



# Product Specification

AU Optronics Corporation

B133EW03 V0

(V) Preliminary Specifications

( ) Final Specifications

|            |                          |
|------------|--------------------------|
| Module     | 13.3" WXGA Color TFT-LCD |
| Model Name | B133EW03 V0              |

|   |                            |                                   |                            |
|---|----------------------------|-----------------------------------|----------------------------|
| <b>Customer</b><br><hr/> <hr/>                                | <b>Date</b><br><hr/> <hr/> | <b>Approved by</b><br><hr/> <hr/> | <b>Date</b><br><hr/> <hr/> |
| <b>Checked &amp; Approved by</b><br><hr/> <hr/>               |                            | <b>Prepared by</b><br><hr/> <hr/> |                            |
| Note: This Specification is subject to change without notice. |                            |                                   |                            |
| NBBU Marketing Division /<br>AU Optronics corporation         |                            |                                   |                            |



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## Contents Record of Revision

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| Version and Date | Page | Old description            | New Description | Remark |
|------------------|------|----------------------------|-----------------|--------|
| 0.1 2007/06/25   | All  | First Edition for Customer |                 |        |
|                  |      |                            |                 |        |
|                  |      |                            |                 |        |
|                  |      |                            |                 |        |



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## 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 nor modify the Module Assembly.
- 8) Do not press the reflector sheet at the back of the module to any directions.
- 9) At the insertion or removal of the Signal Interface Connector, be sure not to rotate nor tilt the Interface Connector of the TFT Module.
- 10) After installation of the TFT Module into an enclosure (Notebook PC Bezel, for example), 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.
- 11) 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.



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## 2. General Description

B133EW03 V0 is a Color Active Matrix Liquid Crystal Display composed of a TFT LCD panel, a driver circuit, and backlight system. The screen format is intended to support the WXGA (1280(H) x 800(V)) screen and 262k colors (RGB 6-bits data driver). All input signals are LVDS interface compatible. Inverter of backlight is not included.

B133EW03 V0 is designed for a display unit of notebook style personal computer and industrial machine.

### 2.1 General Specification

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

| Items   | Unit                 | Specifications  |
|---|----------------------|---|
| Screen Diagonal   | [mm]                 | 337.8 (13.3 W")   |
| Active Area   | [mm]                 | 286.08 (H) x 178.8 (V)                                    |
| Pixels H x V  |                      | 1280x3 (RGB) x 800  |
| Pixel Pitch   | [mm]                 | 0.2235 x 0.2235   |
| Pixel Arrangement   |                      | R.G.B. Vertical Stripe                                    |
| Display Mode  |                      | Normally White  |
| White Luminance<br>(ILED=16.0mA)                          | [cd/m <sup>2</sup> ] | 330Typ. (5 points average)<br>270 Min. (5 points average) |
| Luminance Uniformity                                      |                      | 1.8 max. (5 points)                                       |
| Contrast Ratio  |                      | 500:1 Typ.,300:1 Min.                                     |
| Backlight Mode  |                      | LED ( X54 )   |
| Optical Rise Time/Fall Time                               | [msec]               | 16 Typ., 25 Max.  |
| Nominal Input Voltage VDD                                 | [Volt]               | +3.3 Typ.   |
| Power Consumption   | [Watt]               | Logic 0.7W; BLU 3.5W(max)                                 |
| Weight  | [Grams]              | 210 g Typ., 225g Max.                                     |
| Physical Size   | [mm]                 | 297.15 (W) x 203.15 (H) x 2.7 (T) Typ.                    |
| Electrical Interface                                      |                      | R/G/B Data, 3 Sync, Signals, Clock (4 pairs LVDS)         |
| Surface Treatment   |                      | Hard coating 3H, Glare type,                              |
| Support Color   |                      | 262K colors ( RGB 6-bit )                                 |
| Temperature Range<br>Operating<br>Storage (Non-Operating) | [°C]<br>[°C]         | 0 to +50<br>-20 to +60                                    |
| RoHS Compliance   |                      | RoHS Compliance   |



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## 2.2 Optical Characteristics

The optical characteristics are measured under stable conditions at 25°C ( Room Temperature ) :

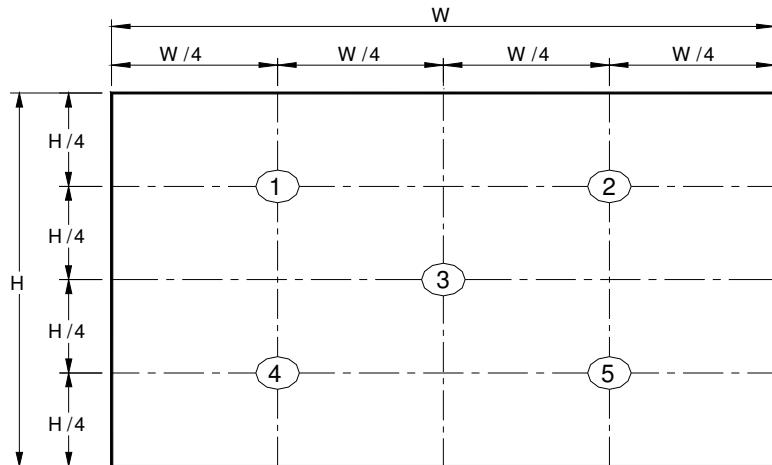
| Item   | Unit                 | Conditions         | Min.  | Typ.  | Max.  | Note     |
|--|----------------------|--------------------|-------|-------|-------|----------|
| White Luminance<br>I <sub>F</sub> =20mA                | [cd/m <sup>2</sup> ] | 5 points average   | 270   | 330   | -     | 1, 4, 5. |
| Viewing Angle<br>(6 O'clock direction)                 | [degree]             | Horizontal (Right) | 60    | 75    | -     | 9        |
|  | [degree]             | CR = 10 (Left)     | 60    | 75    | -     |          |
|  | [degree]             | Vertical (Upper)   | 55    | 65    | -     |          |
|  | [degree]             | CR = 10 (Lower)    | 50    | 60    | -     |          |
| Luminance Uniformity                                   |                      | 5 Points           |       |       | 1.25  | 1        |
| Luminance Uniformity                                   |                      | 13 Points          |       |       | 1.80  | 2        |
| CR: Contrast Ratio                                     |                      |                    | 300   | 500   | -     | 6        |
| Cross talk   | %                    |                    |       |       | 1.4   | 7        |
| Response Time  | [msec]               | Rising             | -     | 5     | 10    | 8        |
|  | [msec]               | Falling            | -     | 11    | 15    |          |
|  | [msec]               | Rising + Falling   |       | 16    | 25    |          |
| Color/Chromaticity-- Panel<br>Coordinates ( CIE 1391 ) |                      | White x            | 0.283 | 0.313 | 0.343 |          |
|  |                      | White y            | 0.299 | 0.329 | 0.359 |          |
| Color / Chromaticity-- LED<br>Coordinates ( CIE 1391 ) |                      | Rx                 | 0.570 | 0.600 | 0.630 |          |
|  |                      | Ry                 | 0.315 | 0.345 | 0.375 |          |
|  |                      | Gx                 | 0.290 | 0.320 | 0.350 |          |
|  |                      | Gy                 | 0.525 | 0.555 | 0.580 |          |
|  |                      | Bx                 | 0.120 | 0.150 | 0.180 |          |
|  |                      | By                 | 0.090 | 0.120 | 0.150 |          |



