**( ) Preliminary Specification**
**(V) Final Specification**

| Module | 27.0" Color TFT-LCD |
|---|---|
| Model Name | M270DAN01.0 |

| Customer | Date |
|---|---|
| | |
| **Approved by** | |
| | |

Note: This Specification is subject to change without notice.

| Approved by | Date |
|---|---|
| Howard Lee | |
| **Prepared by** | |
| Shin Yu Lin | 2013/4/16 |

AU Optronics Corporation

# Content

# Records of Revision

| Version and Date | Page | Old description | New Description | Remark |
|---|---|---|---|---|
| 0.1 2012/09/20 | All | First Version | N/A | |
| 0.2 2012/09/20 | 6~7 | 1. The minimum of white luminance is 240nit<br>2. The typical of white luminance is 300nit<br>3. The module consumption is 31.26W<br>4. The Color / Chromaticity is TBD<br>5. The weight of module is TBD | 1. The minumn of white luminance is 280 nit<br>2. The typical of white luminance is 350nit<br>3. The module consumptiion is 34.9W<br>4. The Color / Chromaticity is defined by Min/Tpy/Max<br>5. The weight of module is 2319g | |
| | 12/ 28 | - | Add second source of LVDS CNT1 | |
| | 13 | LED forward Voltage variation maximum is 3.6V | LED forward Voltage variation maximum is 3.4V | |
| | 15 | - | Update power specifications | |
| | 18 | Each module consists of 60 pcs LED ( 4 strings x 15 pcs / string ) | The back light unit of electrical characteristics is modified by Min/ Typ / Max/ LED pcs.<br>Each module consists of 68 pcs LED ( 4 strings x 17 pcs / string ) | |
| | 23/ 34 | Old label position | Label position alteration | |
| | 33 | - | Update mechanical drawing- add hook in gate IC side | |
| | 37 | The weight of packing and shipment is TBD | To define weight of packing and shipment | |
| 0.3 2013/01/6 | 27 | 1. The maker of module connector 2 is JAE.<br>2. The part no. of module connector 2 is FI-NXB40SLA-HF10 | 1. The maker of module connector 2 is STARCONN.<br>2. The part no. of module connector 2 is 115F40-R000RA-M3 | |
| | 22/38 | Original pin assignment of module connector (CNT2) | New pin assignment of module connector (CNT2) | |
| | 23/34 | Original module back cover picture | New module back cover picture | |
| | 26 | The T6 of power ON/OFF sequence is 100 ms | The T6 of power ON/OFF sequence is 150 ms | |

Update power specifications table (page 15):

| Symbol | Description | Min. | Typ. | Max. | Unit | Conditions |
|---|---|---|---|---|---|---|
| VDD | Logic/LCD Drive Voltage | 4.5 | 5.0 | 5.5 | [Volt] | +/-10% |
| IDD1 | Input Current | - | 1.6 | 2.0 | [A] | VDD= 5.0V, All White  Pattern at 60 Hz |
| | | - | 2.0 | 2.5 | [A] | VDD= 5.0V, All White  Pattern at 75 Hz |
| PDD1 | VDD Power | - | 8.0 | 10.0 | [Watt] | VDD= 5.0V, All White  Pattern at 60 Hz |
| | | - | 10.0 | 12.5 | [Watt] | VDD= 5.0V, All White  Pattern at 75 Hz |
| IRush | Inrush Current | - | - | 2.0 | [A] | Note 1 |
| VDDrp | Allowable Logic/LCD Drive Ripple Voltage | - | - | 500 | [mV] p-p. | VDD= 5.0V, All White Pattern at 75 Hz |

Old back light unit table (page 18):

| Symbol | Description | Min. | Typ. | Max. | Unit | Note |
|---|---|---|---|---|---|---|
| IRLED | LED Operation Current | - | 120.0 | 126.0 | [mA] | Note 1 |
| VLB | Light Bar Operation Voltage (for reference) | 45.0 | 49.5 | 54.0 | [Volt] | Note 2 |
| PBLU | BLU Power Consumption (for reference) | - | 23.7 | 27.2 | [Watt] | Note 3 |
| LTLED | LED Life Time (Typical) | 30,000 | - | - | [Hour] | Note 4 |

New back light unit table (page 18):

| Symbol | Description | Min. | Typ. | Max. | Unit | Note |
|---|---|---|---|---|---|---|
| IRLED | LED Operation Current | - | 120.0 | 130.0 | [mA] | Note 1 |
| VLB | Light Bar Operation Voltage (for reference) | 50 | 56.1 | 61.2 | [Volt] | Note 2 |
| PBLU | BLU Power Consumption (for reference) | - | 26.9 | 31.8 | [Watt] | Note 3 |
| LTLED | LED Life Time (Typical) | 30,000 | - | - | [Hour] | Note 4 |

| | | | | | |
|---|---|---|---|---|---|
| 0.4 2013/02/04 | 23/34 | Original module back cover picture | New module back cover picture | |
| | 28/33 | Orignal module connector 1 information | New module connector 1 information | 4 |
| 0.5 2013/3/20 | 19~23 / 25 | 1. The original relationship between LVDS 4 ports input signal is dual screen.<br>2. The original naming of input signal are RFO_XX/ RBO_XX/ RFE_XX/ RBE_XX<br>3. The original naming of signal pair are RFO/ RFE/ RBO/ RBE | 1. The new relationship between LVDS 4 ports input signal is single screen<br>2. The new naming of input signal are RX_XX/ RX_XX<br>3. The new naming of signal pair are port 1/ port 2/ port 3/ port 4 | |
| | 23/34 | NA | Add shipping label mark line. | |
| 0.6 2013/4/16 | 34 | Original size and appearance of BS-ITO tape | New size and appearance of BS-ITO tape | |

# 1  Handling Precautions

1) Since front polarizer is easily damaged, pay attention not to scratch it.

2) Be sure to turn off power supply when inserting or disconnecting from input connector.

3) Wipe off water drop immediately. Long contact with water may cause discoloration or spots.

4) When the panel surface is soiled, wipe it with absorbent cotton or other soft cloth.

5) Since the panel is made of glass, it may break or crack if dropped or bumped on hard surface.

6) Since CMOS LSI is used in this module, take care of static electricity and insure human earth when handling.

7) Do not open or modify the Module Assembly.

8) Do not press the reflector sheet at the back of the module to any directions.

9) In case if a Module has to be put back into the packing container slot after once it was taken out from the container, do not press the center of LED light bar edge. Instead, press at the far ends of the LED light bar edge softly. Otherwise the TFT Module may be damaged.

10) At the insertion or removal of the Signal Interface Connector, be sure not to rotate nor tilt the Interface Connector of the TFT Module.

11) After installation of the TFT Module into an enclosure, do not twist nor bend the TFT Module even momentary. At designing the enclosure, it should be taken into consideration that no bending/twisting forces are applied to the TFT Module from outside. Otherwise the TFT Module may be damaged.

12) Small amount of materials having no flammability grade is used in the LCD module. The LCD module should be supplied by power complied with requirements of Limited Power Source (IEC60950 or UL1950), or be applied exemption.

13) Avoid touching COF position while doing mechanical design.

14) Avoid stressing front bezel position when doing mechanical design

15) While storing modules as spares for a long time, the following precautions are necessary:

   ➢ Store modules in a dark place. Do not expose them to sunlight or fluorescent light.

   ➢ Keep the temperature between 5°C and 35°C at normal humidity.

## 2   General Description

This specification applies to the 27 inch-QHD color a-Si TFT-LCD Module M270DAN01.0. The display supports the QHD - 2560(H) x 1440(V) screen format and 1.07B colors (RGB 8-bit +FRC data). The light source of this TFT-LCD module is W-LED. All input signals are 4-channel LVDS interface and this module doesn't contain a driver for backlight.

### 2.1   Display Characteristics

The following items are characteristics summary on the table under 25°C condition:

| Items | Unit | Specification |
|---|---|---|
| Screen Diagonal | [mm] | 684.7 (27.0") |
| Active Area | [mm] | 596.7  (H) x  335.6   (V) |
| Pixels H x V | | 2560(x3) x 1440 |
| Pixel Pitch | [um] | 233.1 (per one triad) ×233.1 |
| Pixel Arrangement | | R.G.B. Vertical Stripe |
| Display Mode | | Normally Black |
| White Luminance ( Center ) | [cd/m2] | 350 cd/m2 (Typ.) |
| Contrast Ratio | | 1000 (Typ.) |
| Optical Response Time | [msec] | 12ms (Typ., G/G) |
| Nominal Input Voltage VDD | [Volt] | + 5.0 V |
| Power Consumption (VDD line + LED line) | [Watt] | 34.9 W (typ) <br> VDD line : PDD (typ), All white pattern at 60Hz = 8.0W <br> LED line : PBLU (typ) = 26.9 W |
| Weight | [g] | 2319 |
| Physical Size | [mm] | 630.0 (W) x 368.2 (H) x 10.6(D)    (Typ.) |
| Electrical Interface | | 4 channel LVDS |
| Support Color | | 1.07B colors (RGB 8-bit + FRC data) |
| Surface Treatment | | Anti-Glare, 3H |
| Temperature Range <br> Operating <br> Storage (Shipping) | <br> [°C] <br> [°C] | 0 to +50 <br> -20 to +60 |
| RoHS Compliance | | RoHS Compliance |
| TCO Compliance | | TCO 6.0 Compliance |

## 2.2   Optical Characteristics

The optical characteristics are measured under stable conditions at 25°C:

| Item | Unit | Conditions | Min. | Typ. | Max. | Note |
|------|------|-----------|------|------|------|------|
| Viewing Angle | [degree] | Horizontal    (Right) | 75 | 89 | - | 2 |
| | | CR = 10        (Left) | 75 | 89 | - | |
| | | Vertical        (Up) | 75 | 89 | - | |
| | | CR = 10       (Down) | 75 | 89 | - | |
| Contrast Ratio | | Normal Direction | 600 | 1000 | - | 3 |
| Response Time | [msec] | Gray to Gray | - | 12 | - | 4 |
| Color / Chromaticity Coordinates (CIE) | | Red x | 0.630 | 0.660 | 0.690 | 5 |
| | | Red y | 0.302 | 0.332 | 0.362 | |
| | | Green x | 0.270 | 0.300 | 0.330 | |
| | | Green y | 0.599 | 0.629 | 0.659 | |
| | | Blue x | 0.117 | 0.147 | 0.177 | |
| | | Blue y | 0.022 | 0.052 | 0.082 | |
| Color Coordinates (CIE) White | | White x | 0.283 | 0.313 | 0.343 | |
| | | White y | 0.299 | 0.329 | 0.359 | |
| Central Luminance | [cd/m2] | | 280 | 350 | - | 6 |
| Luminance Uniformity | [%] | | 75 | 80 | - | 7 |
| Crosstalk (in 60Hz) | [%] | | | | 1.5 | 8 |
| Flicker | dB | | | | -20 | 9 |

