanical Characteristics

| Item | Min. | Max. | Unit | Remark |
|---------------------------------|------|------|------|------------|
| Hardness of Surface | 3 | -- | H | JIS K-5600 |
| Operation Force (Pen or Finger) | 80 | | gf | Note 1, 2 |

Note 1: Within "active area", but not near the active area boundary and on the dot-spacer.

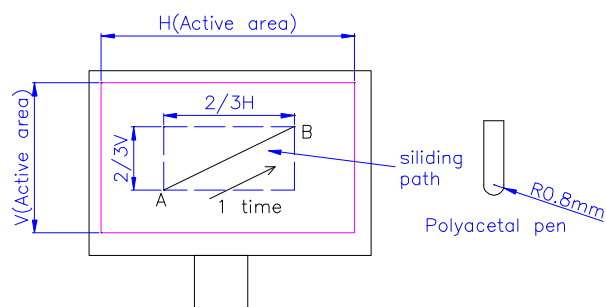
Note 2: Operation force measurement is under test condition as figure below.



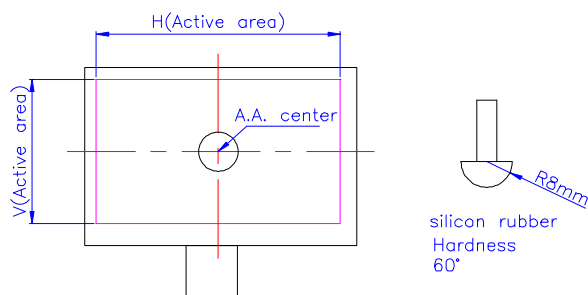
4. Life Test Condition

| Item | Min. | Max. | Unit | Remark |
|------------|--------|------|-------|-----------|
| Notes Life | 10^5 | -- | lines | Note 1, 2 |
| Input Life | 10^6 | -- | times | Note 1, 3 |

Note 1: Notes Life test condition (by pen): slide on central 2/3 of active area and use R 0.8mm polyacetal pen, input force : 250gf, frequency : 60mm/sec. Sliding from A to B complete 1 time. shown as figure2.



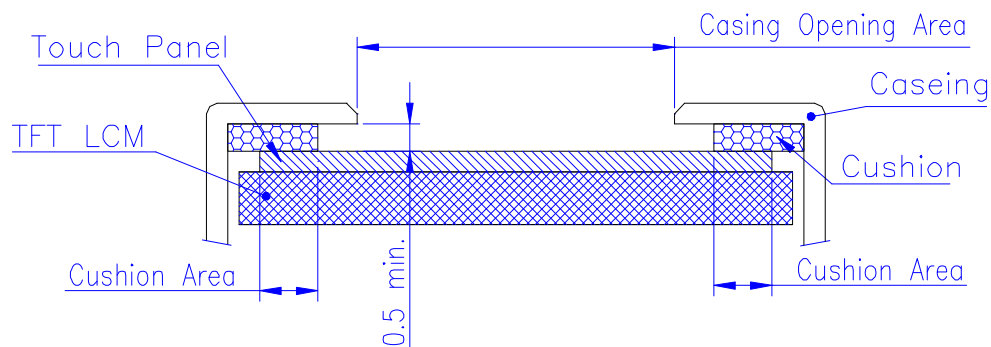
Note 2: Input Life test condition (by finger): test position on active area center and use R8.0mm silicon rubber (hardness 60°), test force: 250gf, frequency : 2times/sec. shown as figure.



5. Attention

Please pay attention for below matters at mounting design of touch panel of LCD module.

- 1) In order to avoid the incorrect or abnormal input, please design the casing opening area out of the touch panel area. Suggest casing opening area shown as mechanical drawing. Suggest the gap between casing and touch panel surface at least 0.5 mm to avoid incorrect input.
- 2) Cushion area must not contact with active area. Suggest cushion area shown as mechanical drawing.
- 3) Use elastic or non-conductive material to enclosure touch panel.
- 4) Do not bond film of touch panel with casing.
- 5) The touch panel edge is conductive. Do not touch it with any conductive part after mounting.



- 6) If user wants to cleaning touch panel by air gun, pressure 2kg/cm^2 below is suggested. Not to blow glass from FPC site to prevent FPC peeled off.
- 7) Do not put a heavy shock or stress on touch panel and film surface. Ex. Don't lift the panel by the vacuum nozzle.
- 8) Do not lift LCD module by FPC.
- 9) Please use dry cloth or soft cloth with neutral detergent (after wring dry) or one with ethanol at cleaning. Do not use any organic solvent, acid or alkali liquor.
- 10) Do not pile touch panel. Do not put heavy goods on touch panel.

