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Datasheet

Amoled

AL101WXL02-N

AM-01-001

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PRODUCT SPECIFICATIONS

- (•) Preliminary specifications
- () Final specifications

DOCUMENT NUMBER: AL101WXL02-N
PRODUCT NO.: AL101WXL02-N
PRODUCT NAME: 10.1" 1280 x 800 LCD Module

| |
|--------------------|
| CUSTOMER |
| |
| APPROVED BY |
| |
| DATE: |

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|-----------------|
| APPROVAL |
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| Prepared by | Date | Revision | Changes |
|-------------|--------------|----------|------------------|
| SY | Sep. 2, 2015 | 0.01 | Initial release |
| Asa | Sep. 4, 2015 | 0.02 | Optical modified |
| Stanley | Oct. 8, 2015 | 0.03 | Add weight |
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1. Features

10.1 TFT Liquid Crystal Display module is a color active matrix thin film transistor (TFT) liquid crystal display (LCD) that uses amorphous silicon TFT as a switching device. It is composed of a TFT LCD panel, a timing controller, voltage reference, common voltage, column driver, and row driver circuit. This TFT LCD has a 10.1-inch diagonally measured active display area with 1280 horizontal by 800 vertical pixel array resolution.

2. Physical Specifications

| Item | Specifications | Remark |
|--------------------|------------------------------------|--------|
| LCD size | 10.1 inch(Diagonal) | |
| Driver element | a-Si TFT active matrix | |
| Display resolution | 1280 (W) × 3(RGB) x 800(H) dots | |
| Display mode | Normally Black, Transmissive (IPS) | |
| Dot pitch | 0.1695 (W) x0.1695 (H) mm | |
| Active area | 216.96 (W) x 135.6 (H) mm | |
| Module size | 231.0 (W) x 154.4 (H) × 5.7 (D) mm | |
| Surface treatment | HC | |
| Color arrangement | R.G.B-stripe | |
| Interface | Digital | |
| Weight | 240 g | |



3. Absolute Maximum Ratings

| ITEM | SYMBOL | VALUES | | UNIT | REMARK |
|-----------------------|-----------|--------|-----|------|--------------------|
| | | MIN | MAX | | |
| Power Voltage | V_{DD} | -0.3 | 7.0 | V | VSS=0V, TA=25°C |
| | V_{LED} | -0.3 | 24 | V | |
| Operation Temperature | T_{op} | -20 | 70 | °C | |
| Storage Temperature | T_{st} | -30 | 80 | °C | |

Note : The absolute maximum rating values of this product are not allowed to be exceeded at any times.

Should a module be used with any of the absolute maximum ratings exceeded, the characteristics of the module may not be recovered, or in an extreme case, the module may be permanently destroyed.

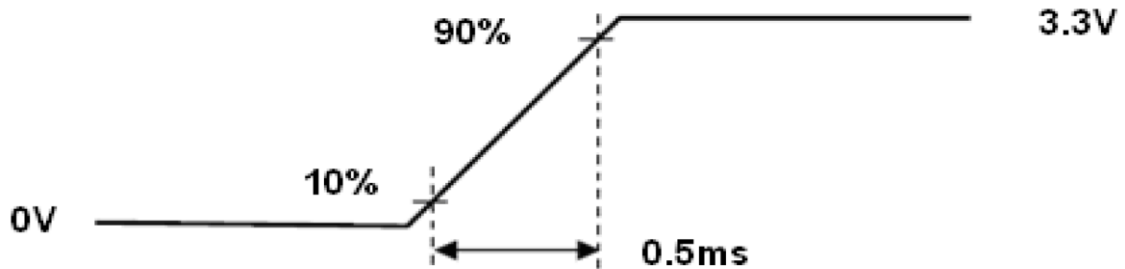


4. Electrical Specifications

4.1 Typical Operation Conditions

| Item | Symbol | Min | Typ | Max | Unit | Note |
|--|----------------------|-----|------|-----|------|-------------|
| LCD Drive Voltage | VDD | 3.0 | 3.3 | 3.6 | V | (2),(4) |
| VDD Current | White Pattern IDD | -- | 0.27 | -- | A | (3),(4) |
| VDD Power Consumption | White Pattern PDD | -- | -- | 1.0 | W | (3),(4) |
| Rush Current | Irush | | | 1.5 | A | (1),(4),(5) |
| Allowable Logic/LCD Drive Ripple Voltage | VDDrp | | | 300 | mV | (4) |

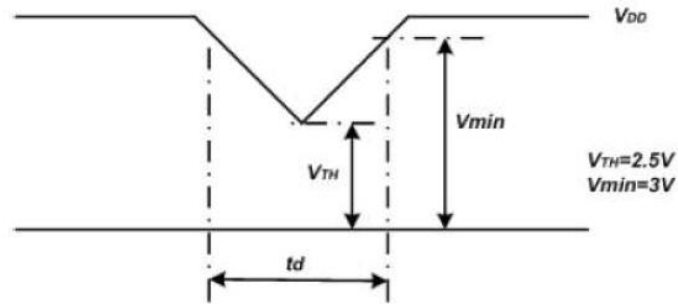
Note 1.Measure Condition



VDD rising time

Note 2.VDD Power Dip Condition

If $V_{TH} < V_{DDRVmin}$, then $t_{dR} < 10ms$; when the voltage return to normal our panel must revive automatically.