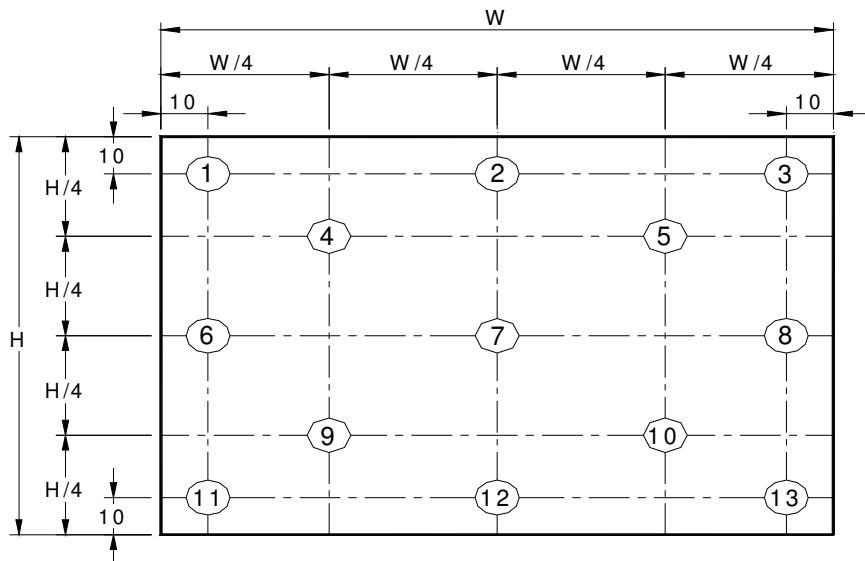
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Note 2: 13 points position



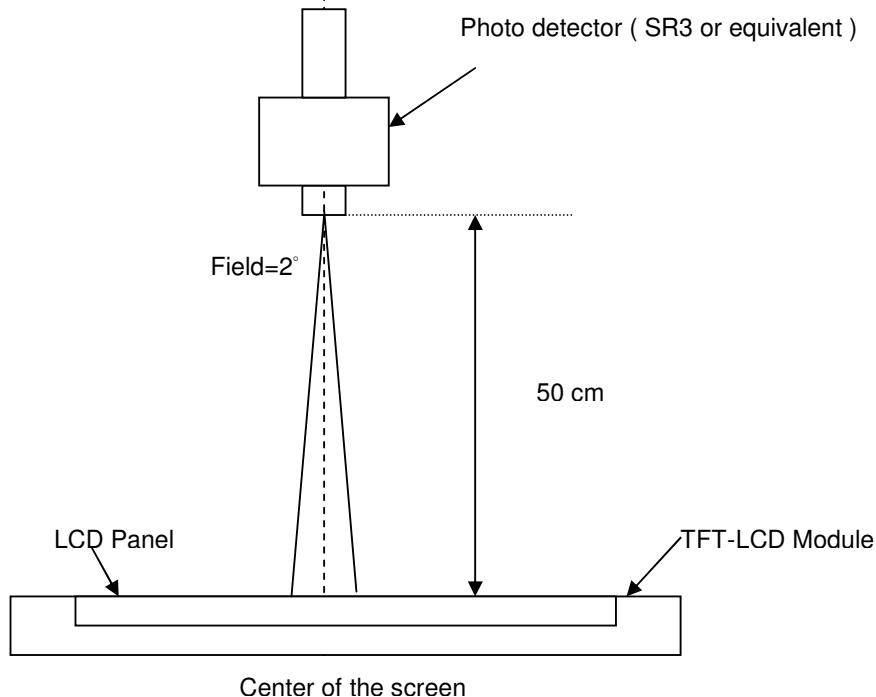
Note 3: The luminance uniformity of 5 and 13 points is defined by dividing the maximum luminance values by the minimum test point luminance

$$\delta_{W5} = \frac{\text{Maximum Brightness of five points}}{\text{Minimum Brightness of five points}}$$

$$\delta_{W13} = \frac{\text{Maximum Brightness of thirteen points}}{\text{Minimum Brightness of thirteen points}}$$

**Note 4: Measurement method**

The LCD module should be stabilized at given temperature for 30 minutes to avoid abrupt temperature change during measuring. 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 5 : Definition of Average Luminance of White ( $Y_L$ ) :**

Measure the luminance of gray level 63 at 5 points ,  $Y_L = [L_1 + L_2 + L_3 + L_4 + L_5] / 5$   
 $L_x$  is corresponding to the luminance of the point X at Figure in Note (1).

**Note 6 : Definition of contrast ratio:**

Contrast ratio is calculated with the following formula.

$$\text{Contrast ratio (CR)} = \frac{\text{Brightness on the "White" state}}{\text{Brightness on the "Black" state}}$$

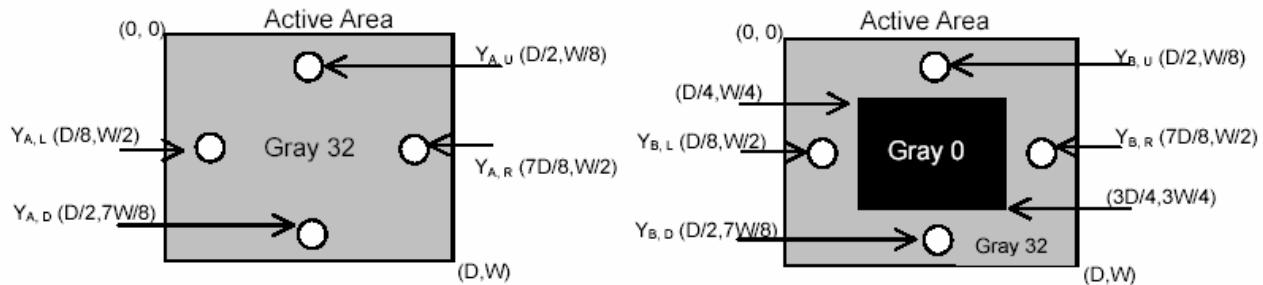
Note 7 : Definition of Cross Talk (CT)