F. Reliability Test Items

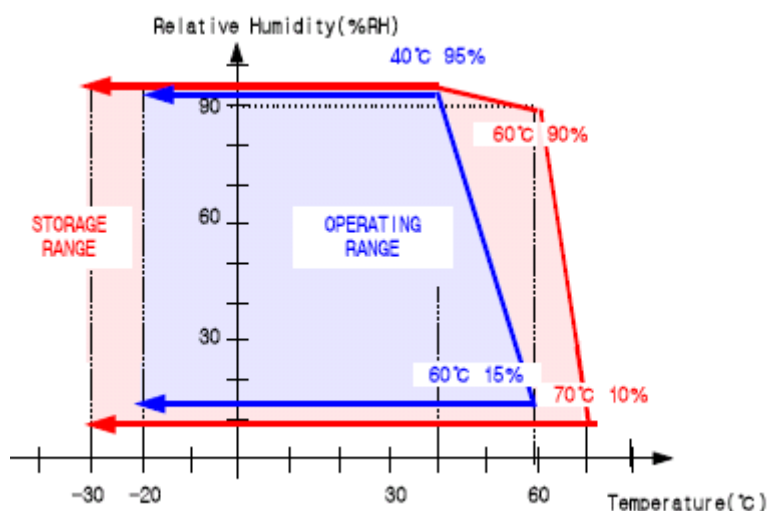
| No. | Test items | Conditions | Remark |
|-----|----------------------------------|---|---|
| 1 | High Temperature Storage | Ta= 70℃ 240Hrs | |
| 2 | Low Temperature Storage | Ta= -20℃ 240Hrs | |
| 3 | High Temperature Operation | Tp= 60℃ 240Hrs | |
| 4 | Low Temperature Operation | Ta= -10℃ 240Hrs | |
| 5 | High Temperature & High Humidity | Tp= 40℃, 90% RH 240Hrs | Operation |
| 6 | Heat Shock | -25℃~70℃, 50 cycle, 2Hrs/cycle | Non-operation |
| 7 | Electrostatic Discharge | Contact = ± 4 kV, class B Air = ± 8 kV, class B | Note 5 |
| 8 | Vibration | Frequency range : 10~55Hz Stoke : 1.5mm Sweep : 10Hz~55Hz~10Hz 2 hours for each direction of X,Y,Z | Non-operation JIS C7021, A-10 condition A : 15 minutes |
| 9 | Mechanical Shock | 100G . 6ms, ±X,±Y,±Z 3 times for each direction | Non-operation JIS C7021, A-7 condition C |
| 10 | Vibration (With Carton) | Random vibration: 0.015G ² /Hz from 5~200Hz -6dB/Octave from 200~500Hz | IEC 68-34 |
| 11 | Drop (With Carton) | Height: 60cm 1 corner, 3 edges, 6 surfaces | |
| 12 | Pressure | 5kgf, 5sec | Note 6 |

Note 1: Ta: Ambient Temperature. Tp: Panel Surface Temperature

Note 2: In the standard conditions, there is not display function NG issue occurred. All the cosmetic specification is judged before the reliability stress.

Note 3: All the cosmetic specification is judged before the reliability stress.

Note 4: temperature and relative humidity range is shown in the figure below



Note 5 : All test techniques follow IEC6100-4-2 standard.

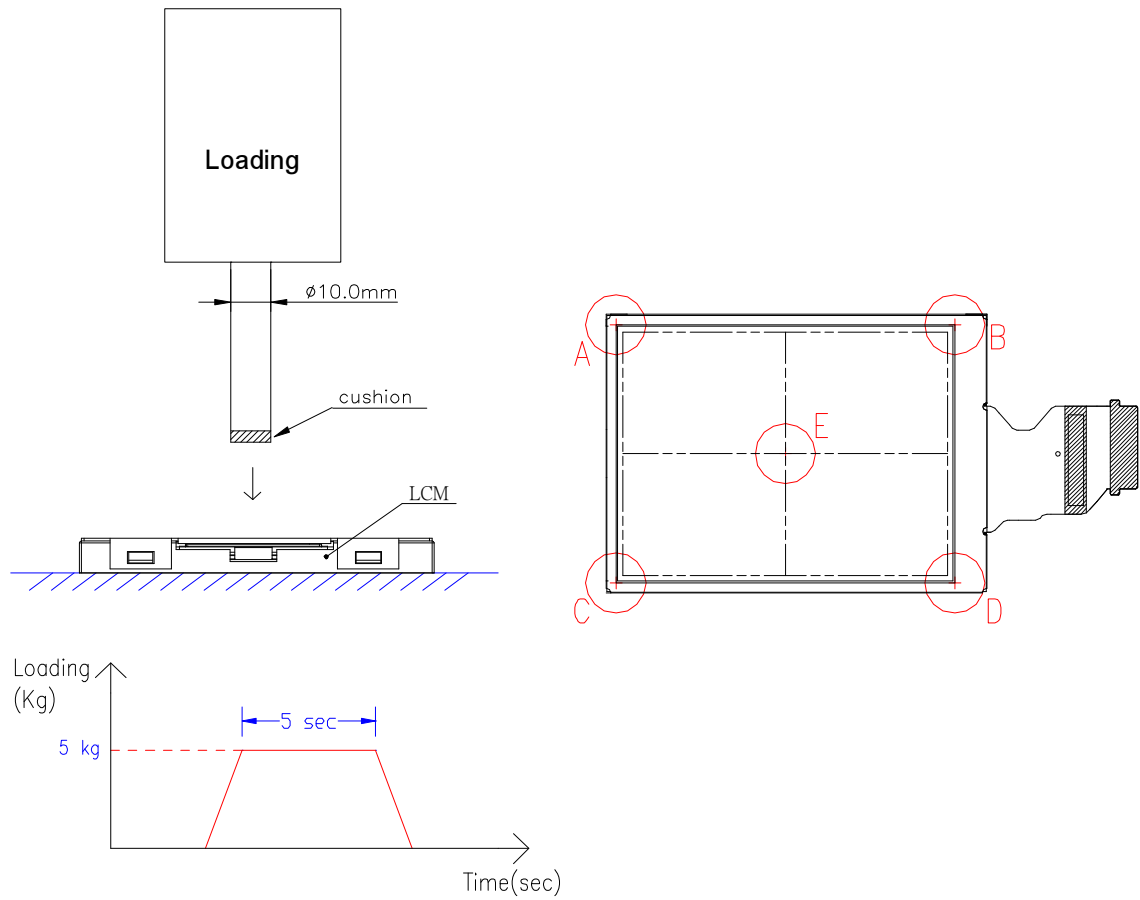
| Test Condition | | Note |
|----------------------|---|------|
| Pattern | | |
| Procedure And Set-up | <p><u>Contact Discharge</u> : 330Ω, 150pF, 1sec, 5 point, 10times/point</p> <p><u>Air Discharge</u> : 330Ω, 150pF, 1sec, 5 point, 10times/point</p> | |
| Criteria | B – Some performance degradation allowed. No data lost. Self-recoverable hardware failure. | |