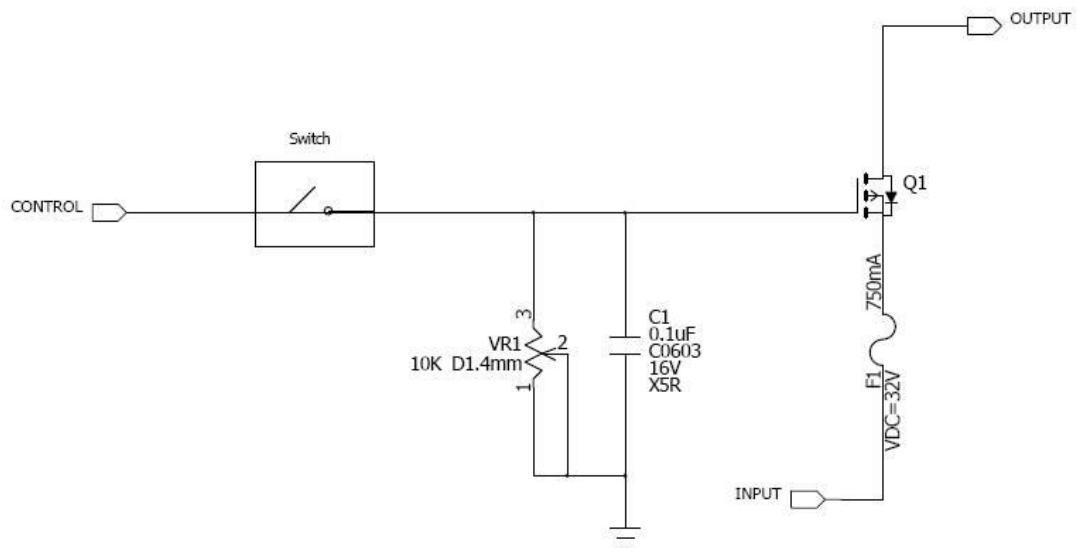


VDD Power Dip

Note (3) Frame Rate=60Hz, VDD=3.3V,DC Current.

Note (4) Operating temperature 25°C , humidity 55%RH.

Note (5) The reference measurement circuit of rush current.



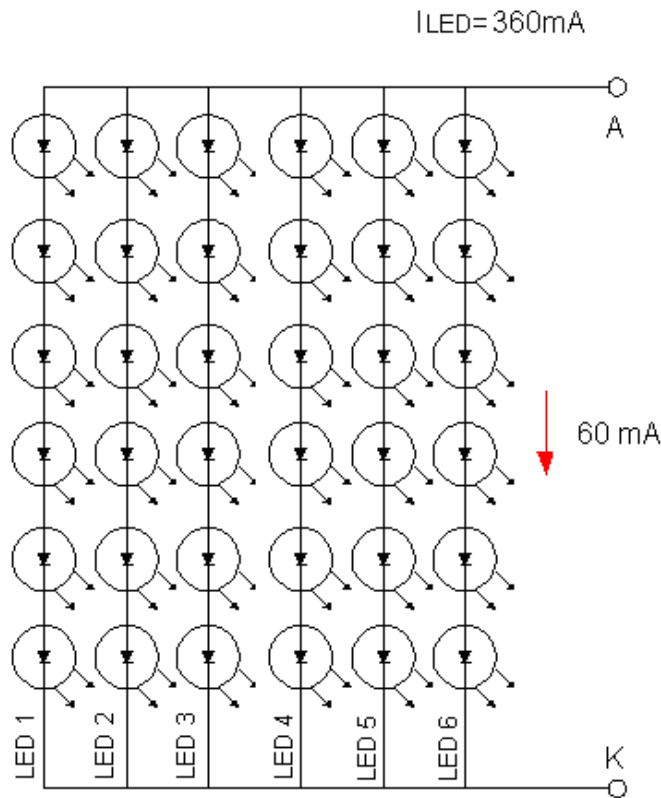


4-2 LED Driving Conditions

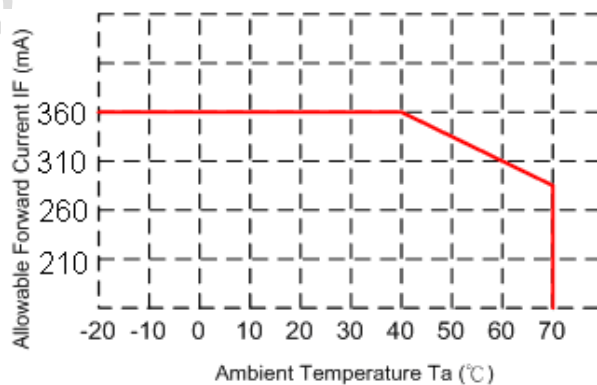
| ITEM | SYMBOL | MIN | TYP | MAX | UNIT | CONDITION |
|-----------------------|----------|-----|-----|-----|------|----------------|
| LED Backlight Voltage | V_{BL} | -- | 22 | 24 | V | For reference |
| LED Backlight Current | I_{BL} | - | 360 | -- | mA | Ta=25°C |
| LED Life Time | | -- | 50K | - | kHr | Note* |

Note* : Brightness to be decreased to 50% of the initial value.