$$CT = |Y_B - Y_A| / Y_A \times 100 \text{ (%)}$$

Where

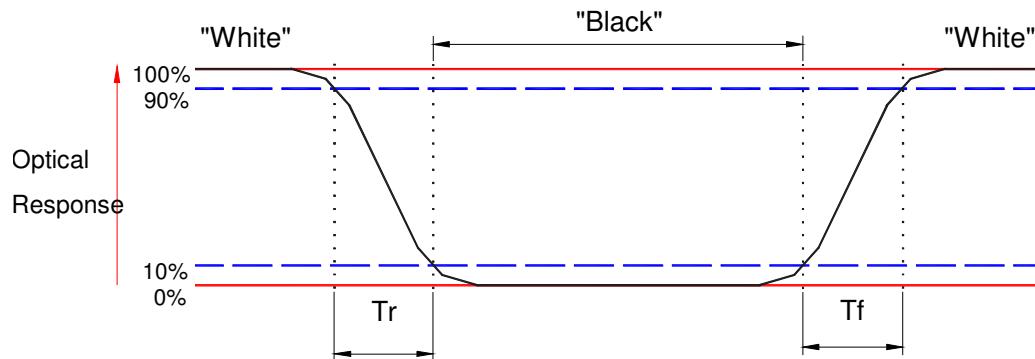
$Y_A$  = Luminance of measured location without gray level 0 pattern (cd/m<sup>2</sup>)

$Y_B$  = Luminance of measured location with gray level 0 pattern (cd/m<sup>2</sup>)



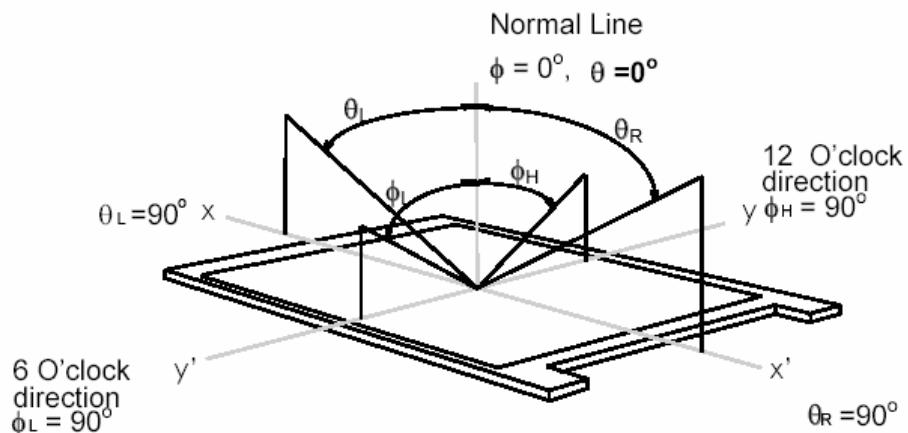
Note 8: Definition of response time:

The output signals of BM-7 or equivalent 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 interval between the 10% and 90% of amplitudes. Refer to figure as below.



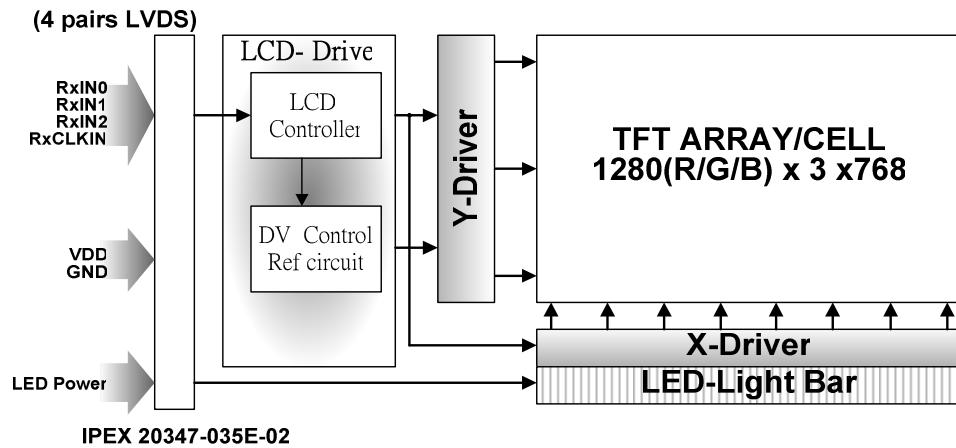
**Note 9. Definition of viewing angle**

Viewing angle is the measurement of contrast ratio  $\geq 10$ , at the screen center, over a  $180^\circ$  horizontal and  $180^\circ$  vertical range (off-normal viewing angles). The  $180^\circ$  viewing angle range is broken down as follows;  $90^\circ$  ( $\theta$ ) horizontal left and right and  $90^\circ$  ( $\phi$ ) 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.



### 3. Functional Block Diagram

The following diagram shows the functional block of the 13.3 inches wide Color TFT/LCD Module:





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## 4. Absolute Maximum Ratings

Absolute maximum ratings of the module are as following:

### 4.1 Absolute Rating of TFT LCD Module

| Item                    | Symbol | Min  | Max  | Unit   | Conditions |
|-------------------------|--------|------|------|--------|------------|
| Logic/LCD Drive Voltage | VDD    | -0.3 | +4.0 | [Volt] | Note 1,2   |

### 4.2 Absolute Rating of Backlight Unit

| Item        | Symbol | Min | Max | Unit | Conditions |
|-------------|--------|-----|-----|------|------------|
| LED Current | ILED   | -   | 30  | [mA] | Note 1,2   |