Note 6: The panel is tested as figure. The jig is ϕ 10 mm made by Copper with rubber and the loading

speed is 3mm/min on position A~E. After the condition, no glass crack will be found and panel

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function check is OK.(no guarantee LC mura 、 LC bubble)



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2. Module/Panel Label Information

The module/panel (collectively called as the "Product") will be attached with a label of Shipping Number which represents the identification of the Product at a specific location. Refer to the Product outline drawing for detailed location and size of the label. The label is composed of a 22-digit serial number with the following definition:

ABCDEFGHIJKLMNOPQRSTUV

- For internal system usage and production serial numbers.
- AUO Module or Panel factory code, represents the final production factory to complete the Product
- Product version code, ranging from 0~9 or A~Z (for Version after 9)
- Week Code, the production week when the product is finished at its production process

Example:

501M06ZL06123456781Z05:

Product Manufacturing Week Code: WK50

Product Version: Version 1

Product Manufacturing Factory: M06

3. Carton Label Information

The packing carton will be attached with a carton label where packing Q'ty, AUO Model Name, AUO Part Number, Customer Part Number (Optional) and a series of Carton Number in 13 or 14 digits are printed. The Carton Number is appearing in the following format:

ABC-DEFG-HIJK-LMN

- DEFG appear after first "-" represents the packing date of the carton
- Date from 01 to 31
- Month, ranging from 1~9, A~C. A for Oct, B for Nov and C for Dec.
- A.D. year, ranging from 1~9 and 0. The single digit code represents the last number of the year

Refer to the drawing of packing format for the location and size of the carton label.

H. Precautions

1. Do not twist or bend the module and prevent the unsuitable external force for display module during assembly.
2. Adopt measures for good heat radiation. Be sure to use the module within the specified temperature.
3. Avoid dust or oil mist during assembly.
4. Follow the correct power sequence while operating. Do not apply the invalid signal, otherwise, it will cause improper shut down and damage the module.
5. Less EMI: it will be more safety and less noise.
6. Please operate module in suitable temperature. The response time & brightness will drift by different temperature.
7. Avoid to display the fixed pattern (exclude the white pattern) in a long period, otherwise, it will cause image sticking.
8. Be sure to turn off the power when connecting or disconnecting the circuit.
9. Polarizer scratches easily, please handle it carefully.
10. Display surface never likes dirt or stains.
11. A dewdrop may lead to destruction. Please wipe off any moisture before using module.
12. Sudden temperature changes cause condensation, and it will cause polarizer damaged.
13. High temperature and humidity may degrade performance. Please do not expose the module to the direct sunlight and so on.
14. Acetic acid or chlorine compounds are not friends with TFT display module.
15. Static electricity will damage the module, please do not touch the module without any grounded device.
16. Do not disassemble and reassemble the module by self.
17. Be careful do not touch the rear side directly.
18. No strong vibration or shock. It will cause module broken.
19. Storage the modules in suitable environment with regular packing.
20. Be careful of injury from a broken display module.
21. Please avoid the pressure adding to the surface (front or rear side) of modules, because it will cause the display non-uniformity or other function issue.