## *Note 1:* **Measurement Method**

The LCD module should be stabilized at given temperature for 30 minutes to avoid abrupt temperature change during measuring (at surface 35°C). In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 30 minutes in a stable, windless and dark room.
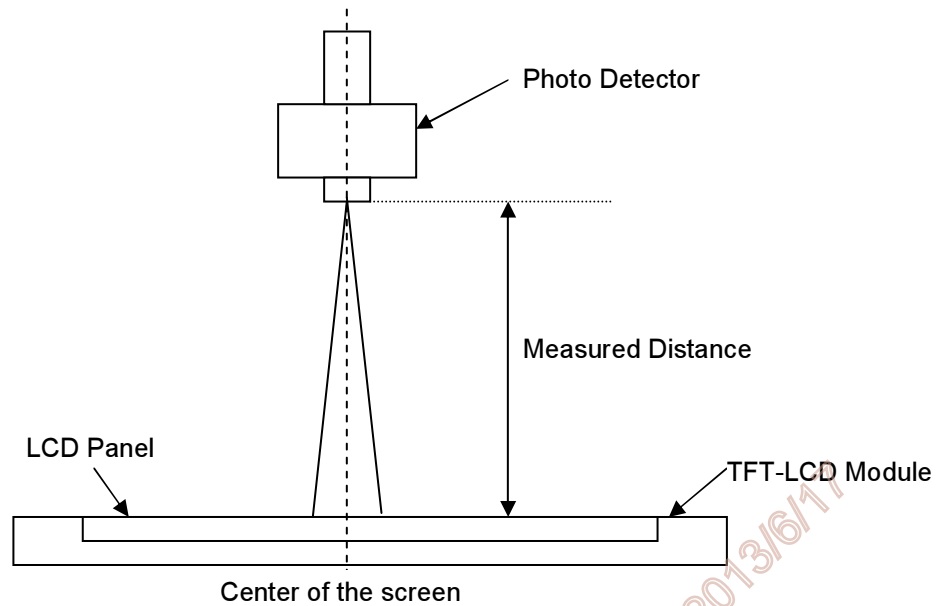


## *Note 2:* **Definition of Viewing Angle** measured by ELDIM (EZContrast 88)

Viewing angle is the measurement of contrast ratio $\geq 10$, at the screen center, over a 180° horizontal and 180° vertical range (off-normal viewing angles). The 180° viewing angle range is broken down as follows; 90° (θ) horizontal left and right and 90° (Φ) vertical, high (up) and low (down). The measurement direction is typically perpendicular to the display surface with the screen rotated about its center to develop the desired measurement viewing angle.
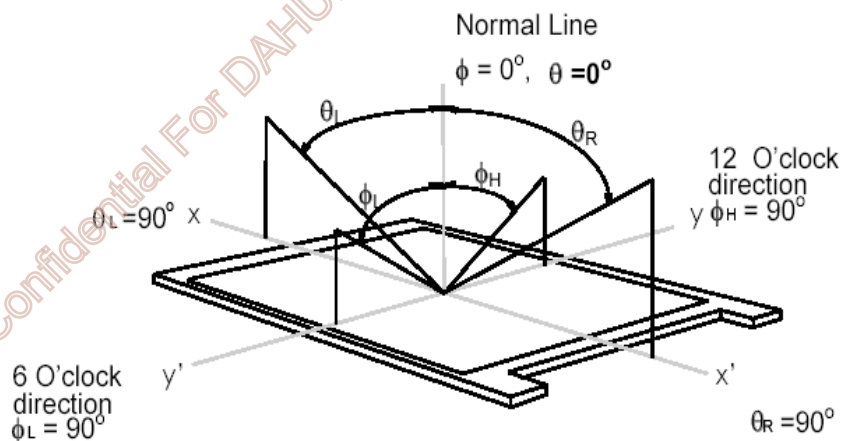
*Note 3:* **Contrast Ratio** measured by TOPCON SR-3

*Note 4:* **Definition of Response time** measured by Westar TRD-100A

The output signals of photo detector are measured when the input signals are changed from "Full Black" to "Full White" (rising time, $T_{rR}$), and from "Full White" to "Full Black" (falling time, $T_{rF}$), respectively. The response time is interval between the 10% and 90% (1 frame at 60 Hz) of amplitudes.
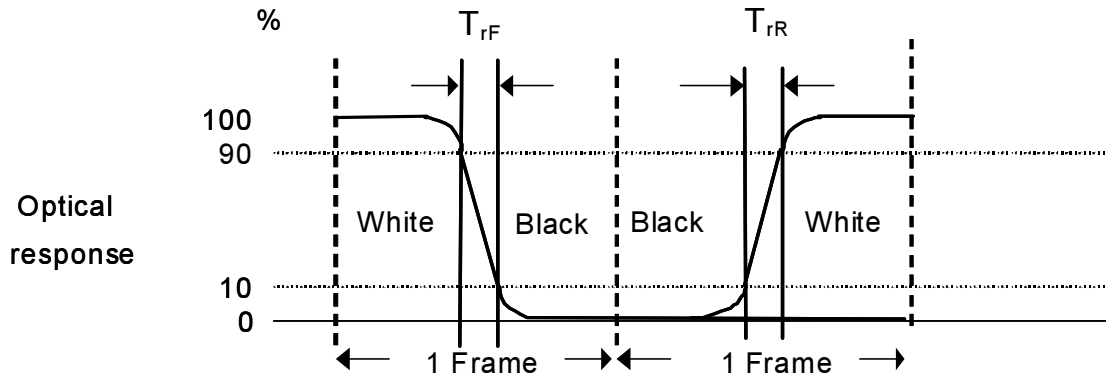


The gray to gray response time is defined as the following table. The algorithm is **|** Gray Level A – Gray Level B **|** $\geqq$ 256.

| Gray Level to Gray Level | | Falling Time | | | | |
|---|---|---|---|---|---|---|
| | | G0 | G255 | G511 | G767 | G1023 |
| Rising Time | G0 | | | | | |
| | G255 | | | | | |
| | G511 | | | | | |
| | G767 | | | | | |
| | G1023 | | | | | |

- $T_{GTG\_typ}$ is the total average time at rising time and falling time of gray to gray.
- $T_{GTG\_max}$ is the maximum time at rising time or falling time of gray to gray.

*Note 5:* **Color Chromaticity and Coordinates (CIE)** measured by TOPCON SR-3

*Note 6:* **Central Luminance** measured by TOPCON SR-3

*Note 7:* **Luminance Uniformity** of these 9 points defined as below and measured by TOPCON SR-3
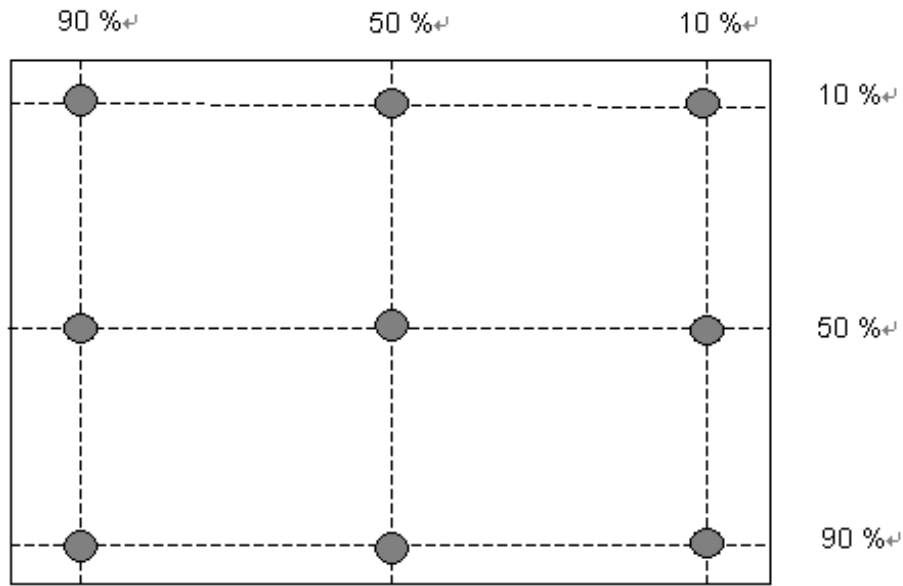
$$Uniformity = \frac{Minimum\ Luminance\ in\ 9\ points\ (1-9)}{Maximum\ Luminance\ in\ 9\ Points\ (1-9)}$$

**Note 8:** **Crosstalk** defined as below and measured by TOPCON SR-3

$CT = |\ YB - YA\ |\ /\ YA \times 100\ (\%)$

Where

YA = Luminance of measured location without gray level 0 pattern (cd/m2)

YB = Luminance of measured location with gray level 0 pattern (cd/m2)

*Note 9:* **Test Pattern Sub-checker Pattern** measured by TOPCON SR-3

| R | G | B | R | G | B |

☐ Gray Level = 511

▨ Gray Level = 0
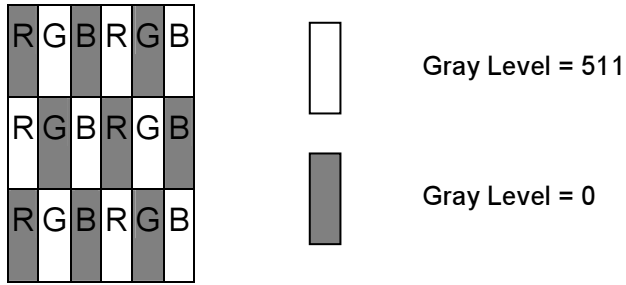
Method: Record dBV & DC value with TRD-100
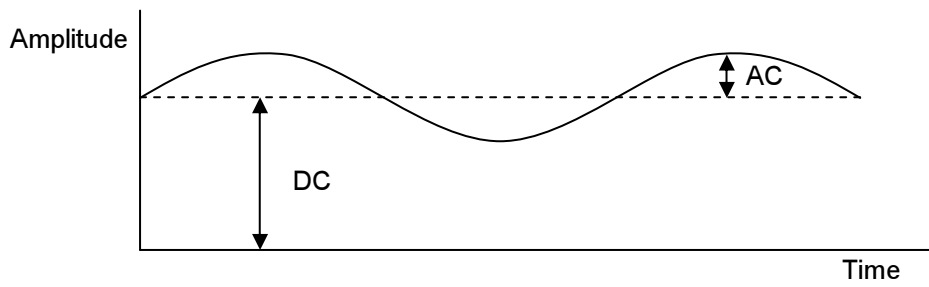


