

**15.0" XGA****High brightness color TFT-LCD module****Model: CH150CLGL-HB4****Date: Mar. 05<sup>th</sup>, 2013**

**Note: This specification is subject to change  
without notice**

**Customer :** \_\_\_\_\_**Date :** \_\_\_\_\_**Approved****Prepared****Date:****Date:**

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## RECORD OF REVISION

Version and Date		Page	Old description	New description	Remark
0.1	2013/03/05	All	First Edition for customer		

## 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) 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, do not twist nor bend the TFT Module even momentarily. 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.

## 2. General Description

### 2.1, Overview

CH150CLGL-HB4 is a Color Active Matrix Liquid Crystal Display composed of a TFT-LCD display, a driver circuit, and a backlight system. The screen format is intended to support XGA(1024(H) x 768(V)) screen and 16.2M (RGB 8-bits) or 262k (RGB 6-bits). All input signals are LVDS interface compatible. All the design rules of this module can correspond to PSWG standard.

### 2.2 Features

- Sunlight readable display, 1500nits.
- LED backlight
- Wide temperature operating
- RoHS Compliance

### 2.3 Application

Industrial Application.

## 2.4 Display Specifications

Items	Unit	Specification
Screen Diagonal	inch	15
Active Area	mm	304.128(H) x 228.096(V)
Pixels H x V	pixels	1024x3(RGB) x 768
Pixels Pitch	um	297 (per one triad) x 297
Pixel Arrangement		RGBW Rectangle
Display mode		TN mode, normally white
White luminance (center)	Cd/m <sup>2</sup>	1500 (Typ.)
Contrast ratio		700 (Typ.)
Optical Response Time	msec	8 ms (Typ. on/off)
Normal Input Voltage VDD	Volt	3.3
Power Consumption (VDD Line + LED L Lines)	Watt	18.6
Weight	Grams	1000 typ.
Physical size	mm	326.5(H)x 253.5(V) x 13.1(D) (typ.)
Electrical Interface		1 Channel LVDS
Support Colors		16.2 M colors (RGB 8-bits) 262 k color (RGB 6-bits)
Surface Treatment		Anti-Glaire (AG)
Temperature range		
Operating	°C	-30 ~ 85
Storage (Shipping)	°C	-30 ~ 85
RoHS Compliance		RoHS Compliance

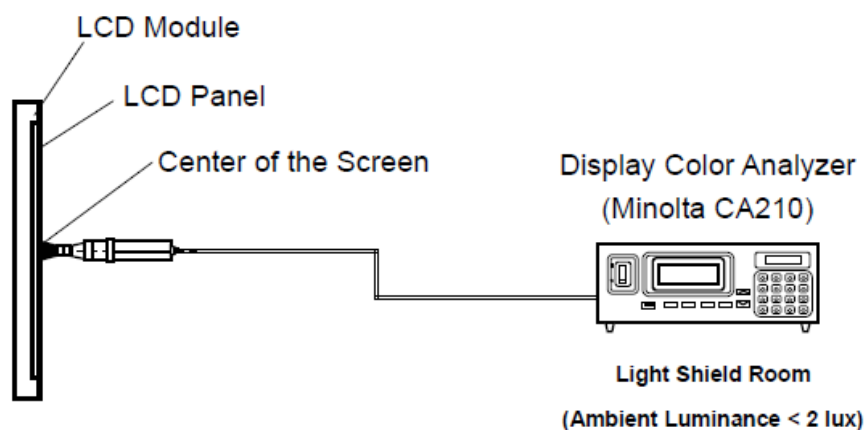
## 2.5 Optical Characteristics

The following optical characteristics are measured under stable condition at 25 °C