Ta=25°C

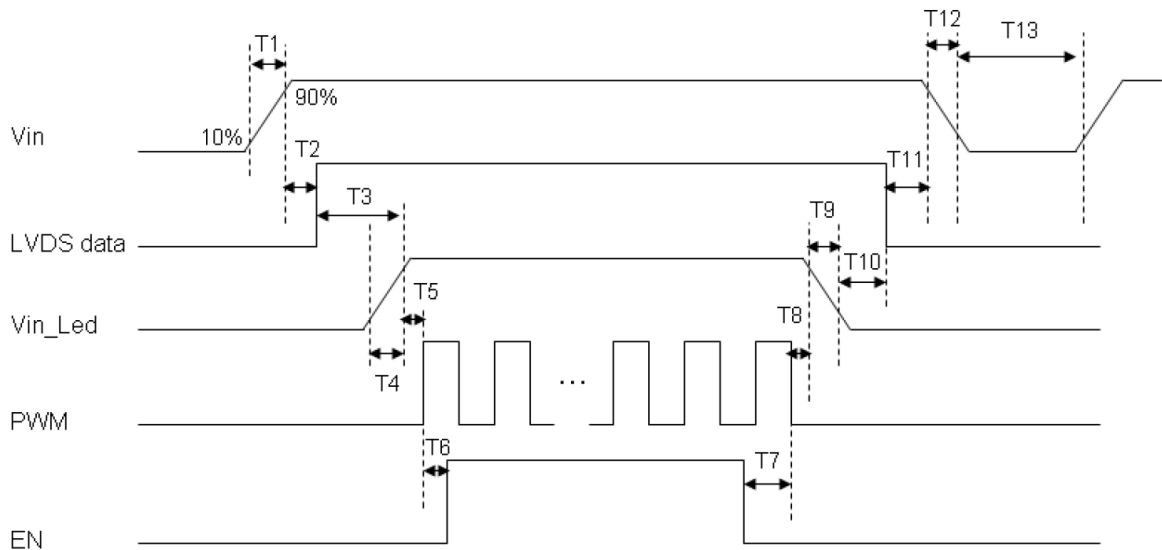


When LCM is operated over 40°C ambient temperature, the ILED should be follow :





4.3 Power Sequence



Power Sequencing Requirements

| Parameter | Symbol | Unit | Min | Typ. | Max |
|--|--------|------|-----|------|-----|
| VIN Rise Time | T1 | ms | 0.5 | -- | 10 |
| VIN Good to Signal Valid | T2 | ms | 30 | -- | 90 |
| Signal Valid to Backlight On | T3 | ms | 200 | -- | -- |
| Backlight Power On Time | T4 | ms | 0.5 | -- | -- |
| Backlight VDD Good to System PWM On | T5 | ms | 10 | -- | -- |
| System PWM ON to Backlight Enable ON | T6 | ms | 10 | -- | -- |
| Backlight Enable Off to System PWM Off | T7 | ms | 0 | -- | -- |
| System PWM Off to B/L Power Disable | T8 | ms | 10 | -- | -- |
| Backlight Power Off Time | T9 | ms | -- | 10 | 30 |
| Backlight Off to Signal Disable | T10 | ms | 200 | -- | -- |
| Signal Disable to Power Down | T11 | ms | 0 | -- | 50 |
| VIN Fall Time | T12 | ms | -- | 10 | 30 |
| Power Off | T13 | ms | 500 | -- | -- |