$$Flicker\ (dB) = 20\log \frac{AC\ Level(at\ 30\ Hz)}{DC\ Level}$$

# 3 Functional Block Diagram

The following diagram shows the functional block of the 27.0 inch Color TFT-LCD Module:
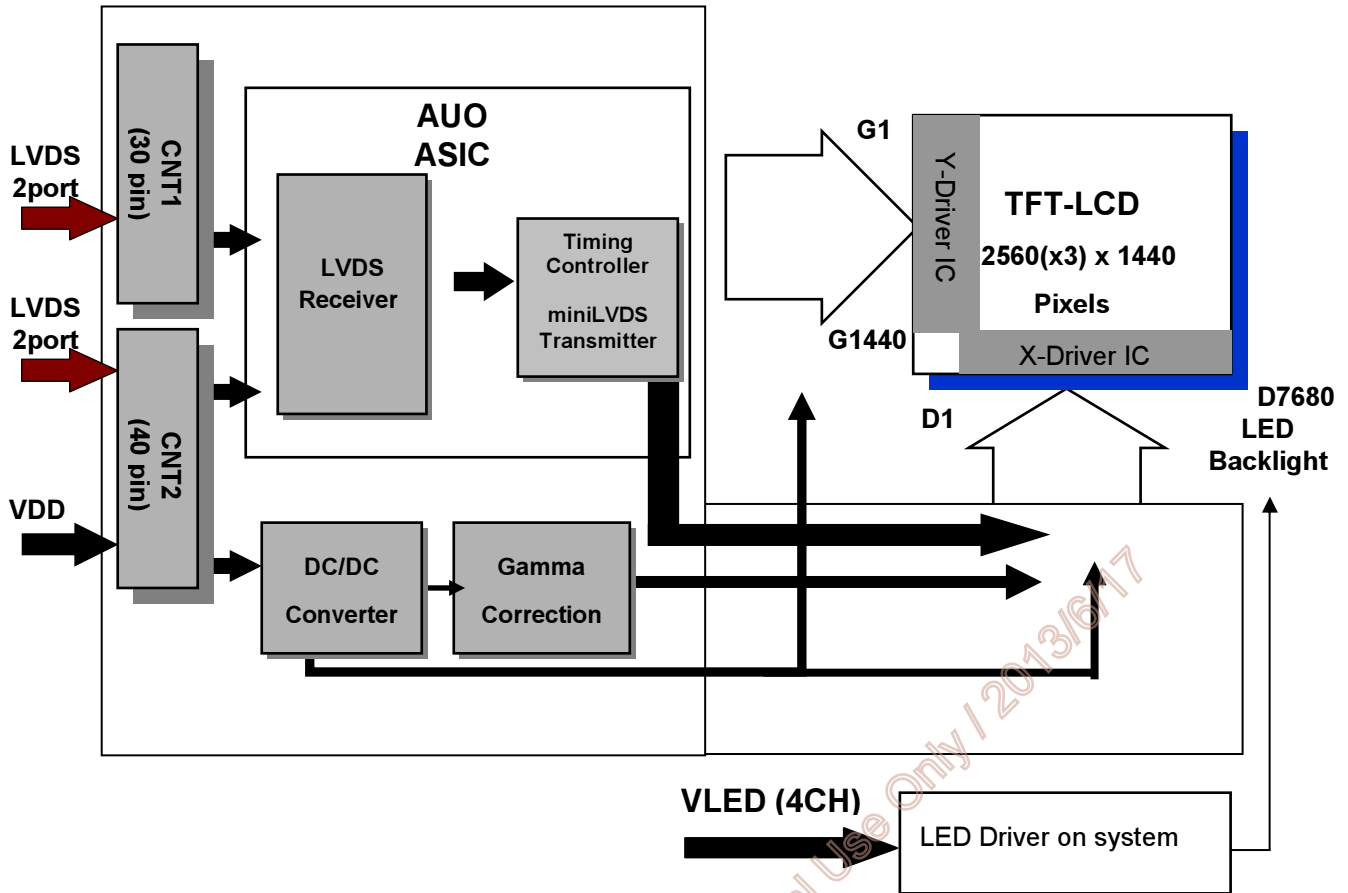
# 4   Absolute Maximum Ratings

Absolute maximum ratings of the module are listed as follows:

## 4.1   TFT LCD Module

| Item | Symbol | Min | Max | Unit | Conditions |
|------|--------|-----|-----|------|------------|
| Logic/LCD Drive | VDD | -0.3 | 6.0 | [Volt] | *Note 1, 2* |

## 4.2   Backlight Unit

| Item | Symbol | Min | Max | Unit | Conditions |
|------|--------|-----|-----|------|------------|
| LED Forward Current | IRLED1 | 0 | 150 | [mA] | *Note 1,2,5* *100% duty* |
| | IRLED2 | | | | |
| | IRLED3 | | | | |
| | IRLED4 | | | | |
| LED Pulse Forward Current | IPLED1 | - | 300 | [mA] | *Note 1,2,5* *10% duty @100Hz* |
| | IPLED2 | | | | |
| | IPLED3 | | | | |
| | IPLED4 | | | | |
| LED forward Voltage variation (per string variation) | △Vf | - | 3.4 | [Volt] | *Note 1,2* |

## 4.3   Absolute Ratings of Environment

| Item | Symbol | Min. | Max. | Unit | Conditions |
|------|--------|------|------|------|------------|
| Operating Temperature | TOP | 0 | +50 | [°C] | *Note 3* |
| Glass Surface Temperature (Operation) | TGS | 0 | +65 | [°C] | *Note3* *Note4* |
| Operation Humidity | HOP | 5 | 90 | [%RH] | *Note 3* |
| Storage Temperature | TST | -20 | +60 | [°C] | |
| Storage Humidity | HST | 5 | 90 | [%RH] | |

**Note 1:** With in Ta (25 °C)

**Note 2:** Permanent damage to the device may occur if exceeding maximum values

**Note 3:** Temperature and relative humidity range are shown as the below figure.

    1. 90% RH Max ( Ta ≦39°C)

    2. Max wet-bulb temperature at 39°C or less. ( Ta ≦39°C)

    3. No condensation

**Note 4:** *Function Judged only*

**Note 5:** IRLED1,2,3,4 and IPLED1,2,3,4 define as per strings LED current.

Operating Range    Storage Range
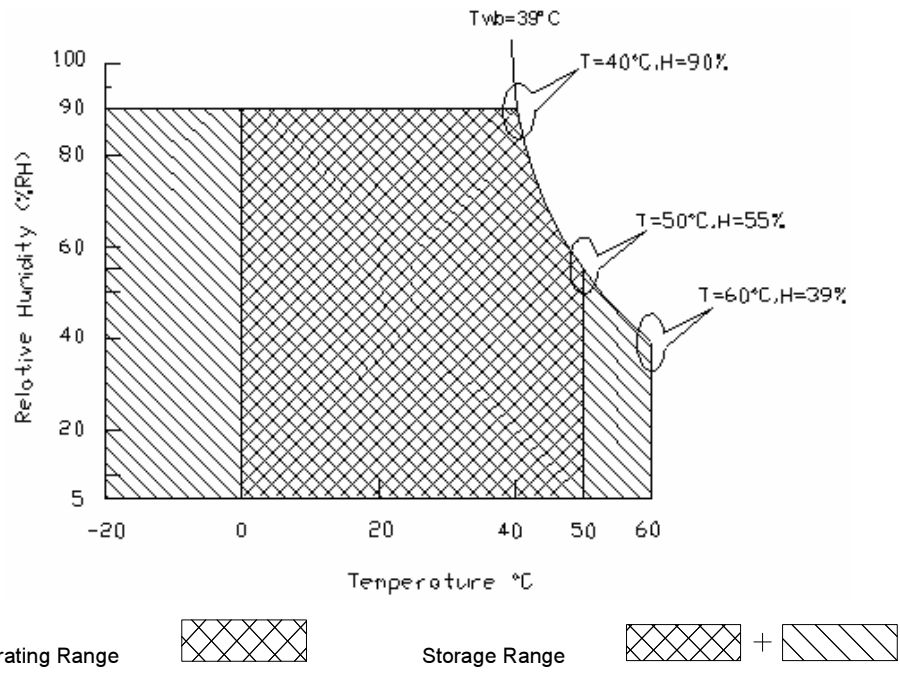
# 5 Electrical Characteristics

## 5.1 TFT LCD Module

### 5.1.1 Power Specification

Input power specifications are listed as follows:

| Symbol | Description | Min | Typ. | Max | Unit | Conditions |
|--------|-------------|-----|------|-----|------|------------|
| VDD | Logic/LCD Drive Voltage | 4.5 | 5.0 | 5.5 | [Volt] | +/-10% |
| IDD1 | Input Current | - | 1.6 | 2.0 | [A] | VDD= 5.0V, All White Pattern at 60 Hz |
| | | - | 2.0 | 2.5 | [A] | VDD= 5.0V, All White Pattern at 75 Hz |
| PDD1 | VDD Power | - | 8.0 | 10.0 | [Watt] | VDD= 5.0V, All White Pattern at 60 Hz |
| | | - | 10.0 | 12.5 | [Watt] | VDD= 5.0V, All White Pattern at 75 Hz |
| IRush | Inrush Current | - | - | 2.0 | [A] | *Note 1* |
| VDDrp | Allowable Logic/LCD Drive Ripple Voltage | - | - | 500 | [mV] p-p | VDD= 5.0V, All White Pattern at 75 Hz |

***Note 1:*** **Measurement Conditions:**

The duration of rising time of power input is 470 us.
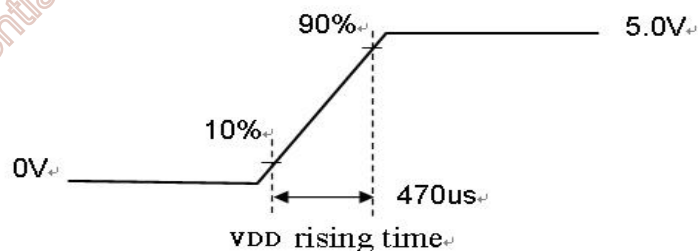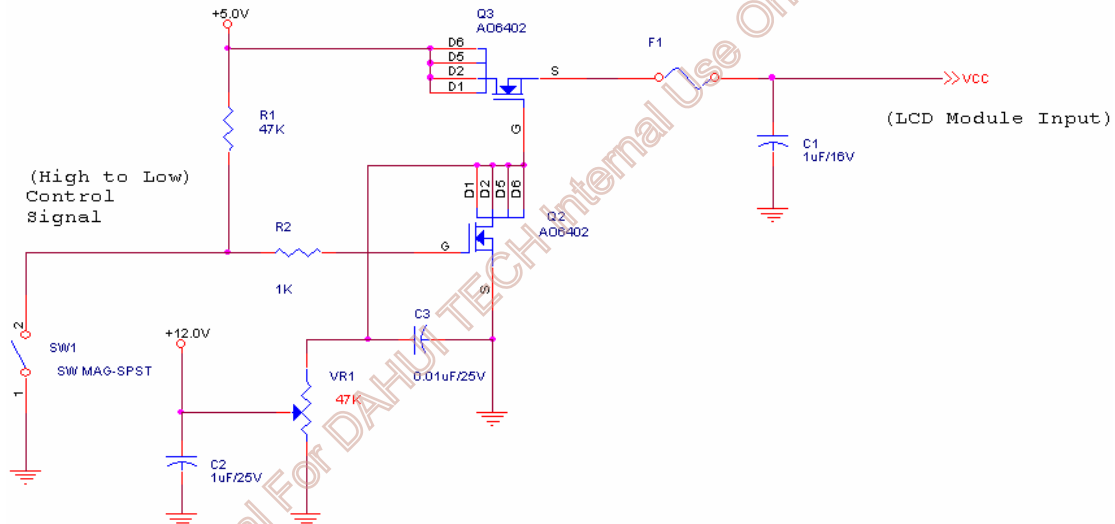
## 5.1.2 Signal Electrical Characteristics