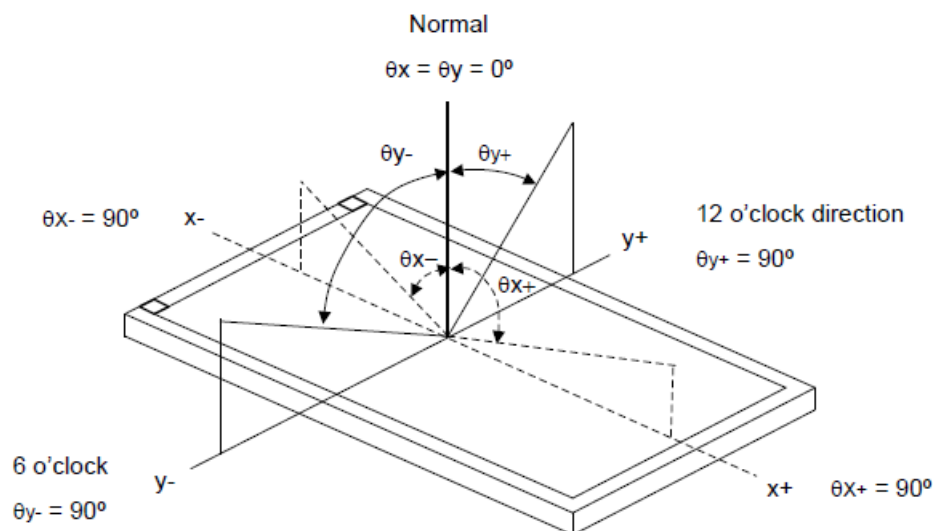
Items	Unit	Conditions	Min.	Typ.	Max.	Note
Viewing angle	Deg.	Horizontal (Right) CR=10 (Left)	140	160		2
		Vertical (Up) CR=10 (Down)	120	140		
Contrast Ratio		Normal Direction	400	700		3
Response Time	msec	Raising time ( $T_{rR}$ )		5.7		4
		Falling time ( $T_{rF}$ )		2.3		
		Raising + Falling		8		
Color / Chromaticity Coordinates (CIE)		Red x	-0.03	TBD	+0.03	5
		Red y		TBD		
		Green x		TBD		
		Green y		TBD		
		Blue x		TBD		
		Blue y		TBD		
Color coordinates (CIE) White		White x		0.313		
		White y		0.329		
Center Luminance	Cd/m <sup>2</sup>		1200	1500		6
Luminance Uniformity	%		75			7
Crosstalk (in 60 Hz)	%				1.2	
Flicker	dB				-20	

## Note 1: Measurement method

The LCD module should be stabilized at given temperature for 0.5 hour to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 1 hour in a windless room.