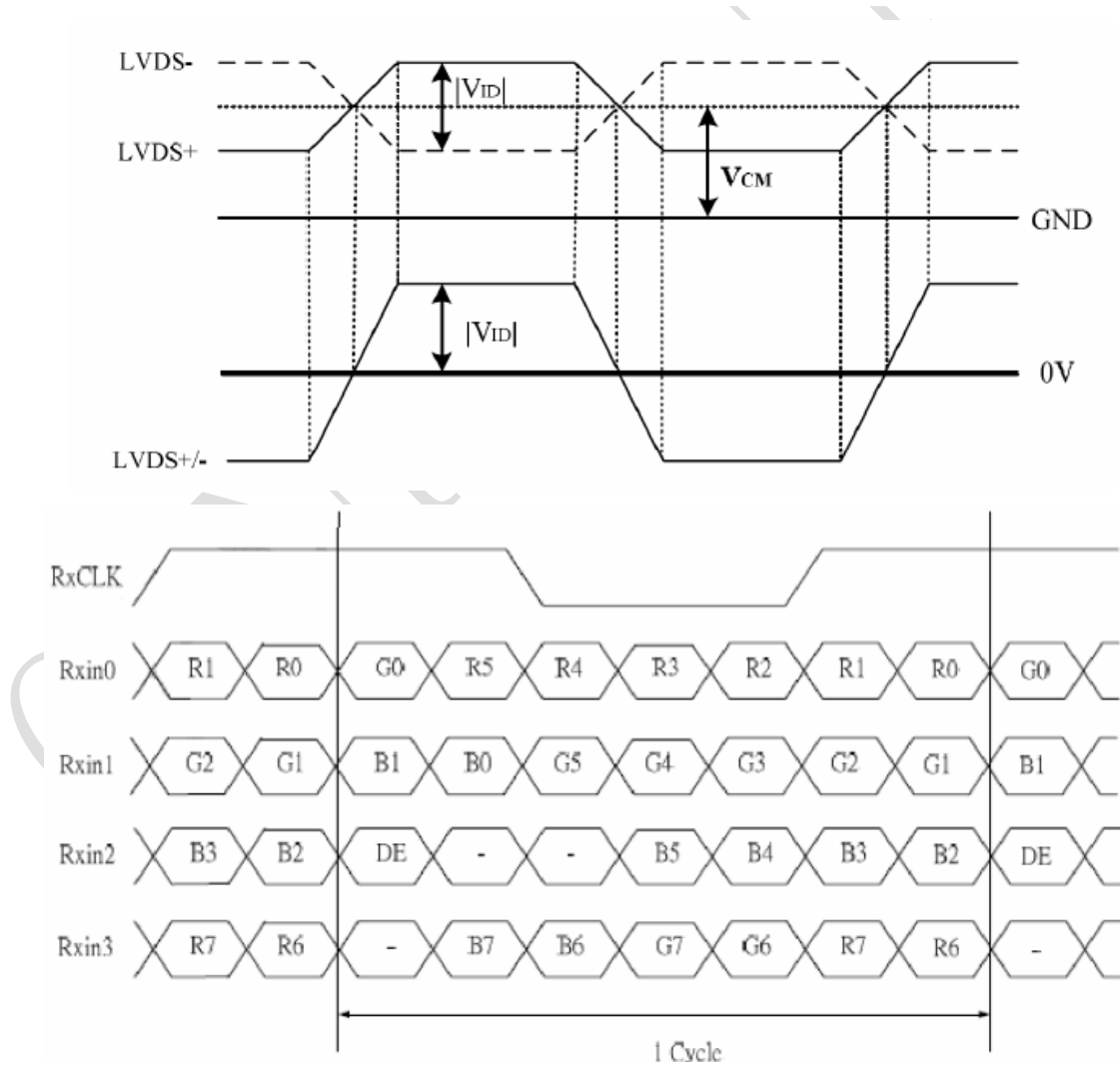
4.4 LVDS Signal Timing Characteristics

4.4.1 AC Electrical Characteristics

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Conditions |
|------------------------------|------------------|---------------------------|------|-------------------------------|------|------------------------|
| Differential Input High | V _{th} | - | - | +100 | mV | V _{CM} =+1.2V |
| Differential Input Low | V _{tl} | -100 | - | - | mV | V _{CM} =+1.2V |
| Magnitude Differential Input | V _{ID} | 200 | - | 400 | mV | - |
| Common Mode Voltage | V _{CM} | 0.3+ (V _{ID} /2) | - | VDD-1.2- (V _{ID} /2) | V | - |
| Common Mode Voltage | ΔV _{CM} | - | - | 50 | mV | V _{CM} =+1.2V |

Note (1) Input signals shall be low or Hi-Z state when VDD is off.

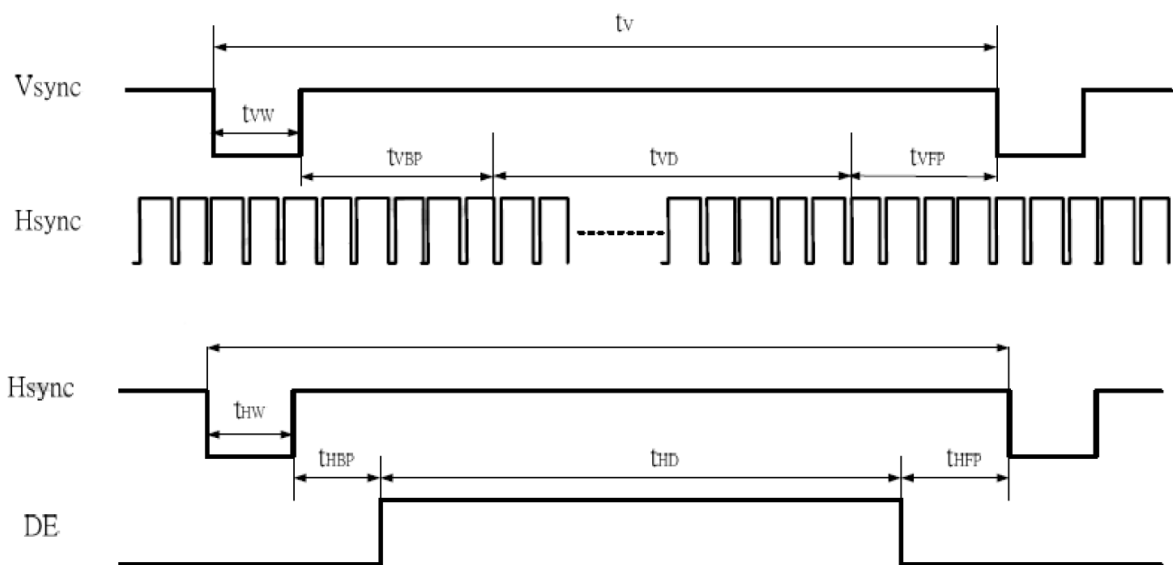
(2) All electrical characteristics for LVDS signal are defined and shall be measured at the interface connector of LCD.