### (1) DC Characteristics of each signal are as following:

| Symbol | Description | Min | Typ | Max | Units | Conditions |
|--------|-------------|-----|-----|-----|-------|------------|
| $V_{TH}$ | Differential Input High Threshold | - | - | +100 | [mV] | $V_{CM}$ = 1.2V **Note 1** |
| $V_{TL}$ | Differential Input Low Threshold | -100 | - | - | [mV] | $V_{CM}$ = 1.2V **Note 1** |
| $\lvert V_{ID} \rvert$ | Input Differential Voltage | 100 | - | 600 | [mV] | **Note 1** |
| $V_{CM}$ | Differential Input Common Mode Voltage | +1.0 | +1.2 | +1.5 | [V] | $V_{TH}$-$V_{TL}$ = 200MV (max) **Note 1** |

***Note 1:*** LVDS Signal Waveform
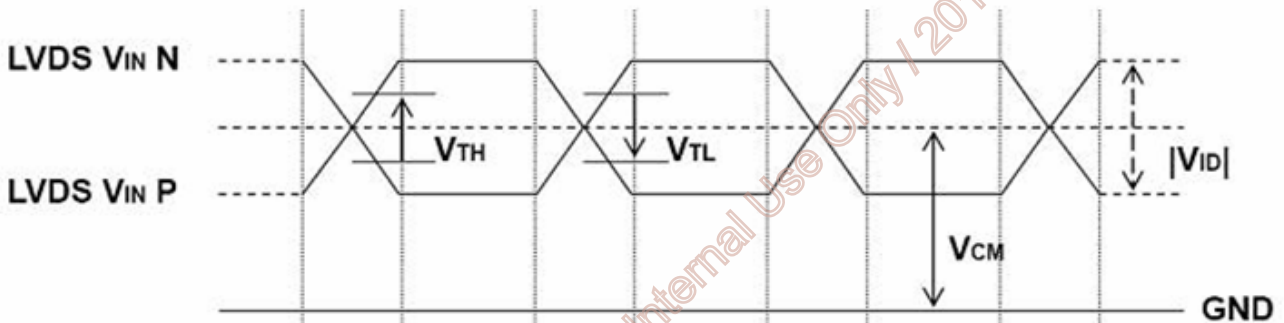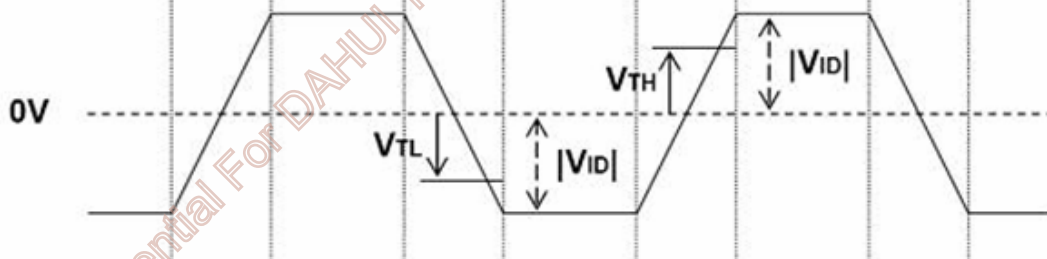
## (2) AC Characteristics

| Symbol | Description | Min | Max | Units | Conditions |
|--------|-------------|-----|-----|-------|------------|
| $F_{DEV}$ | Maximum deviation of input clock frequency during SSC | - | ± 3 | % | |
| $F_{MOD}$ | Maximum modulation frequency of input clock during SSC | - | 200 | KHz | |
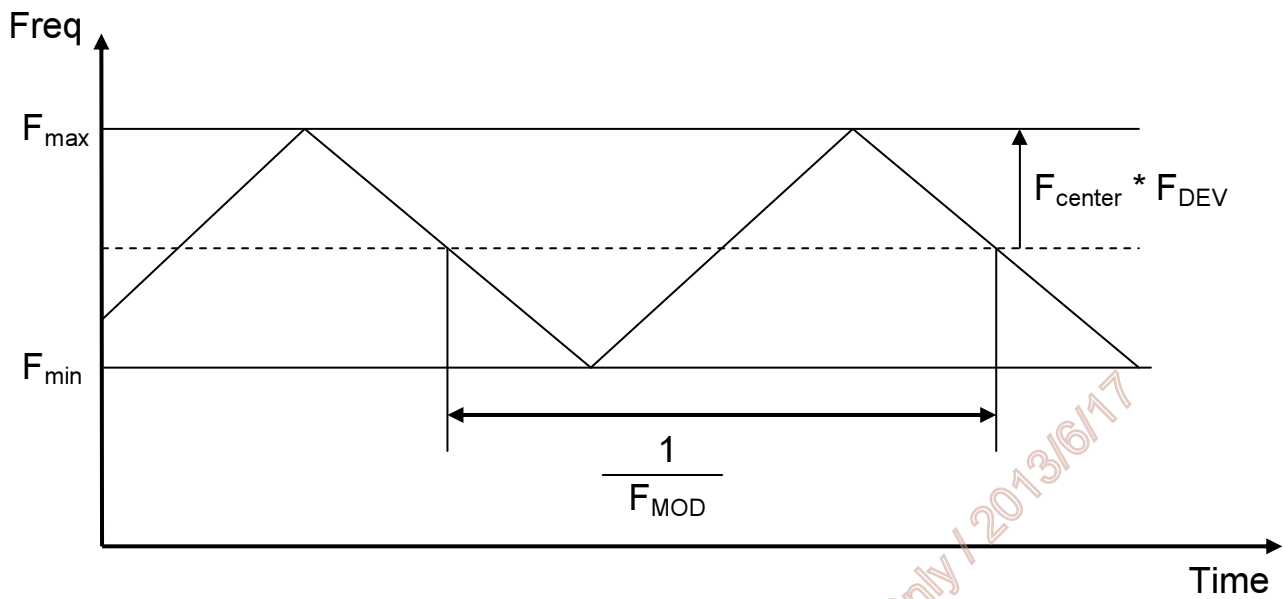
< Spread Spectrum>

## 5.2 Backlight Unit

Parameter guideline for LED driving is under stable conditions at 25 °C (Room Temperature):

| Symbol | Description | Min. | Typ. | Max. | Unit | Note |
|--------|-------------|------|------|------|------|------|
| IRLED | LED Operation Current | - | 120.0 | 130.0 | [mA] | *Note 1* |
| VLB | Light Bar Operation Voltage (for reference) | 50.0 | 56.1 | 61.2 | [Volt] | *Note 2* |
| PBLU | BLU Power Consumption (for reference) | - | 26.9 | 31.8 | [Watt] | *Note 3* |
| LTLED | LED Life Time (Typical) | 30,000 | - | - | [Hour] | *Note 4* |

Each module consists of 68 pcs LED ( 4 strings x 17 pcs / string )

*Note 1:* The specified current is 100% duty of LED chip input current, IRLED1,2,3,4 define as per strings LED current.

*Note 2:* The value showed is one string operation voltage.

*Note 3:* PBLU = VLB *( IRLED1+IRLED2+IRLED3+IRLED4)

*Note 4:* Definition of life time: Brightness becomes to 50% of its original value. The minimum life time of LED unit is on the condition of IRLED = 120mA and 25±2°C (Room Temperature).

# 6   Signal Characteristics

## 6.1   Pixel Format Definition

Following figure shows the relationship between the input signals and LCD pixel format.
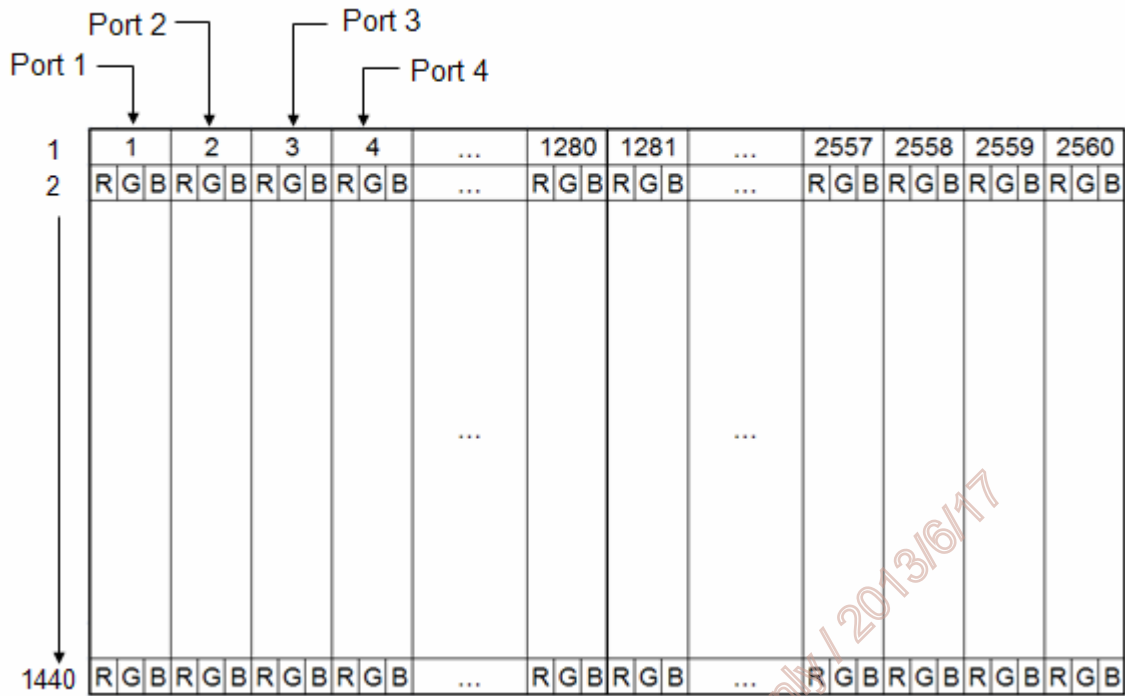