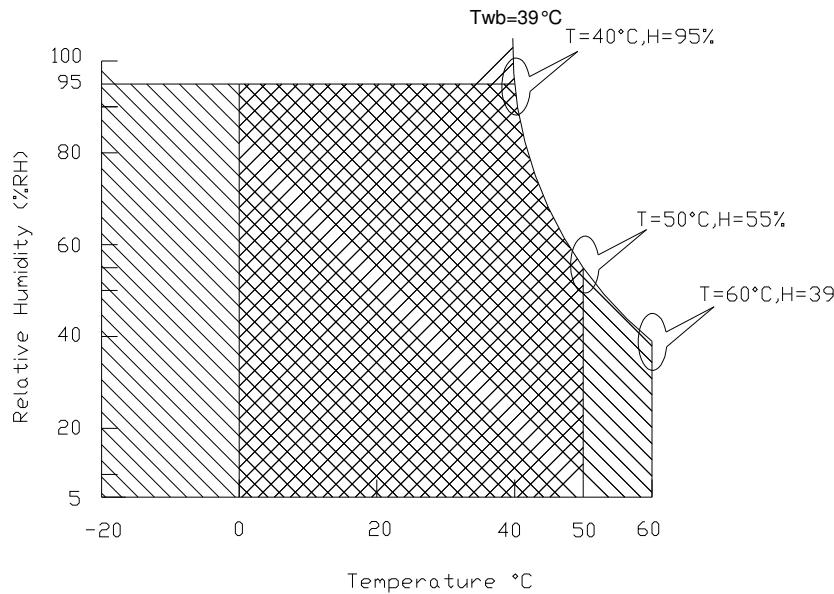
### 4.3 Absolute Ratings of Environment

| Item                  | Symbol | Min | Max | Unit  | Conditions |
|-----------------------|--------|-----|-----|-------|------------|
| Operating Temperature | TOP    | 0   | +50 | [°C]  | Note 3     |
| Operation Humidity    | HOP    | 5   | 95  | [%RH] | Note 3     |
| Storage Temperature   | TST    | -20 | +65 | [°C]  | Note 3     |
| Storage Humidity      | HST    | 5   | 95  | [%RH] | Note 3     |

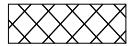
Note 1: At Ta (25°C)

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

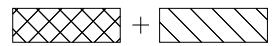
Note 3: For quality performance, please refer to AUO IIS ( Incoming Inspection Standard ) .



**Operating Range**



**Storage Range**



## 5. Electrical characteristics

### 5.1 TFT LCD Module

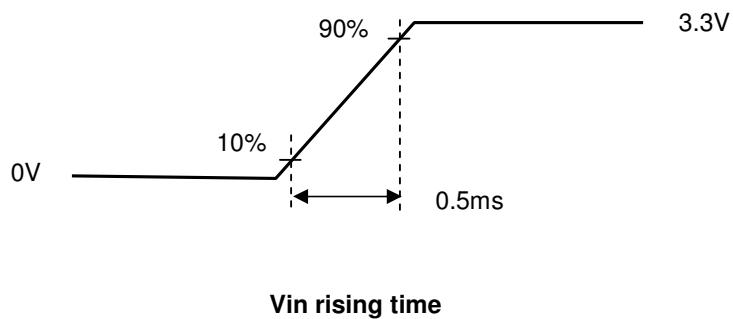
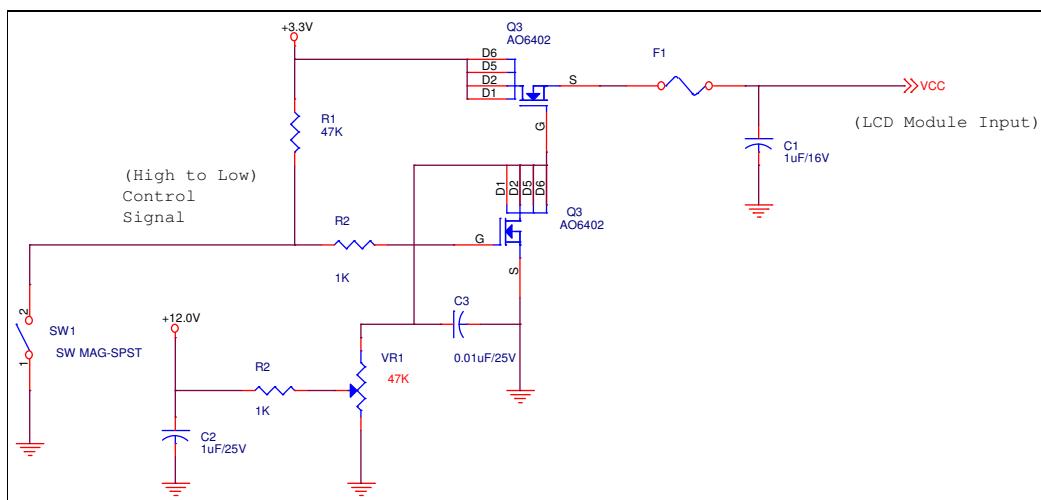
#### 5.1.1 Power Specification

Input power specifications are as follows;

| Symble | Parameter                                | Min | Typ  | Max | Units       | Note   |
|--------|--|-----|------|-----|-------------|--------|
| VDD    | Logic/LCD Drive Voltage                  | 3.0 | 3.3  | 3.6 | [Volt]      |        |
| PDD    | VDD Power                                |     | 0.7  | 1.0 | [Watt]      | Note 1 |
| IDD    | IDD Current                              |     | 270  | 330 | [mA]        | Note 1 |
| IRush  | Inrush Current                           |     | 0.81 | 1.5 | [A]         | Note 2 |
| VDDRp  | Allowable Logic/LCD Drive Ripple Voltage |     |      | 100 | [mV]<br>p-p |        |

Note 1 : Maximum Measurement Condition : Mosaic

Note 2 : Measure Condition



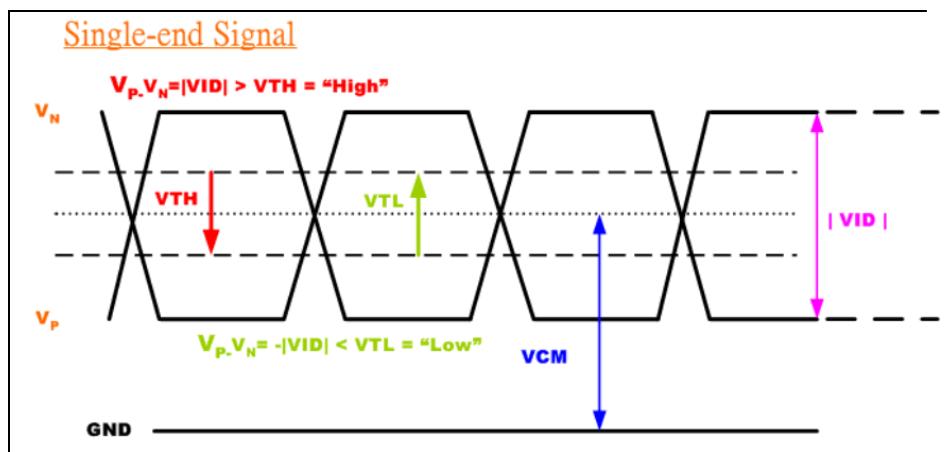
## 5.1.2 Signal Electrical Characteristics

Input signals shall be low or High-impedance state when VDD is off.