4.4.2 Timing Table

| Parameter | Symbol | Unit | Min. | Typ. | Max. |
|--------------------------|--------------------------|-------|--------|--------|--------|
| Frame Rate | -- | Hz | - | 60 | - |
| Frame Period | t_v | line | (815) | (823) | (1023) |
| Vertical Display Time | t_{VD} | line | 800 | | |
| Vertical Blanking Time | $t_{VW}+t_{VBP}+t_{VFP}$ | line | (15) | (23) | (33) |
| 1 Line Scanning Time | t_H | clock | (1410) | (1440) | (1470) |
| Horizontal Display Time | t_{HD} | clock | 1280 | | |
| Horizontal Blanking Time | $t_{HW}+t_{HBP}+t_{HFP}$ | clock | (60) | (160) | (190) |
| Clock Rate | $1/T_C$ | MHz | (68.9) | (71.1) | (73.4) |





5. Interface

Interface Connector (input signal) : Starconn/300E40-0010RA-G3

| Pin # | Signals Name | Description | Remarks |
|-------|--------------|--|--------------------------|
| 1 | NC | Not Connect | - |
| 2 | VDD | Power Supply, 3.3V (typical) | - |
| 3 | VDD | Power Supply, 3.3V (typical) | |
| 4 | VDD_EDID | Power Supply for EDID I2C Flash IC | |
| 5 | SCL_EDID | I2C Serial Clock for EDID I2C Flash IC | |
| 6 | SDA_EDID | I2C Serial Data for EDID I2C Flash IC | |
| 7 | NC | Not Connect | |
| 8 | LV0N | -LVDS differential data input | |
| 9 | LV0P | +LVDS differential data input | |
| 10 | GND | Ground | |
| 11 | LV1N | -LVDS differential data input | |
| 12 | LV1P | +LVDS differential data input | |
| 13 | GND | Ground | |
| 14 | LV2N | -LVDS differential data input | |
| 15 | LV2P | +LVDS differential data input | |
| 16 | GND | Ground | |
| 17 | LVCLKN | -LVDS differential data input | |
| 18 | LVCLKP | +LVDS differential data input | |
| 19 | GND | Ground | |
| 20 | LV3N | -LVDS differential data input | |
| 21 | LV3P | +LVDS differential data input | |
| 22 | GND | Ground | |
| 23 | NC | Not Connect | |
| 24 | NC | Not Connect | |
| 25 | NC | Not Connect | |
| 26 | NC | Not Connect | |
| 27 | NC | Not Connect | |
| 28 | NC | Not Connect | |
| 29 | CABC_EN | Content Adaptive Brightness Control Function Enable | Enable: Hi Disable:Lo |



| | | | |
|-------|------|-------------|--|
| 30 | NC | Not Connect | |
| 31 | NC | Not Connect | |
| 32 | NC | Not Connect | |
| 33 | NC | Not Connect | |
| 34 | NC | Not Connect | |
| 35 | BIST | BIST pin | |
| 36-40 | NC | Not Connect | |

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6. Optical Specifications

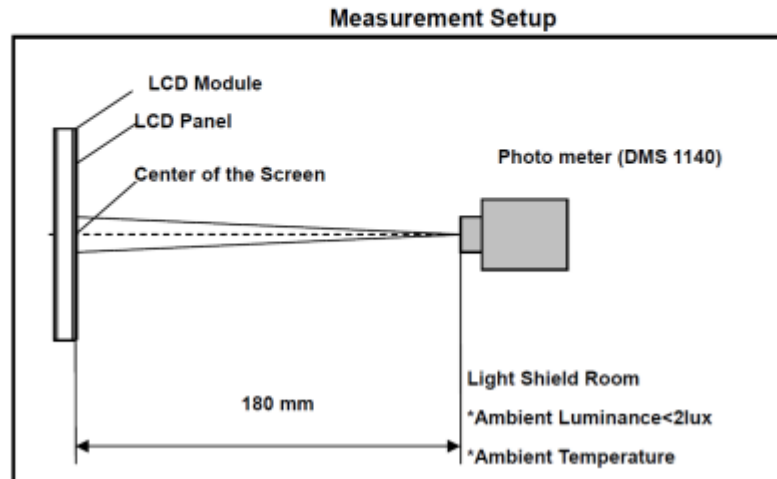
Table 2 Optical Characteristics

| Item | Conditions | | Min. | Typ. | Max. | Unit | Note | | |
|---------------------------------|------------------|------------|---------------|-------|---------------|--------|---------|---|-------------------|
| Viewing Angle (CR>10) | Horizontal | θ_L | (75) | (85) | - | degree | (1) | | |
| | | θ_R | (75) | (85) | - | | | | |
| | Vertical | θ_T | (75) | (85) | - | | | | |
| | | θ_B | (75) | (85) | - | | | | |
| Contrast Ratio | Center | | (600) | (800) | - | - | (1),(2) | | |
| Response Time | Rising | | - | - | - | ms | (1),(3) | | |
| | Falling | | - | - | - | ms | | | |
| | Rising + Falling | | - | 25 | - | ms | | | |
| Color Chromaticity (CIE1931) | NTSC | | - | 45 | - | % | (1) | | |
| | Red | x | Typ. -0.05 | 0.561 | Typ. +0.05 | - | (1) | | |
| | Red | y | | 0.334 | | | | | |
| | Green | x | | 0.341 | | | | | |
| | Green | y | | 0.568 | | | | | |
| | Blue | x | | 0.161 | | | | | |
| | Blue | y | | 0.129 | | | | | |
| | White | x | | - | | 0.313 | | - | - |
| | White | y | | - | | 0.329 | | - | - |
| White Luminance | Center | | | - | | 1300 | | - | cd/m ² |
| Luminance Uniformity | 9Points | | 70 | 75 | - | % | (1),(4) | | |