**Note 1:** The module use 4port-LVDS interface.

Port 1：1, 5…………………→2557pixel

Port 2：2, 6…………………→2558pixel

Port 3：3, 7…………………→2559 pixel

Port 4：4, 8…………………→2560 pixel

## 6.2 Input Data Format Definition
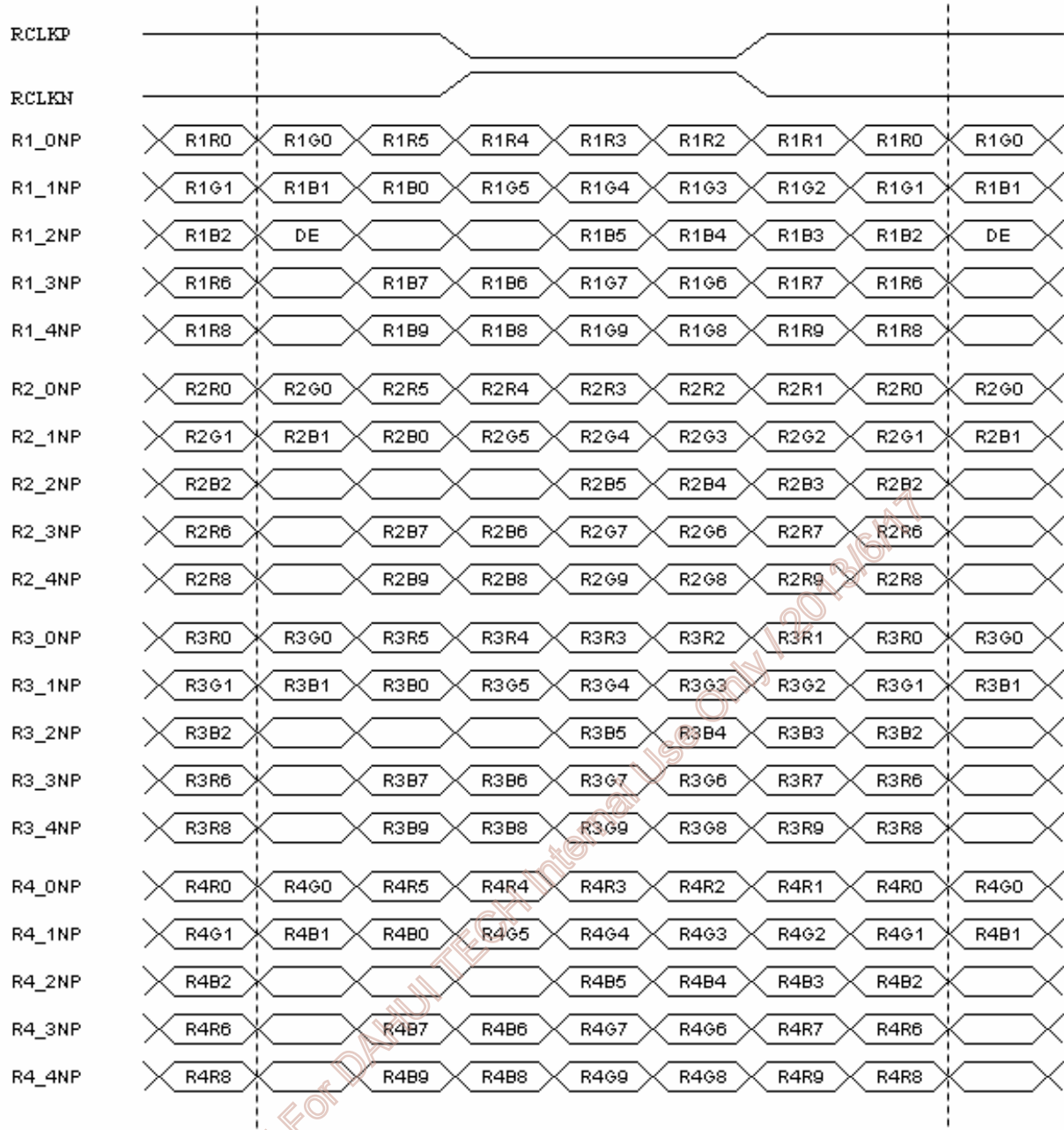


LVDS Data Mapping of NS Format for Quad Channel

## 6.3   Signal Description

The module using 30/40 pin 4port-LVDS interface. LVDS is a differential signal technology for LCD interface and high speed data transfer device.

Module Connector - CNT1

| PIN # | Signal Name | Description | Function |
|-------|-------------|-------------|----------|
| 1 | R1_0N | FIRST_ Negative LVDS differential data input | LVDS port 1 |
| 2 | R1_0P | FIRST_ Positive LVDS differential data input | |
| 3 | R1_1N | FIRST_ Negative LVDS differential data input | |
| 4 | R1_1P | FIRST_ Positive LVDS differential data input | |
| 5 | R1_2N | FIRST_ Negative LVDS differential data input | |
| 6 | R1_2P | FIRST_ Positive LVDS differential data input | |
| 7 | GND | Power Ground | |
| 8 | R1_CLKN | FIRST_ Negative LVDS differential clock input | |
| 9 | R1_CLKP | FIRST_ Positive LVDS differential clock input | |
| 10 | GND | Power Ground | |
| 11 | R1_3N | FIRST_ Negative LVDS differential data input | |
| 12 | R1_3P | FIRST_ Positive LVDS differential data input | |
| 13 | R1_4N | FIRST_ Negative LVDS differential data input | |
| 14 | R1_4P | FIRST_ Positive LVDS differential data input | |
| 15 | GND | Power Ground | |
| 16 | R2_0N | SECOND_ Negative LVDS differential data input | LVDS port 2 |
| 17 | R2_0P | SECOND_ Positive LVDS differential data input | |
| 18 | R2_1N | SECOND_ Negative LVDS differential data input | |
| 19 | R2_1P | SECOND_ Positive LVDS differential data input | |
| 20 | R2_2N | SECOND_ Negative LVDS differential data input | |
| 21 | R2_2P | SECOND_ Positive LVDS differential data input | |
| 22 | GND | Power Ground | |
| 23 | R2_CLKN | SECOND_ Negative LVDS differential clock input | |
| 24 | R2_CLKP | SECOND_ Positive LVDS differential clock input | |
| 25 | GND | Power Ground | |
| 26 | R2_3N | SECOND_ Negative LVDS differential data input | |
| 27 | R2_3P | SECOND_ Positive LVDS differential data input | |
| 28 | R2_4N | SECOND_ Negative LVDS differential data input | |
| 29 | R2_4P | SECOND_ Positive LVDS differential data input | |
| 30 | GND | Power Ground | |

Module Connector - CNT2

| PIN # | Signal Name | Description | Function |
|---|---|---|---|
| 1 | R3_0N | THIRD_ Negative LVDS differential data input | LVDS port 3 |
| 2 | R3_0P | THIRD_ Positive LVDS differential data input | |
| 3 | R3_1N | THIRD_ Negative LVDS differential data input | |
| 4 | R3_1P | THIRD_ Positive LVDS differential data input | |
| 5 | R3_2N | THIRD_ Negative LVDS differential data input | |
| 6 | R3_2P | THIRD_ Positive LVDS differential data input | |
| 7 | GND | Power Ground | |
| 8 | R3_CLKN | THIRD_ Negative LVDS differential clock input | |
| 9 | R3_CLKP | THIRD_ Positive LVDS differential clock input | |
| 10 | GND | Power Ground | |
| 11 | R3_3N | THIRD_ Negative LVDS differential data input | |
| 12 | R3_3P | THIRD_ Positive LVDS differential data input | |
| 13 | R3_4N | THIRD_ Negative LVDS differential data input | |
| 14 | R3_4P | THIRD_ Positive LVDS differential data input | |
| 15 | GND | Power Ground | |
| 16 | R4_0N | FOURTH_ Negative LVDS differential data input | LVDS port 4 |
| 17 | R4_0P | FOURTH_ Positive LVDS differential data input | |
| 18 | R4_1N | FOURTH_ Negative LVDS differential data input | |
| 19 | R4_1P | FOURTH_ Positive LVDS differential data input | |
| 20 | R4_2N | FOURTH_ Negative LVDS differential data input | |
| 21 | R4_2P | FOURTH_ Positive LVDS differential data input | |
| 22 | GND | Power Ground | |
| 23 | R4_CLKN | FOURTH_ Negative LVDS differential clock input | |
| 24 | R4_CLKP | FOURTH_ Positive LVDS differential clock input | |
| 25 | GND | Power Ground | |
| 26 | R4_3N | FOURTH_ Negative LVDS differential data input | |
| 27 | R4_3P | FOURTH_ Positive LVDS differential data input | |
| 28 | R4_4N | FOURTH_ Negative LVDS differential data input | |
| 29 | R4_4P | FOURTH_ Positive LVDS differential data input | |
| 30 | GND | Power Ground | |
| 31 | NC | No connection (for AUO test only. Do not connect) | NC |
| 32 | NC | No connection (for AUO test only. Do not connect) | |
| 33 | GND | Power Ground | Power |
| 34 | GND | Power Ground | |
| 35 | GND | Power Ground | |
| 36 | VDD | Power +5V | |
| 37 | VDD | Power +5V | |
| 38 | VDD | Power +5V | |
| 39 | VDD | Power +5V | |
| 40 | VDD | Power +5V | |

VDD    R3_0N        GND    R1_0N

40    1        30    1

200.00(SHIPPING LABEL-X)    224.20(BLU LABEL-X)

SL

7.5T

BLU LABEL

(LVDS1&2-Y)

174.96±5.00  (LVDS2-X)

106.96±5.00  (LVDS1-X)

(14.03)    (14.03)

INPUT CONNECTOR FIRST PIN

10.6T
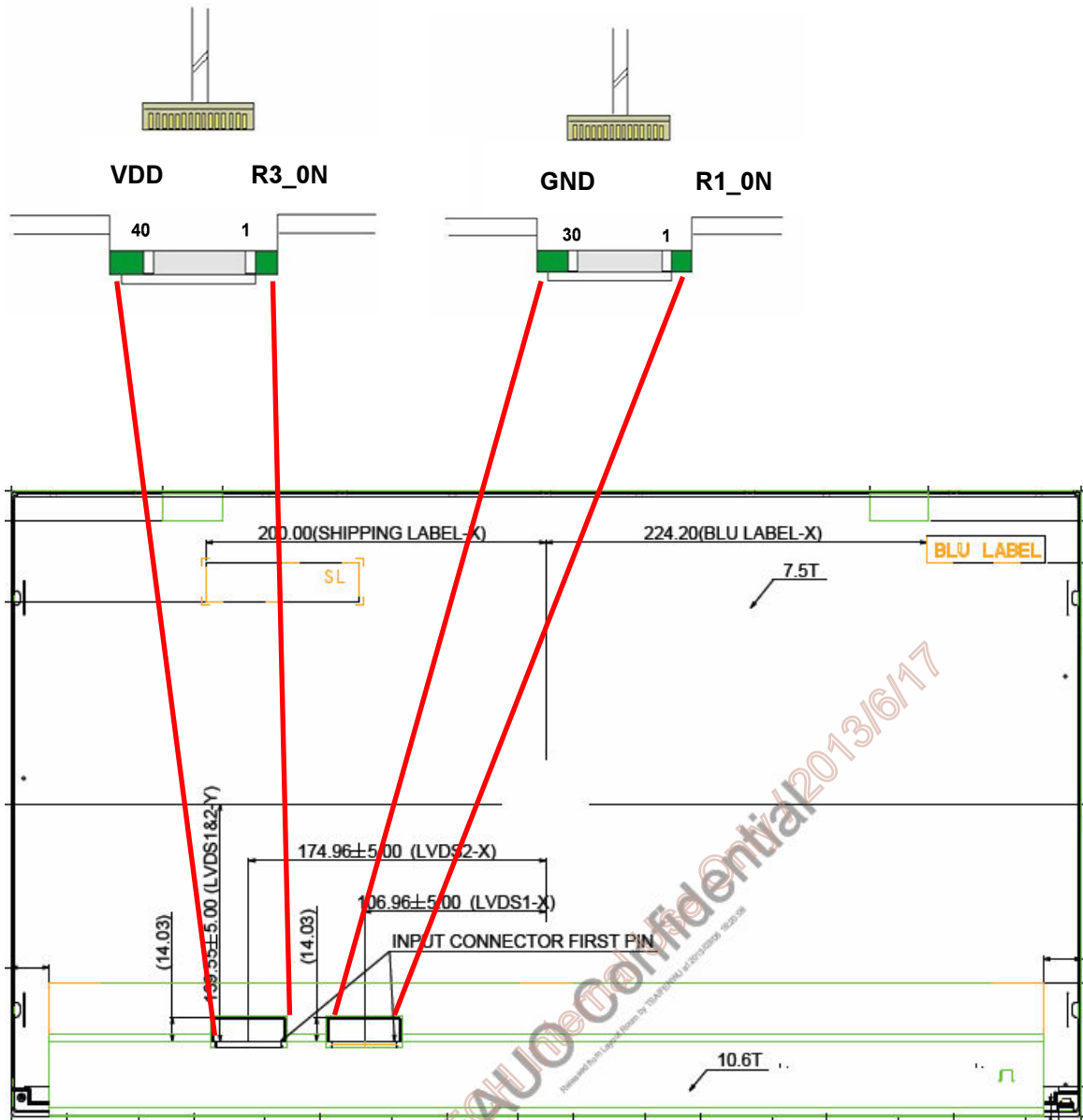
**Note 1:** Input signals of port 1 to port 4 clocks shall be the same timing.