## Note 2: Definition of viewing angle

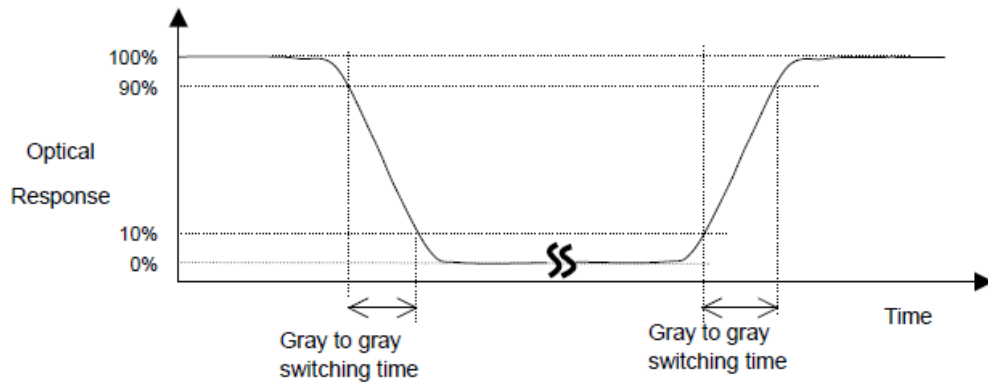


## Note 3: Contrast ratio is measured by Minolta CA210



## Note 4: Definition of Response time

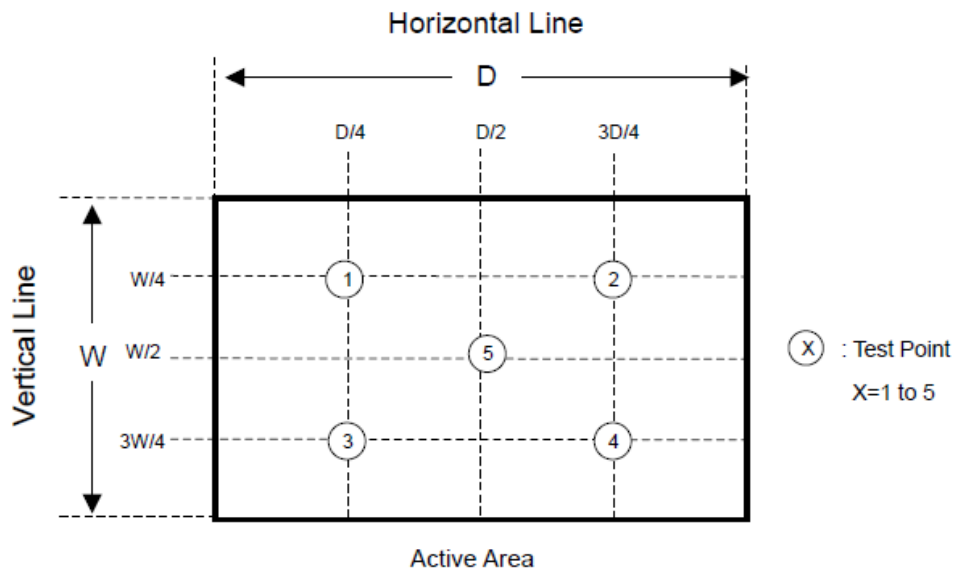
The output signals of photo detector are measured when the input signals are changed from “Full Black” to “Full White” (rising time), and from “Full White” to “Full Black” (falling time), respectively. The response time is interval between the 10% and 90% of amplitudes. Please refer to the figure as below.



Note 5: Color chromaticity and coordinates (CIE) is measured by Minolta CA210

Note 6: Center luminance is measured by Minolta CA210

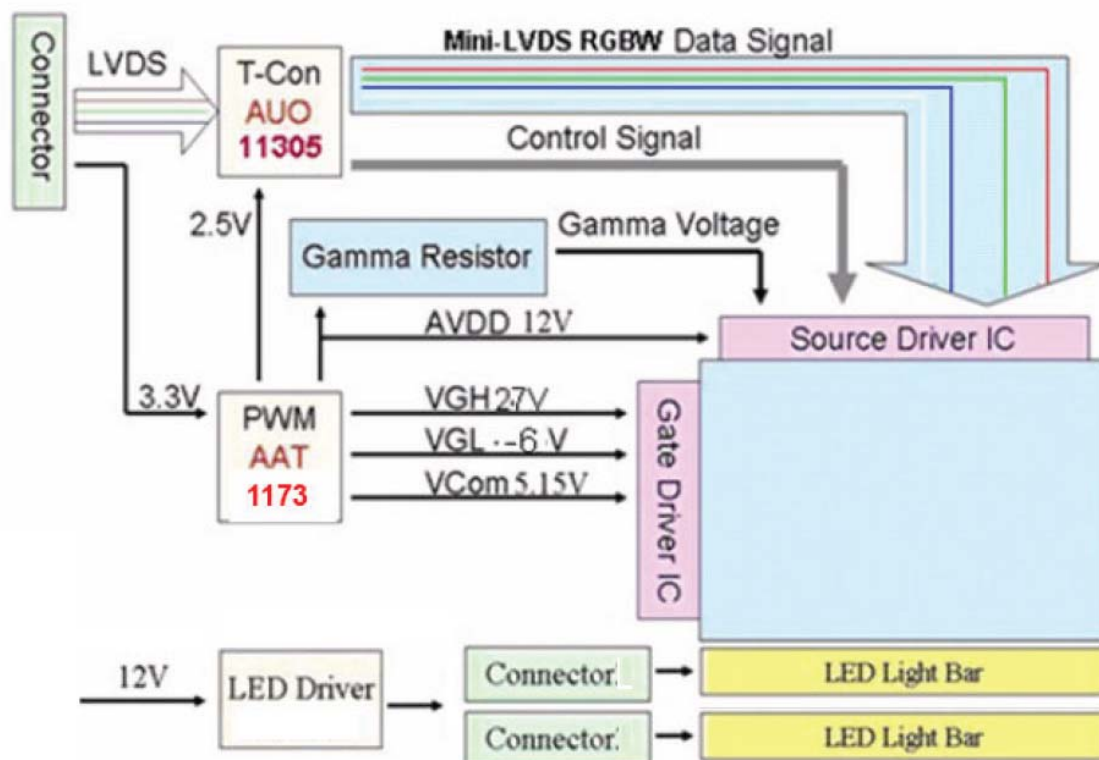
Note 7: Luminance uniformity of these 5 points is defined as below and measured by Minolta CA210