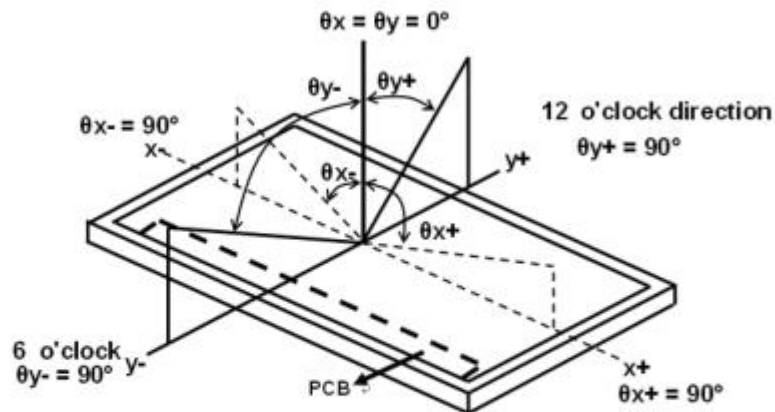


Note (1) Measurement Setup:

The LCD module should be stabilized at given temperature(25°C) for 15 minutes to Avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting backlight for 15 minutes in a windless room.



Definition of Viewing Angle



Note (2) Definition Of Contrast Ratio (CR)

The contrast ratio can be calculated by the following expression

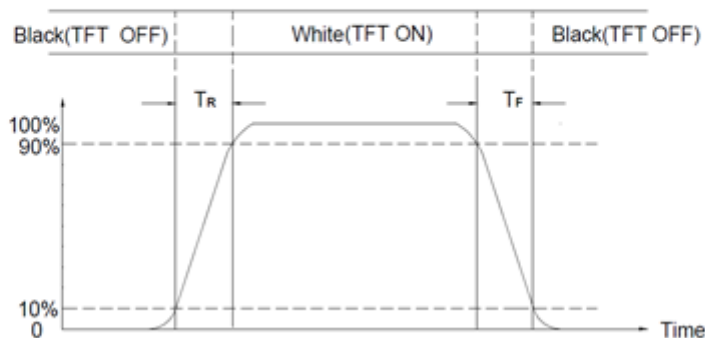


Contrast Ratio (CR) = L255 / L0

L63: Luminance of gray level 255, L0: Luminance of gray level 0

Note (3) Definition Of Response Time (T_R, T_F)

Figure 6 Definition of Response Time

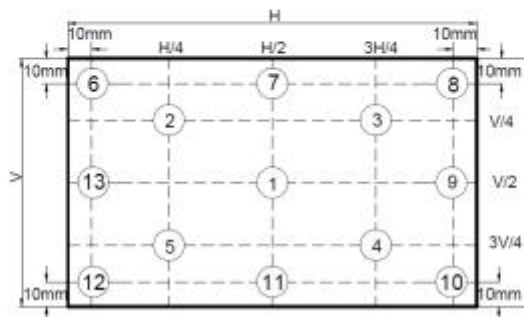


Note (4) Definition Of brightness Luminance

$$\text{Luminance uniformity} = \frac{\text{Min}(L1, L6, L7, L8, L9, L10, L11, L12, L13)}{\text{Max}(L1, L6, L7, L8, L9, L10, L11, L12, L13)} \times 100\%$$

H—Active area length V—Active area width

Measurement Locations





7. Reliability Test Conditions

| Test Item | Test Conditions | Note |
|----------------------------|---|------|
| High Temperature Operation | 70±3°C ,Dry t=240 hrs | |
| Low Temperature Operation | -20±3°C, Dry t=240 hrs | |
| High Temperature Storage | 80±3°C , Dry t=240 hrs | 1,2 |
| Low Temperature Storage | -30±3°C ,Dry t=240 hrs | 1,2 |
| Thermal Shock Test | -20°C ~ 25°C ~ 70°C 30 m in. 5 min. 30 min. (1 cycle) Total 100 cycle(Dry) | 1,2 |
| Storage Humidity Test | 60 °C, Humidity 90%, 240 hrs | 1,2 |
| Vibration Test (Packing) | Sweep frequency : 10 ~ 55 ~ 10 Hz/1min Amplitude : 0.75mm Test direction : X.Y.Z/3 axis Duration : 30min/each axis | 2 |

Note 1 : Condensation of water is not permitted on the module.

Note 2 : The module should be inspected after 1 hour storage in normal conditions (15-35°C , 45-65%RH).

Definitions of life end point :

- Current drain should be smaller than the specific value.
- Function of the module should be maintained.
- Appearance and display quality should not have degraded noticeably.
- Contrast ratio should be greater than 50% of the initial value.



8. General Precaution

8.1 Use Restriction

This product is not authorized for use in life supporting systems, aircraft navigation control systems, military systems and any other application where performance failure could be life-threatening or otherwise catastrophic.