## 6.4 Timing Characteristics

The input signal timing specifications are shown as the following table

| Signal | Item | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Vertical Section | Period | Tv | 1479 | 1481 | 1483 | Th |
| | Active | Tdisp(v) | 1440 | 1440 | 1440 | Th |
| | Blanking | Tbp(v)+Tfp(v)+PWvs | 39 | 41 | 43 | Th |
| Horizontal Section | Period | Th | 676 | 680 | 684 | Tclk |
| | Active | Tdisp(h) | 640 | 640 | 640 | Tclk |
| | Blanking | Tbp(h)+Tfp(h)+PWhs | 36 | 40 | 44 | Tclk |
| Clock | Period | Tclk | 22.22 | 16.56 | 13.16 | ns |
| | Frequency | Freq | 45 | 60.4 | 76 | MHz |
| Frame rate | Frame rate | F | 50 | 60 | 75 | Hz |
| Hsync Frequency | Hsync Frequency | HFreq | 73.9 | 88.8 | 111.2 | KHz |

**Note 1:** DE mode only

## 6.5   Timing Diagram
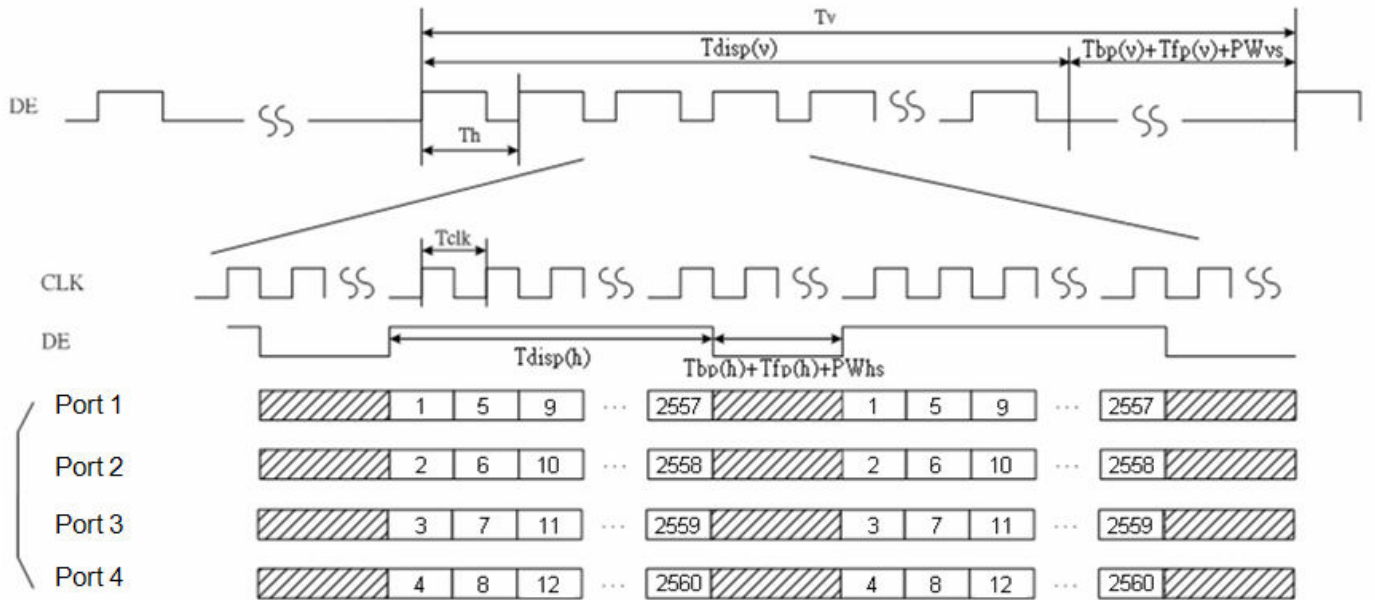
## 6.6 Power ON/OFF Sequence

VDD power and lamp on/off sequence are as follows. Interface signals are also shown in the chart. Signals from any system shall be Hi-Z state when VDD is off.
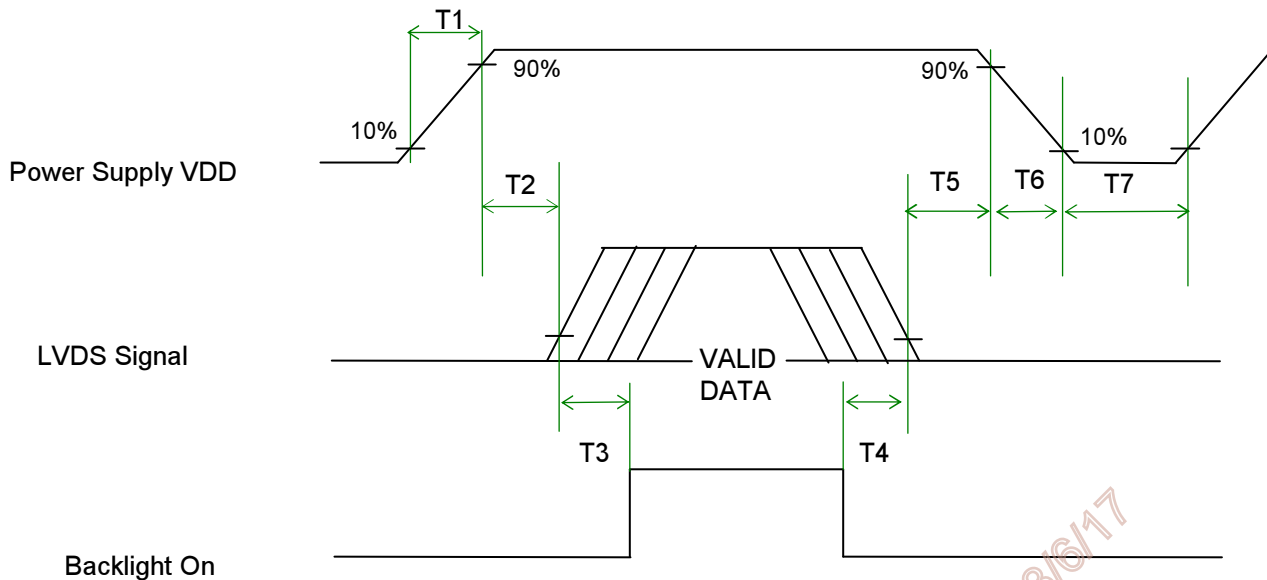


**Power Sequence Timing**

| Parameter | Value | | | Unit |
|:---:|:---:|:---:|:---:|:---:|
| | **Min.** | **Typ.** | **Max.** | |
| T1 | 0.5 | - | 10 | [ms] |
| T2 | 0 | - | 50 | [ms] |
| T3 | 500 | - | - | [ms] |
| T4 | 100 | - | - | [ms] |
| T5 | 0 | - | 50 | [ms]<br>*Note1,2* |
| T6 | 5 | - | 150 | [ms]<br>*Note1,2* |
| T7 | 1000 | - | - | [ms] |

*Note1 :* Recommend setting T5 = 0ms to avoid electronic noise when VDD is off.

*Note2 :* During T5 and T6 period , please keep the level of input LVDS signals with Hi-Z state.

## 7   Connector and Pin Assignment

Physical interface is described as for the connector on module. These connectors are capable of accommodating the following signals and will be following components.

### 7.1   TFT LCD Module

| Connector Name / Designation | Interface Connector / Interface Card |
|---|---|
| Manufacturer | CNT1: STM/ P-TOW/ STARCONN<br>CNT2: STARCONN |
| Type Part Number | CNT1: STM_MSCKT2407P30HB<br>　　　 P-TOW_AL230F-A0G1D-P<br>　　　 STARCONN_093G30-02001A-M4<br>CNT2: STARCONN_115F40-R000RA-M3 |
| Mating Housing Part Number | CNT1: JAE_FI-X30HL<br>　　　 STM_PK2407P30V<br>CNT2: FI-NX40HL |

### 7.1.1   Pin Assignment

Module Connector - CNT1

| Pin# | Signal Name | Pin# | Signal Name |
|---|---|---|---|
| 1 | R1_0N | 2 | R1_0P |
| 3 | R1_1N | 4 | R1_1P |
| 5 | R1_2N | 6 | R1_2P |
| 7 | GND | 8 | R1_CLKN |
| 9 | R1_CLKP | 10 | GND |
| 11 | R1_3N | 12 | R1_3P |
| 13 | R1_4N | 14 | R1_4P |
| 15 | GND | 16 | R2_0N |
| 17 | R2_0P | 18 | R2_1N |
| 19 | R2_1P | 20 | R2_2N |
| 21 | R2_2P | 22 | GND |
| 23 | R2_CLKN | 24 | R2_CLKP |
| 25 | GND | 26 | R2_3N |
| 27 | R2_3P | 28 | R2_4N |
| 29 | R2_4P | 30 | GND |

Module Connector - CNT2

| Pin# | Signal Name | Pin# | Signal Name |
|---|---|---|---|
| 1 | R3_0N | 2 | R3_0P |
| 3 | R3_1N | 4 | R3_1P |
| 5 | R3_2N | 6 | R3_2P |
| 7 | GND | 8 | R3_CLKN |
| 9 | R3_CLKP | 10 | GND |
| 11 | R3_3N | 12 | R3_3P |
| 13 | R3_4N | 14 | R3_4P |
| 15 | GND | 16 | R4_0N |
| 17 | R4_0P | 18 | R4_1N |
| 19 | R4_1P | 20 | R4_2N |
| 21 | R4_2P | 22 | GND |
| 23 | R4_CLKN | 24 | R4_CLKP |
| 25 | GND | 26 | R4_3N |
| 27 | R4_3P | 28 | R4_4N |
| 29 | R4_4P | 30 | GND |
| 31 | NC | 32 | NC |
| 33 | GND | 34 | GND |
| 35 | GND | 36 | VDD |
| 37 | VDD | 38 | VDD |
| 39 | VDD | 40 | VDD |

## 7.2 LED Connector on Backlight Unit

This connector is mounted on LED light bar.

| Connector Name / Designation | Light Bar Connector |
|---|---|
| Manufacturer | E&T(ENTERY) |
| Type Part Number | 3707K-S06N-21R |
| Mating Housing Part Number | H112K-P06N-13B (Locked Type) |