$$\text{Uniformity} = (\text{Min. Luminance of 5 points}) / (\text{Max. Luminance of 5 points})$$

## 3. Functional Block Diagram

The following diagram shows the functional block of the 15 inches Color TFT-LCD Module:



## 4. Absolute Maximum Ratings

Absolute maximum ratings of the module are as following:

### 4.1 TFT LCD Module

Items	Symbol	Min	Max	Unit	Conditions
Logic/ LCD drive voltage	Vin	-0.3	3.6	Volt	Note 1, 2

### 4.2 Backlight unit

Items	Symbol	Min	Max	Unit	Conditions
LED Current	I LED		560	mA	Note 1, 2

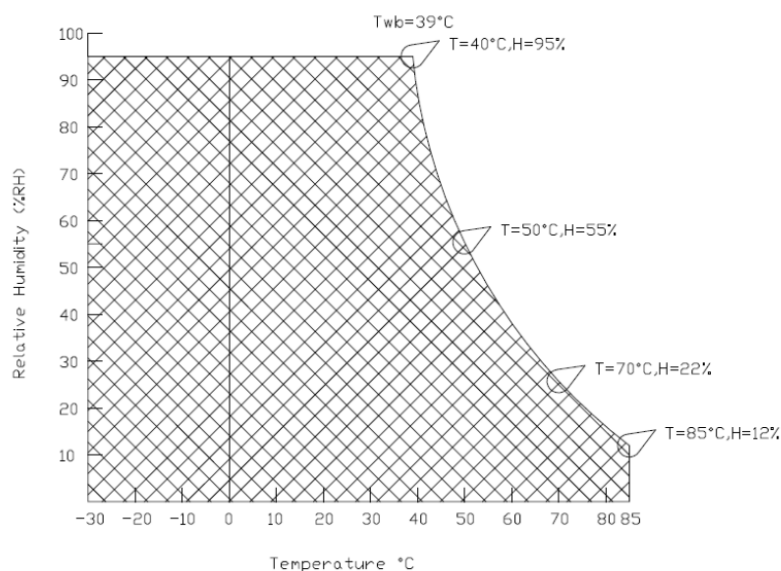
### 4.3 Absolute Ratings of Environment

Items	Symbol	Values			Unit	Conditions
		Min.	Typ.	Max.		
Operation temperature	T <sub>OP</sub>	-30	-	85	°C	Note 3
Operation Humidity	H <sub>OP</sub>	8		90	%	
Storage temperature	T <sub>ST</sub>	-30		85	°C	
Storage Humidity	H <sub>ST</sub>	8		90	%	