8.2 Disassembling or Modification

Do not disassemble or modify the module. It may damage sensitive parts inside LCD module, and may cause scratches or dust on the display. AMOLED Corp. does not warrant the module, if customers disassemble or modify the module.

8.3 Breakage of LCD Panel

- (1) If LCD panel is broken and liquid crystal spills out, do not ingest or inhale liquid crystal, and do not contact liquid crystal with skin.
- (2) If liquid crystal contacts mouth or eyes, rinse out with water immediately.
- (3) If liquid crystal contacts skin or cloths, wash it off immediately with alcohol and rinse thoroughly with water.
- (4) Handle carefully with chips of glass that may cause injury, when the glass is broken.

8.4 Electric Shock

- (1) Disconnect power supply before handling LCD module.
- (2) Do not pull or fold the LED cable.
- (3) Do not touch the parts inside LCD modules and the fluorescent LED's connector or cables in order to prevent electric shock.

8.5 Absolute Maximum Ratings and Power Protection Circuit

- (1) Do not exceed the absolute maximum rating values, such as the supply voltage variation, input voltage variation, variation in parts' parameters, environmental temperature, etc., otherwise LCD module may be damaged.
- (2) Please do not leave LCD module in the environment of high humidity and high temperature for a long time.
- (3) It's recommended to employ protection circuit for power supply.

8.6 Operation

- (1) Do not touch, push or rub the polarizer with anything harder than HB pencil lead.
- (2) Use fingerstalls of soft gloves in order to keep clean display quality, when persons handle the LCD module for incoming inspection or assembly.
- (3) When the surface is dusty, please wipe gently with absorbent cotton or other soft material.
- (4) Wipe off saliva or water drops as soon as possible. If saliva or water drops contact with polarizer for a long time, they may cause deformation or color fading.
- (5) When cleaning the adhesives, please use absorbent cotton wetted with a little petroleum benzene or other adequate solvent.



8.7 Mechanism

Please mount LCD module by using mounting holes arranged in four corners tightly.

8.8 Static Electricity

- (1) Protection film must remove very slowly from the surface of LCD module to prevent from electrostatic occurrence.
- (2) Because LCD modules use CMOS-IC on circuit board and TFT-LCD panel, it is very weak to electrostatic discharge. Please be careful with electrostatic discharge. Persons who handle the module should be grounded through adequate methods.

8.9 Strong Light Exposure

The module shall not be exposed under strong light such as direct sunlight. Otherwise, display characteristics may be changed.

8.10 Disposal

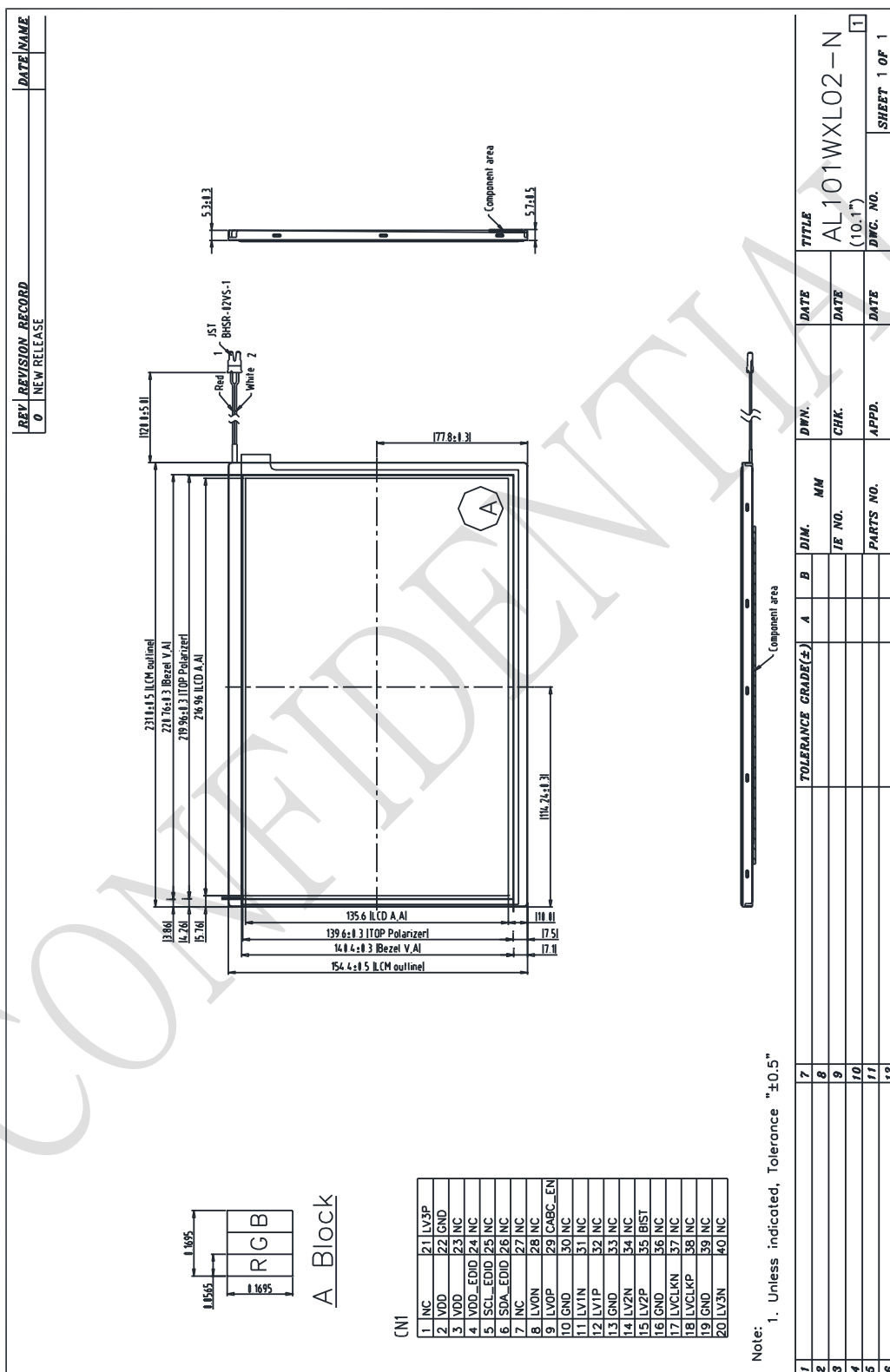
When disposing LCD module, obey the local environmental regulations.