### 7.2.1 LED Pin assignment

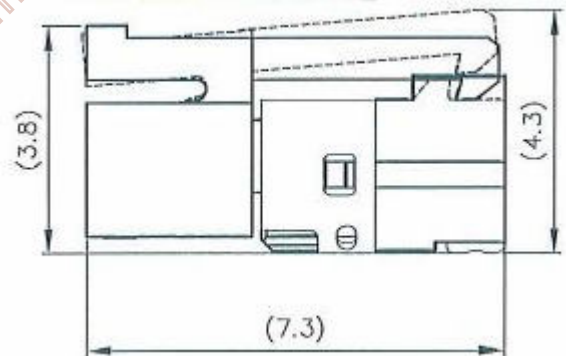| Pin# | Signal Name |
|---|---|
| 1 | IRLED1 (current out) |
| 2 | IRLED2 (current out) |
| 3 | VLED (voltage in) |
| 4 | VLED (voltage in) |
| 5 | IRLED3 (current out) |
| 6 | IRLED4 (current out) |
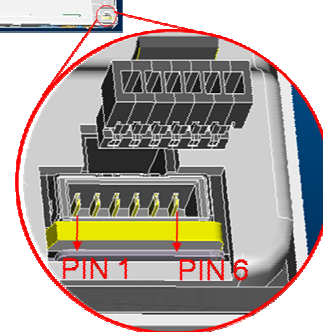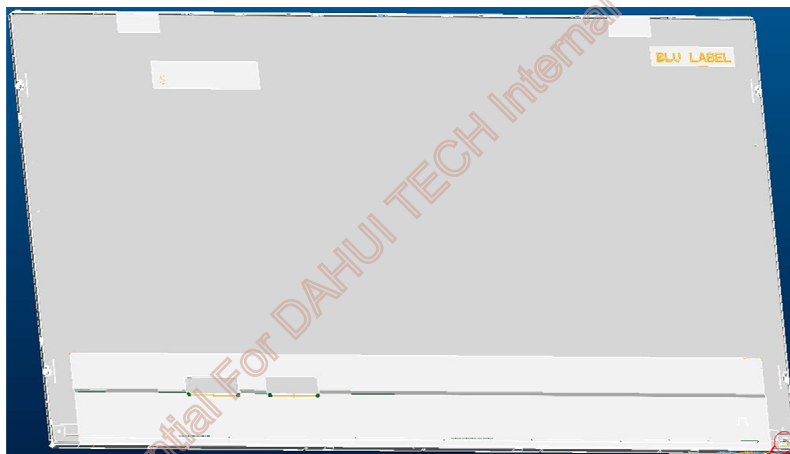
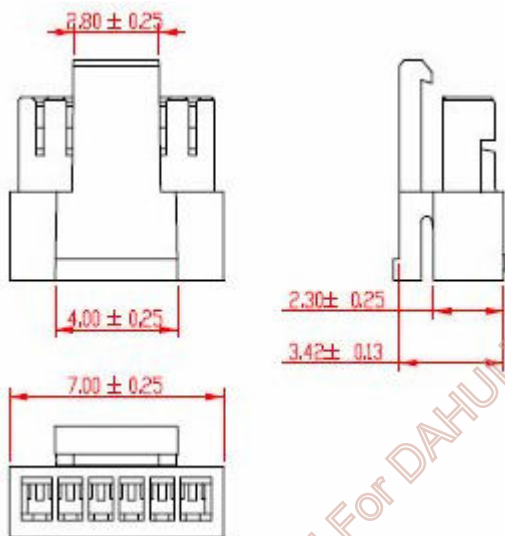### 7.2.2 LED Connector Dimension

$$H \times V \times D = 13.9 \times 3.00 \times 4.25, Pitch = 1.0(unit = mm)$$
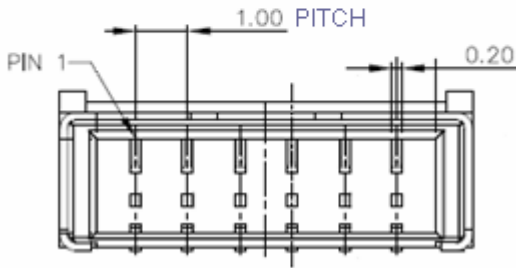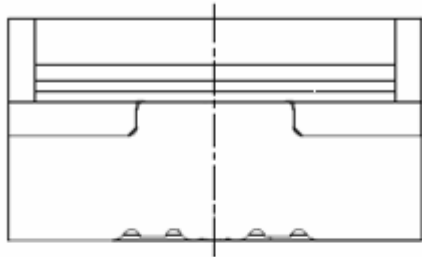
### 7.2.3 LED Mating housing dimension

## 8  Reliability Test

Environment test conditions are listed as following table.

| Items | Required Condition | Note |
|---|---|---|
| Temperature Humidity Bias (THB) | Ta= 50°C, 80%RH, 300 hours | |
| High Temperature Operation (HTO) | Ta= 50°C, 50%RH, 300 hours | |
| Low Temperature Operation (LTO) | Ta= 0°C, 300 hours | |
| High Temperature Storage (HTS) | Ta= 60°C, 300 hours | |
| Low Temperature Storage (LTS) | Ta= -20°C, 300 hours | |
| Vibration Test (Non-operation) | Acceleration: 1.5 Grms<br>Wave: Random<br>Frequency: 10 - 200 Hz<br>Duration: 30 Minutes each Axis (X, Y, Z) | |
| Shock Test (Non-operation) | Acceleration: 50 G<br>Wave: Half-sine<br>Active Time: 20 ms<br>Direction: ±X, ±Y, ±Z (one time for each Axis) | |
| Drop Test | Height: 46 cm, package test | |
| Thermal Shock Test (TST) | -20°C/30min, 60°C/30min, 100 cycles | *Note 1* |
| On/Off Test | On/10sec, Off/10sec, 30,000 cycles | |
| ESD (Electro Static Discharge) | Contact Discharge: ± 8KV, 150pF(330Ω ) 1sec, 15 points, 25 times/ point | *Note 2* |
| | Air Discharge: ± 15KV, 150pF(330Ω ) 1sec 15 points, 25 times/ point | |
| Altitude Test | Operation: 18,000 ft<br>Non-Operation: 40,000 ft | |

**Note 1:** The TFT-LCD module will not sustain damage after being subjected to 100 cycles of rapid temperature change. A cycle of rapid temperature change consists of varying the temperature from -20°C to 60°C, and back again. Power is not applied during the test. After temperature cycling, the unit is placed in normal room ambient for at least 4 hours before power on.

**Note 2:** EN61000-4-2, ESD class B: Certain performance degradation allowed:
> ➤  No data lost
> ➤  Self-recoverable
> ➤  No hardware failures

## 9  Shipping Label

The label on the panel is shown as below:
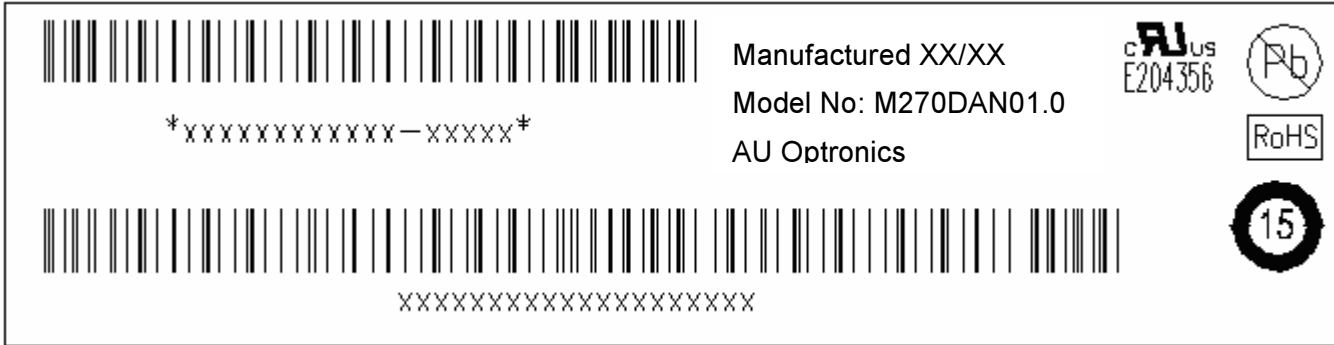


**Note 1:** For Pb Free products, AUO will add ⓟ̶ḃ for identification.

**Note 2:** For RoHS compatible products, AUO will add RoHS for identification.

**Note 3:** For China RoHS compatible products, AUO will add ⑮ for identification.

**Note 4:** The Green Mark will be presented only when the green documents have been ready by AUO Internal Green Team.

![AUO logo]