Signal electrical characteristics are as follows;

| Parameter | Condition  | Min  | Max | Unit |
|-----------|--|------|-----|------|
| Vth       | Differential Input High Threshold<br>(Vcm=+1.2V) |      | 100 | [mV] |
| Vtl       | Differential Input Low Threshold<br>(Vcm=+1.2V)  | -100 |     | [mV] |
| Vcm       | Differential Input Common Mode Voltage           | 0.8  | 2.0 | [V]  |

Note: LVDS Differential Voltage





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## 5.2 Backlight Unit

Parameter guideline for LED

| Parameter                           | Min | Typ | Max | Units                | Condition             |
|-------------------------------------|-----|-----|-----|----------------------|-----------------------|
| White Luminance<br>5 points average | 270 | 330 | -   | [cd/m <sup>2</sup> ] | ( Ta=25°C )           |
| LED current (ILED)                  | -   | 16  | -   | [mA]                 | ( Ta=25°C )<br>Note 2 |
| LED Power consumption               | -   | 3.3 |     | [Watt]               | ( Ta=25°C )<br>Note 6 |



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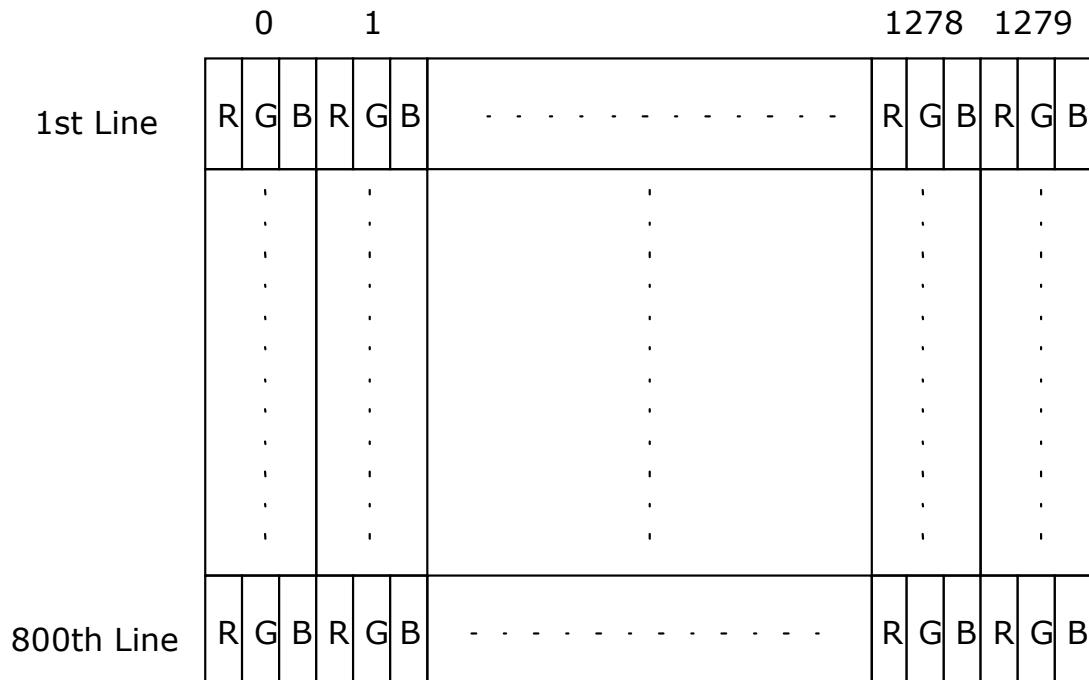
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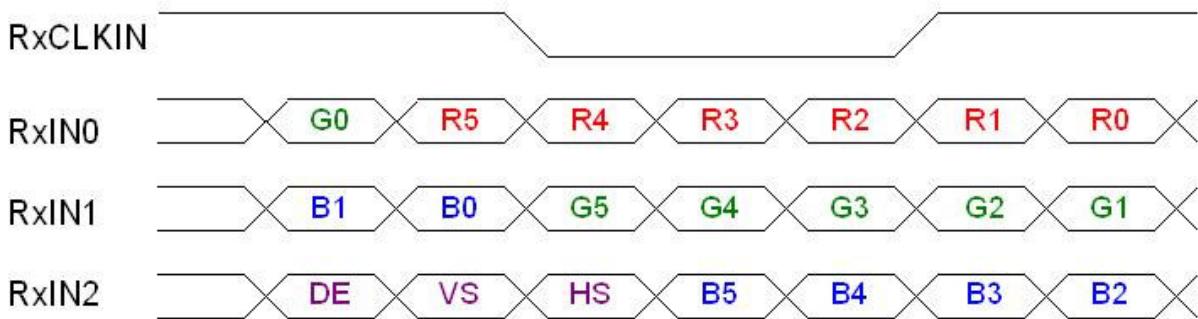
## 6. Signal Characteristic

### 6.1 Pixel Format Image

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



## 6.2 The input data format



| Signal Name                            | Description  |   |
|--|--|---|
| +R5<br>+R4<br>+R3<br>+R2<br>+R1<br>+R0 | Red Data 5 (MSB)<br>Red Data 4<br>Red Data 3<br>Red Data 2<br>Red Data 1<br>Red Data 0 (LSB)             | Red-pixel Data<br>Each red pixel's brightness data consists of these 6 bits pixel data.   |
| +G5<br>+G4<br>+G3<br>+G2<br>+G1<br>+G0 | Green Data 5 (MSB)<br>Green Data 4<br>Green Data 3<br>Green Data 2<br>Green Data 1<br>Green Data 0 (LSB) | Green-pixel Data<br>Each green pixel's brightness data consists of these 6 bits pixel data.   |
| +B5<br>+B4<br>+B3<br>+B2<br>+B1<br>+B0 | Blue Data 5 (MSB)<br>Blue Data 4<br>Blue Data 3<br>Blue Data 2<br>Blue Data 1<br>Blue Data 0 (LSB)       | Blue-pixel Data<br>Each blue pixel's brightness data consists of these 6 bits pixel data.   |
| RxCLKIN                                | Data Clock   | The signal is used to strobe the pixel data and DE signals. All pixel data shall be valid at the falling edge when the DE signal is high. |
| DE                                     | Display Timing   | This signal is strobed at the falling edge of RxCLKIN. When the signal is high, the pixel data shall be valid to be displayed.            |
| VS                                     | Vertical Sync  | The signal is synchronized to RxCLKIN.  |
| HS                                     | Horizontal Sync  | The signal is synchronized to RxCLKIN.  |

Note: Output signals from any system shall be low or High-impedance state when VDD is off.