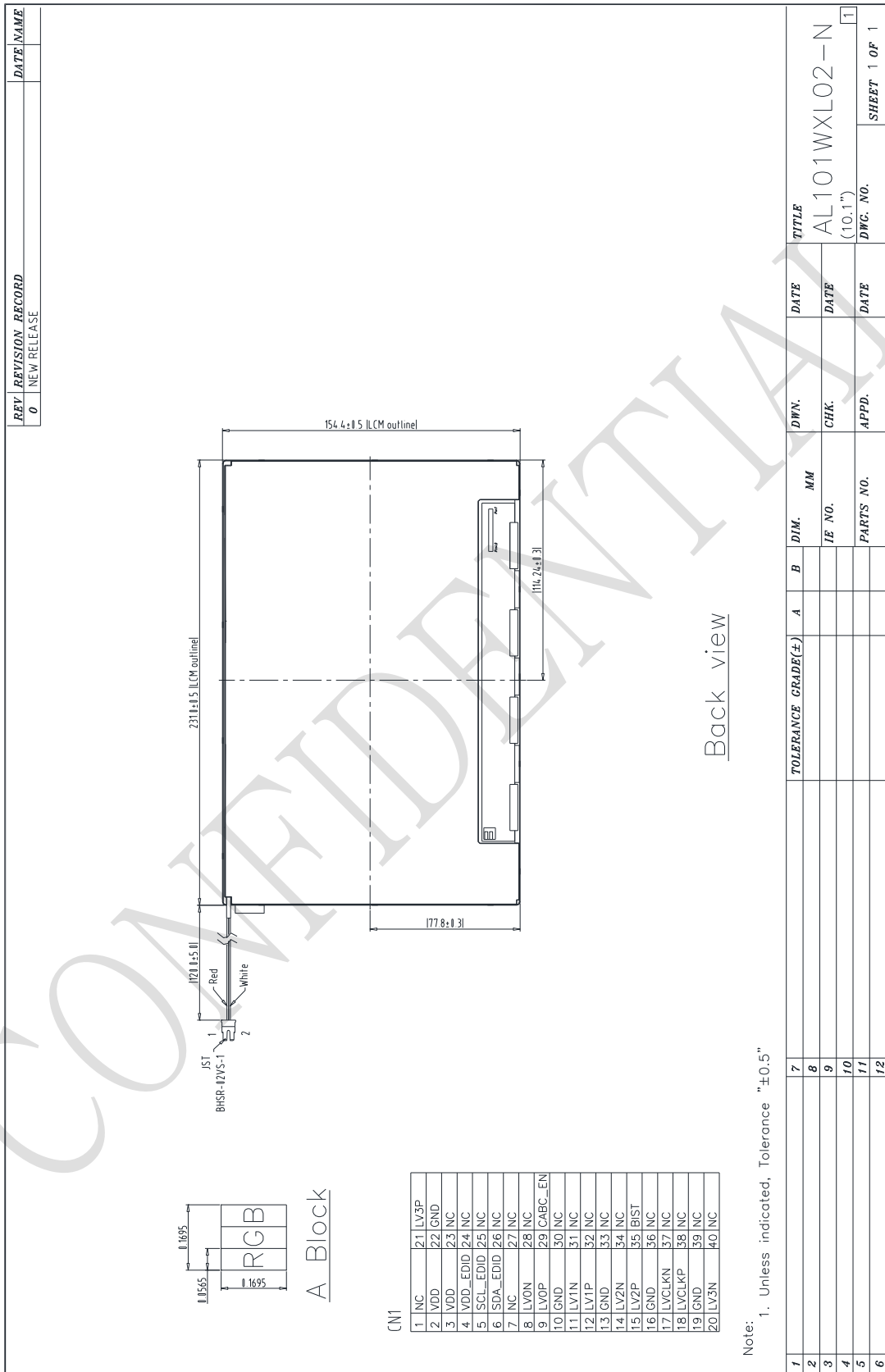
8.11 Others

Do not keep the LCD at the same display pattern continually. The residual image will happen and it will damage the LCD. Please use screen saver.



9. Outline Dimension





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