**Product Specification**

AU OPTRONICS CORPORATION

M270DAN01.0

**10 Mechanical Characteristics**
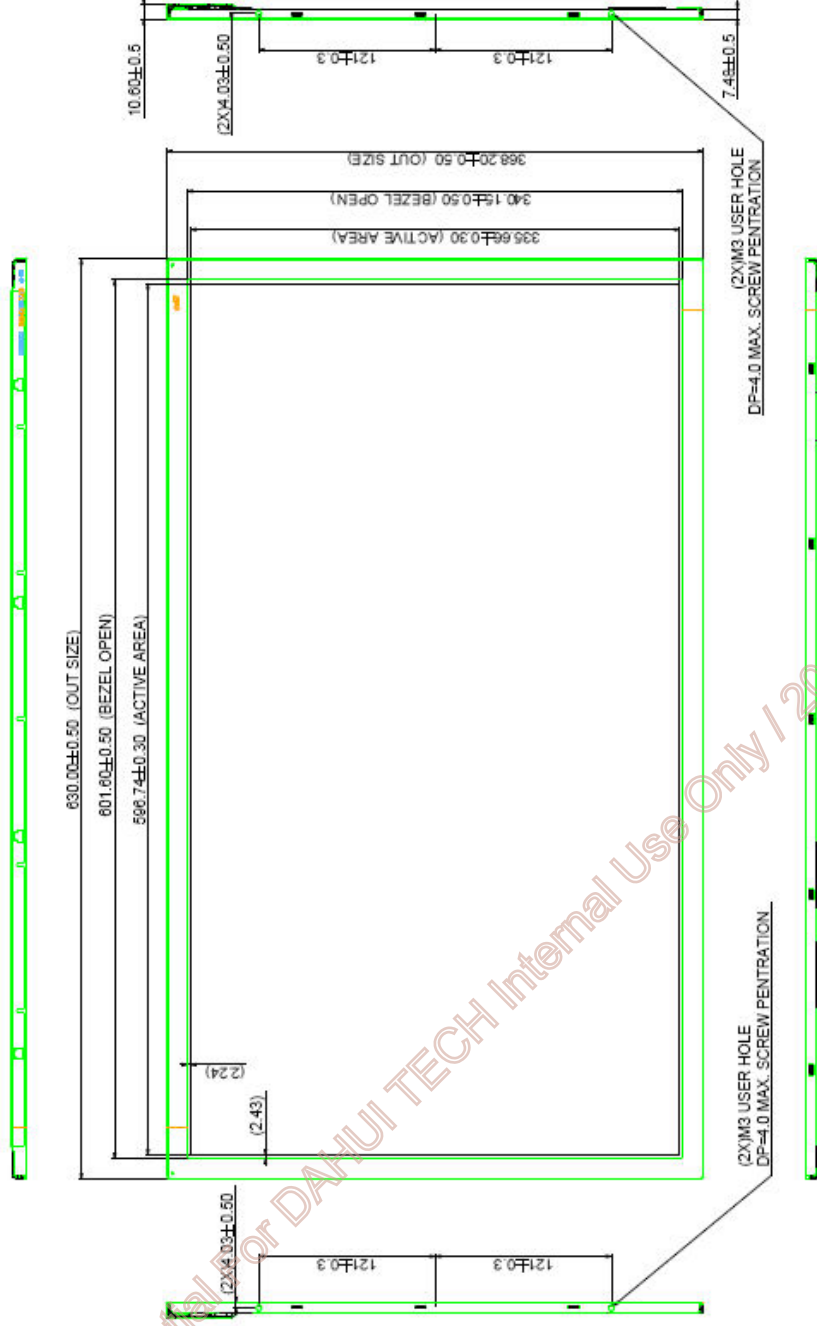


NOTE:
1. TOLERANCE WITHOUT NOTICED TO BE ± 0.5MM.
2. THE DIMENSION EXCLUDES DEFORMATION.
3. BACKLIGHT:LED LIGHT-BAR.
4. MODULE THICKNESS TO BE 11.1MM MAX.
5. LVDS CONNECTOR 1 TO BE STM MSCKT240TP30HB.
6. LVDS CONNECTOR 2 TO BE STARCONN 115F40-R000RA-M3.
7. LIGHT-BAR CONNECTOR TO BE ENTERY 3707K-S06N-21R (6PIN).
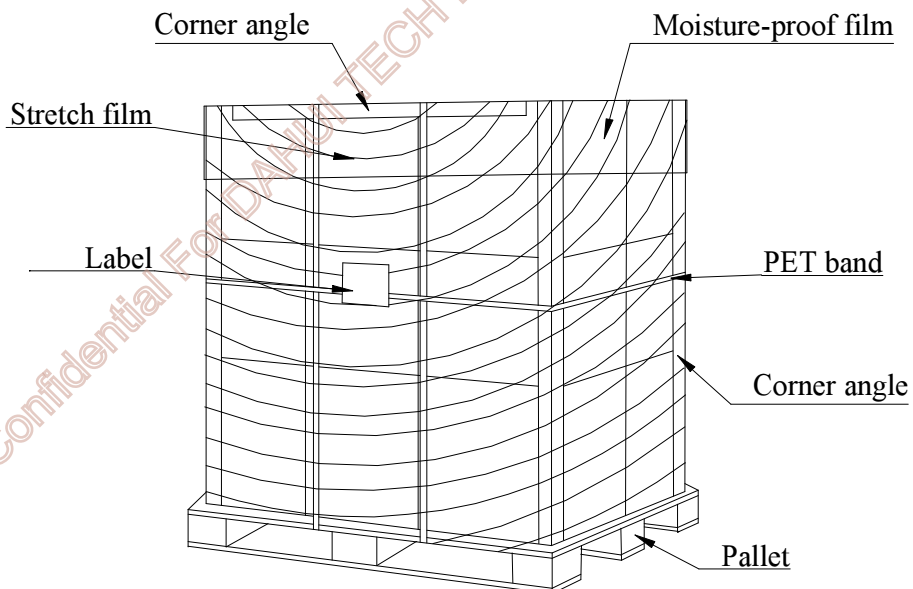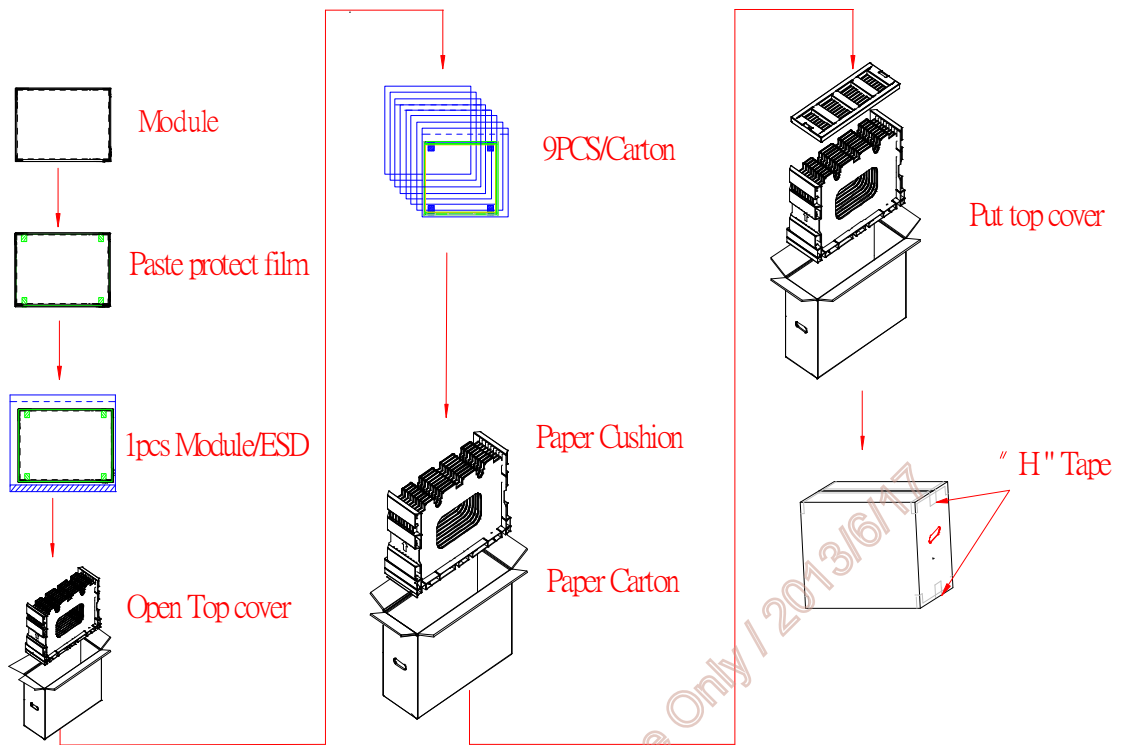8. TORQUE OF M3 USER HOLE SHOULD BE WHITIN 3KGF-CM AND RE-SCREW 10 TIMES.

**Avoid stressing front bezel position when doing mechanical design**

document version 0.6
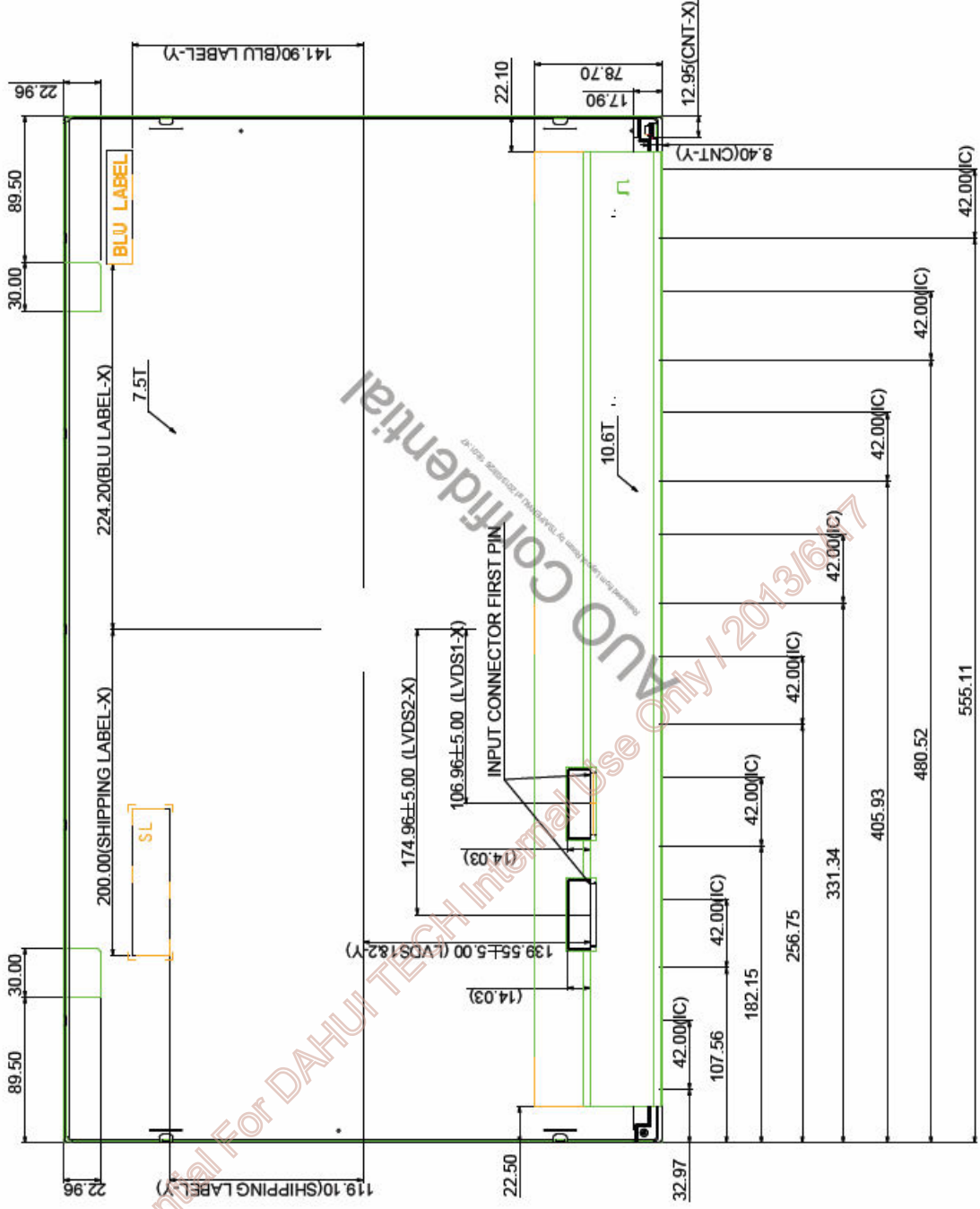
Avoid Touching IC Position When Doing Mechanical Design

# 11 Packing Specification

## 11.1 Packing Flow

Module

Paste protect film

1pcs Module/ESD

Open Top cover

9PCS/Carton

Paper Cushion

Paper Carton

Put top cover

″H″Tape

Corner angle

Moisture-proof film

Stretch film

Label

PET band

Corner angle

Pallet

## 11.2 Pallet and Shipment Information

| | Item | Specification | | | Remark |
|---|---|---|---|---|---|
| | | Q'ty | Dimension | Weight(kg) | |
| 1 | Panel | 1 | 630.0(H)mm x 368.2(V)mm x 10.6(D)mm | 2.319 | *Note 1* |
| 2 | Cushion | 1 | - | 4.41 | |
| 3 | Box | 1 | 720(L)mm x 264(W)mm x 460(H)mm | 1.35 | without Panel & cushion *Note 1* |
| 4 | Packing Box | 9 pcs/Box | 720(L)mm x 264(W)mm x 460(H)mm | 26.424 | with panel & cushion *Note 1* |
| 5 | Pallet | 1 | 1070(L)mm x 740(W)mm x 138(H)mm | 13.85 | *Note 1* |
| 6 | Pallet after Packing | 8 boxes/pallet | 1070(L)mm x 740(W)mm x 1060(H)mm | 225.24 | *Note 1* |

*Note 1*: Estimated value which is subject to change based on real measured data.