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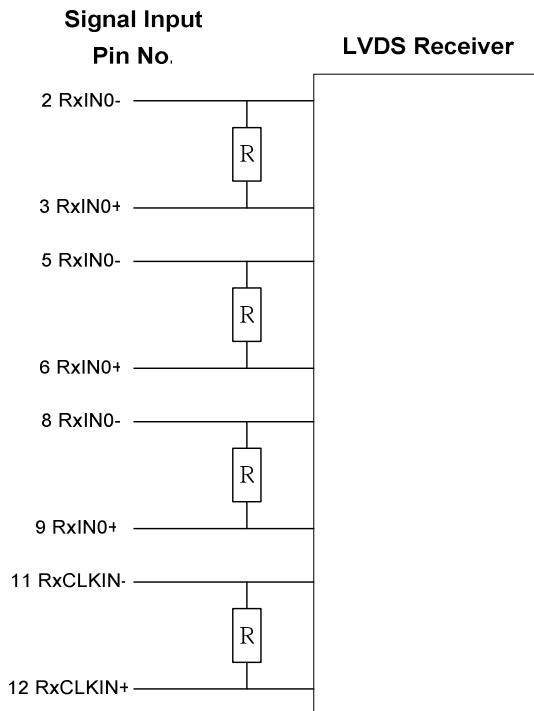
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## 6.3 Signal Description/Pin Assignment

TBD

Note2: Input signals shall be low or High-impedance state when VDD is off. Internal circuit of LVDS inputs are as following.



The module uses a 100ohm resistor between positive and negative data lines of each receiver input

## 6.4 Interface Timing

### 6.4.1 Timing Characteristics

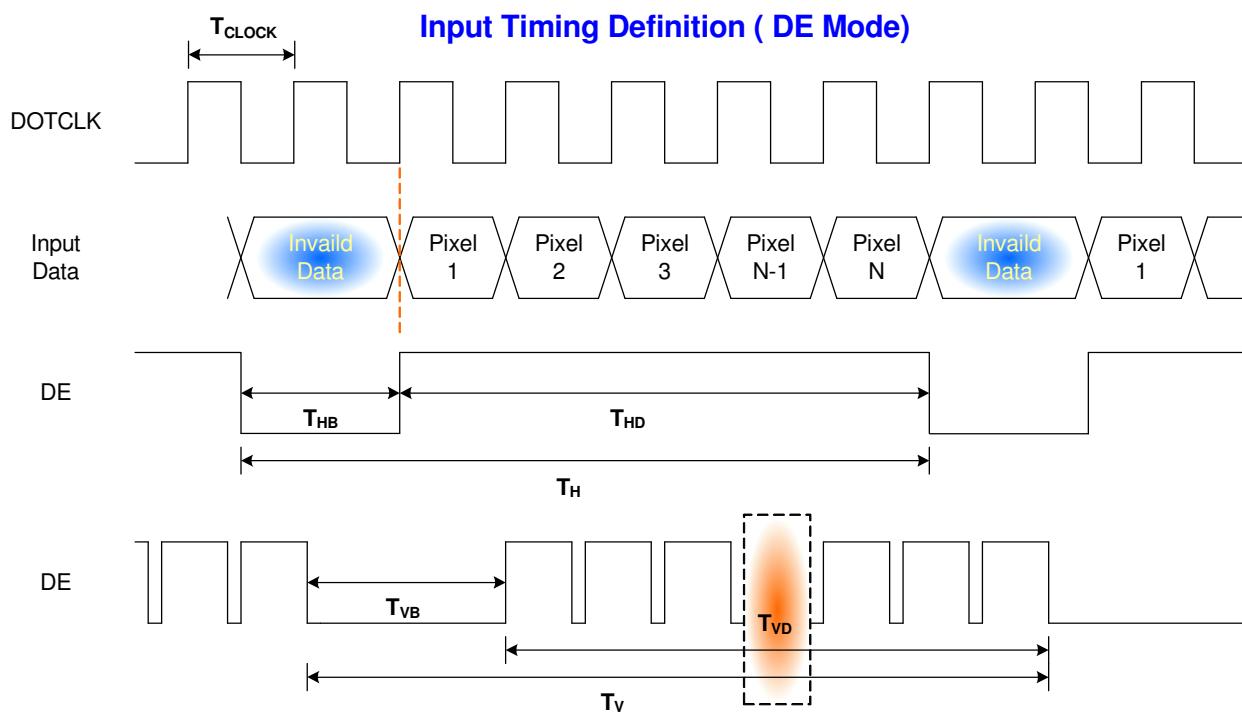
Basically, interface timings should match the 1280x800 /60Hz manufacturing guide line timing.

| Parameter          | Symbol        | Min.     | Typ. | Max. | Unit        |
|--------------------|---------------|----------|------|------|-------------|
| Frame Rate         | -             |          | 60   | -    | Hz          |
| Clock frequency    | $1/T_{Clock}$ |          | 71.1 |      | MHz         |
| Vertical Section   | Period        | $T_V$    | 803  | 823  | $T_{Line}$  |
|                    | Active        | $T_{VD}$ | 800  | 800  |             |
|                    | Blanking      | $T_{VB}$ | 3    | 23   |             |
| Horizontal Section | Period        | $T_H$    | 1303 | 1440 | $T_{Clock}$ |
|                    | Active        | $T_{HD}$ | 1280 | 1280 |             |
|                    | Blanking      | $T_{HB}$ | 23   | 160  |             |

SS: ±1.5%

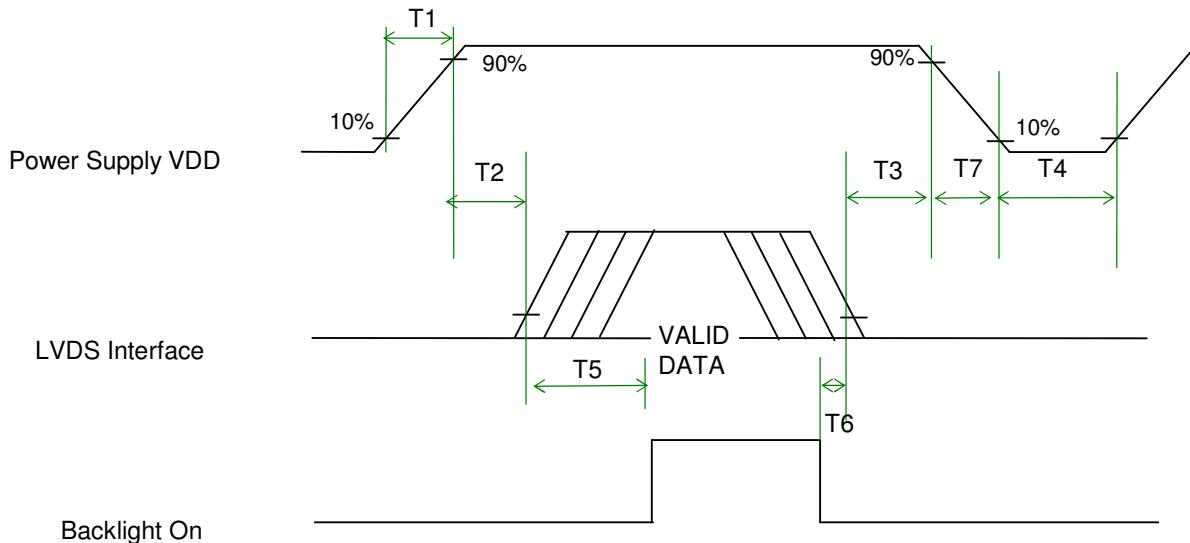
Note : DE mode only

### 6.4.2 Timing diagram



## 6.5 Power ON/OFF Sequence

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



## Power Sequence Timing

| Parameter | Value |      |      | Units |
|-----------|-------|------|------|-------|
|           | Min.  | Typ. | Max. |       |
| T1        | 0.5   | -    | 10   | (ms)  |
| T2        | 0     | -    | 50   | (ms)  |
| T3        | 0     | -    | 50   | (ms)  |
| T4        | 400   | -    | -    | (ms)  |
| T5        | 200   | -    | -    | (ms)  |
| T6        | 200   | -    | -    | (ms)  |
| T7        | 0     | -    | 10   | (ms)  |



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## 7. Connector Description

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 | For Signal Connector |
|------------------------------|----------------------|
| Manufacturer                 | IPEX                 |
| Type / Part Number           | 20347-330E-12        |
| Mating Connect/Part Number   | 20345-XX-XX          |



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## 8. Vibration and Shock Test

### 8.1 Vibration Test

#### Test Spec:

- Test method: Non-Operation
- Acceleration: TBD
- Frequency: TBD
- Sweep: TBD

### 8.2 Shock Test Spec:

#### Test Spec:

- Test method: Non-Operation
- Acceleration: TBD
- Active time: TBD
- Pulse: TBD



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## 9. Reliability

| Items                               | Required Condition                         | Note   |
|-------------------------------------|--|--------|
| Temperature Humidity Bias           | 40°C/90%,48Hr                              |        |
| High Temperature Operation          | 50°C/20%,48Hr                              |        |
| Low Temperature Operation           | 0°C,300Hr                                  |        |
| On/Off Test                         | 25°C, ON/10 sec. OFF/10sec., 30,000 cycles |        |
| Hot Storage                         | 60°C/20% RH ,48 hours                      |        |
| Cold Storage                        | -20°C/50% RH ,48 hours                     |        |
| Thermal Shock Test                  | -20°C/2hr ,60°C/2hr 12cycles               |        |
| Shock Test<br>( Non-Operating )     | TBD  |        |
| Vibration Test<br>( Non-Operating ) | TBD  |        |
| ESD                                 | TBD  | Note 1 |

Note1: According to EN61000-4-2 , ESD class B: Some performance degradation allowed. No data lost

- . Self-recoverable. No hardware failures.

Note3: MTBF ( Excluding the LED ) : 30,000 hours with a confidence level 90%



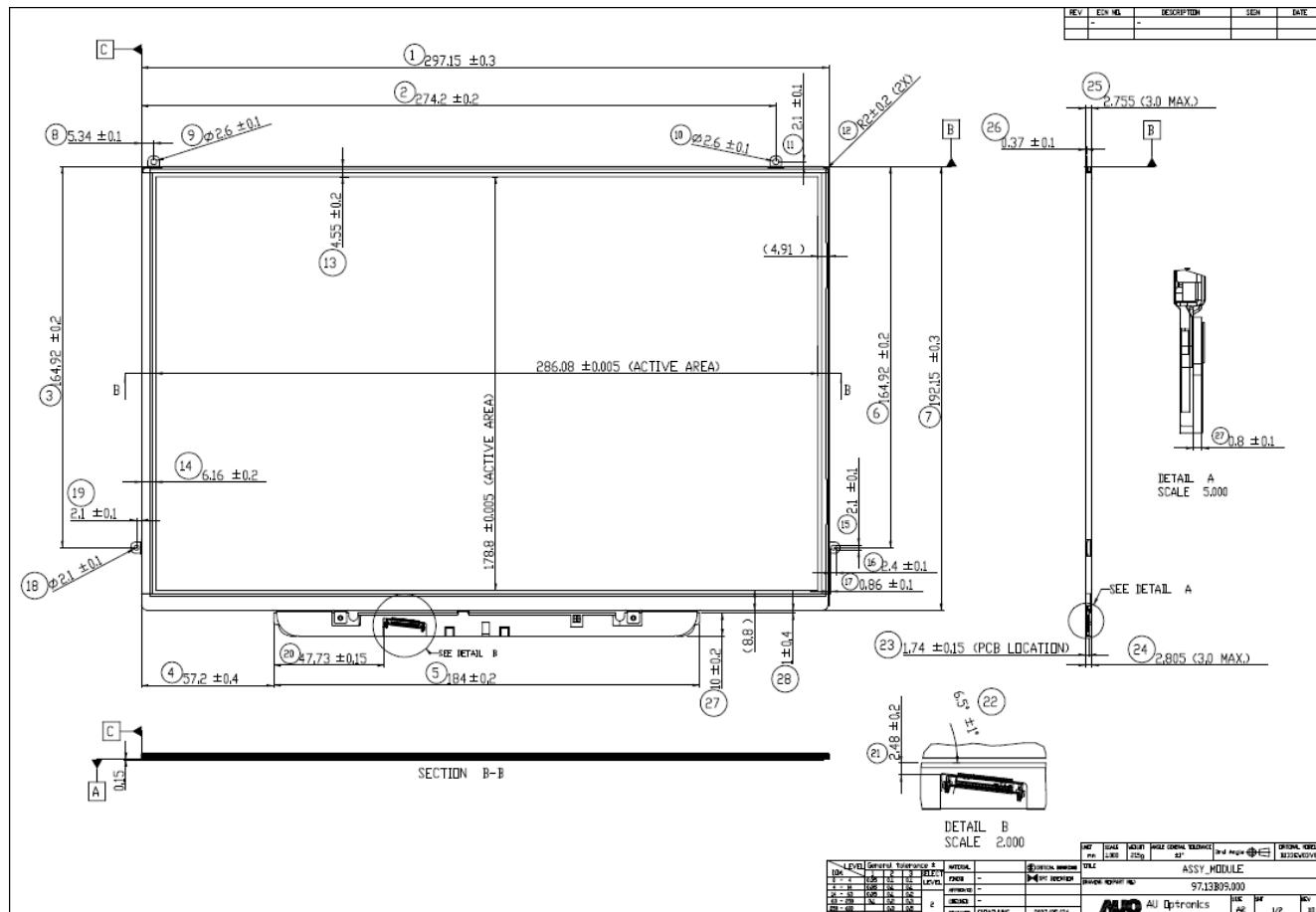
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## 10. Mechanical Characteristics

### 10.1 LCM Outline Dimension

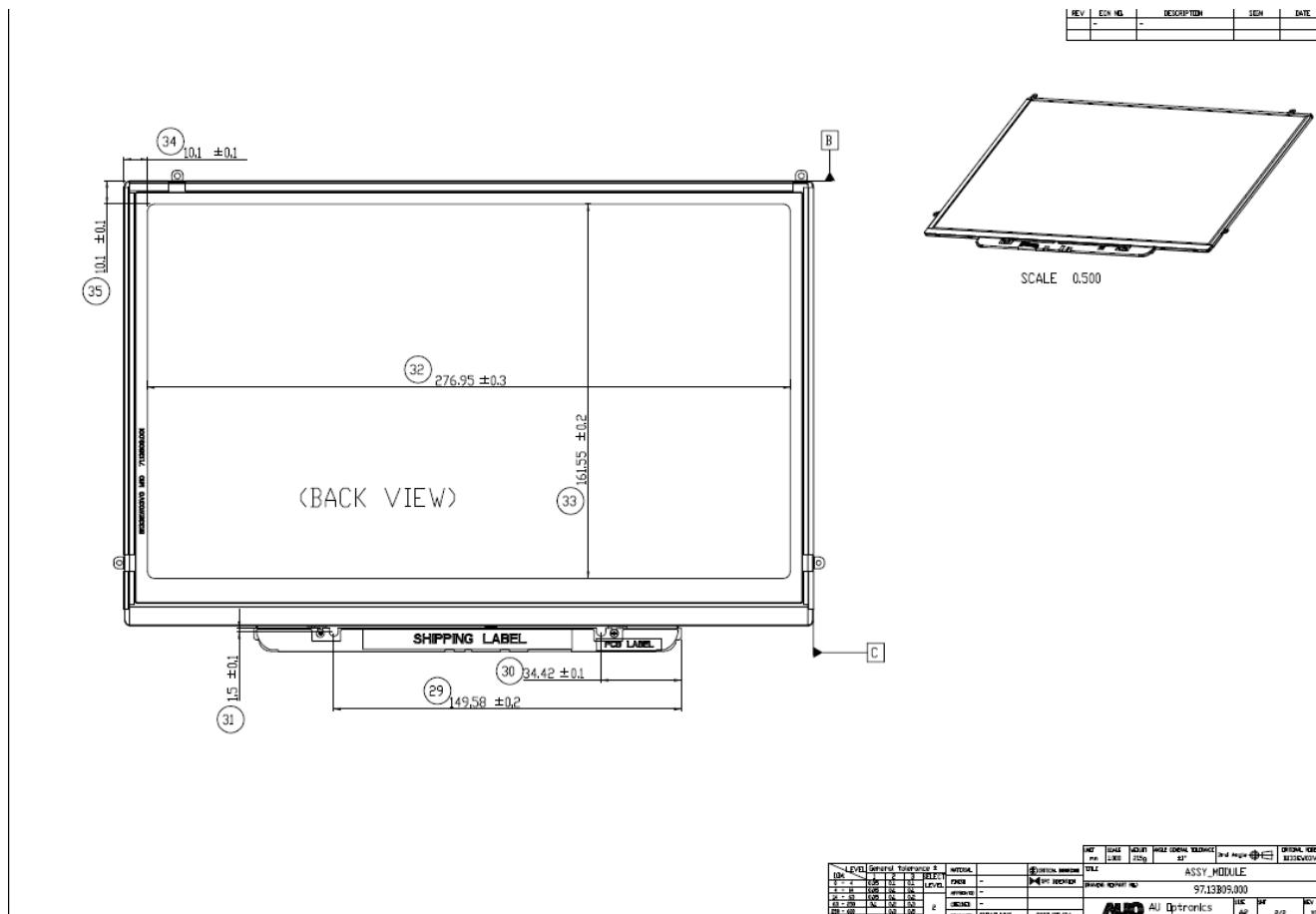




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B133EW03 V0





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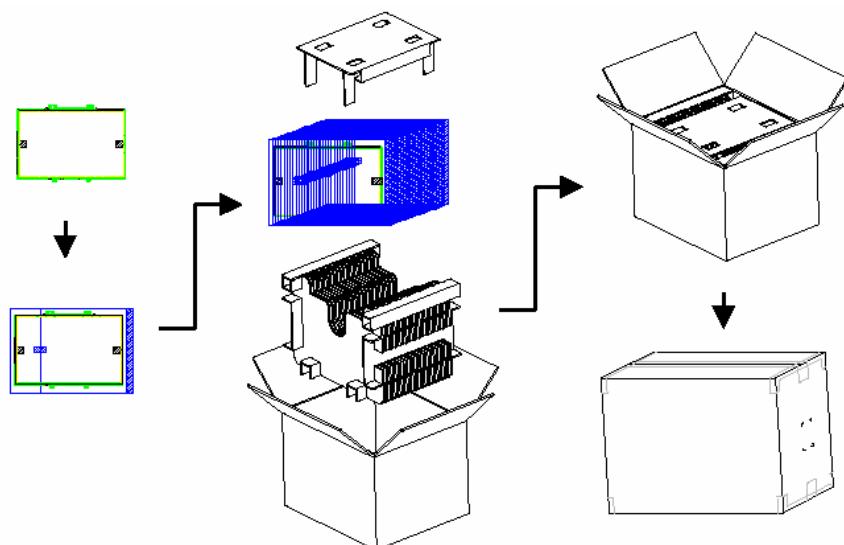
## 11. Shipping and Package

### 11.1 Shipping Label Format

TBD

**11.2. Carton package**

Carton Label: 80mm \* 40mm



**11.3 Shipping package of palletizing**