Note 1: With in Ta= 25°C

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

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



## 5. Electrical characteristics

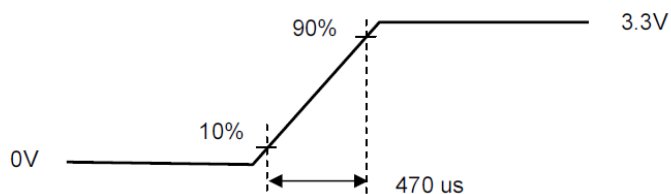
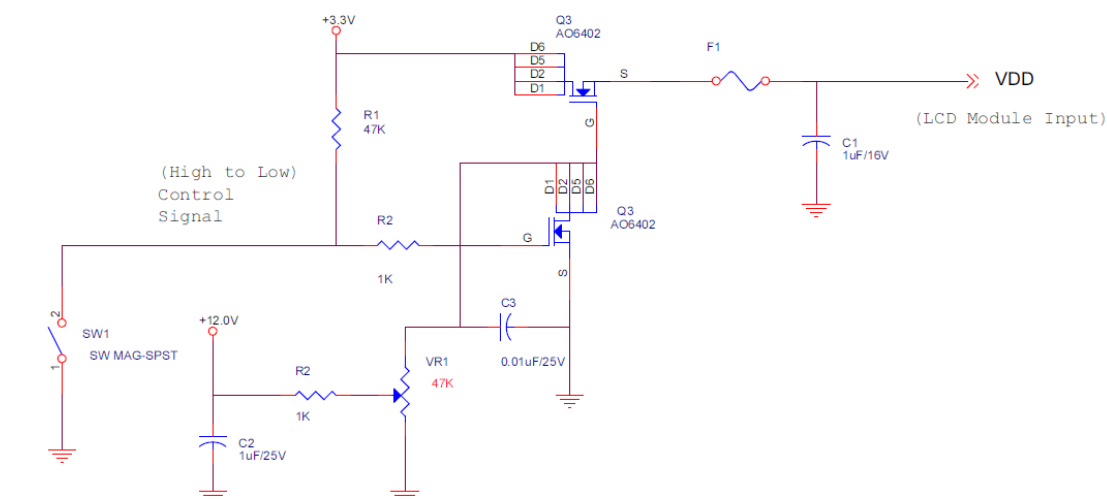
### 5.1 TFT LCD Module

#### 5.1.1 Power Specification

Input power specifications are as follows

Symbol	Parameter	Min	Typ.	Max	Unit	Conditions
VDD	Logic/ LCD Drive Voltage	3	3.3	3.6	Volt	+/- 10%
IDD	Input current		1.0		mA	VDD=3.3V, All black pattern.
PDD	VDD power		3.3	3.6	W	VDD=3.3V, All black pattern.
IRush	Inrush current			3	A	

Note 1: Measurement condition:



VDD rising time



64 Gray pattern

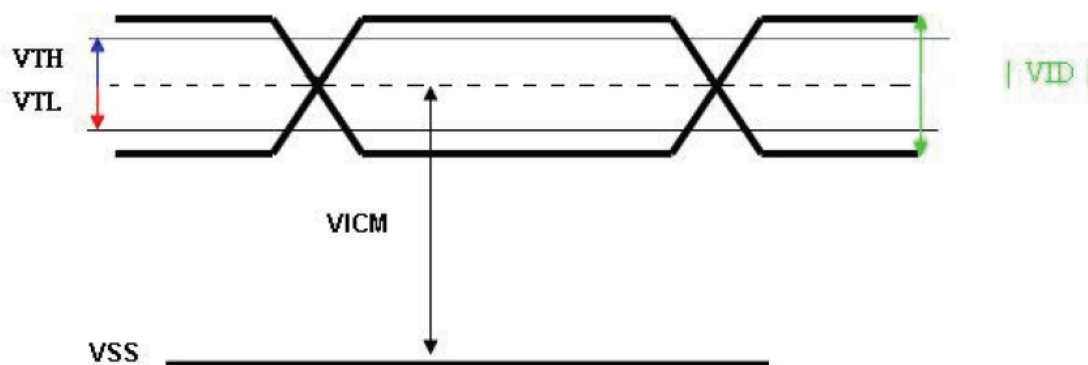
## 5.1.2 Signal Electrical Characteristics

Input signal shall be low or Hi-Z state when VDD is off.

Characteristics of each signal are as following:

Symbol	Parameter	Min	Typ	Max	Unit	Condition
VTH	Differential Input High Threshold			+100	mV	VICM = 1.2V
VTL	Differential Input Low Threshold	-100			mV	VICM = 1.2V
VID	Input Differential Voltage	100	400	600	mV	
VICM	Differential Input Common Mode Voltage	+1.15	1,2	+1.45	V	VTH/VTL = 100mV

Note: LVDS Signal Waveform.



## 5.2 Backlight Unit

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

Parameter	Min	Typ	Max	Unit	Note
LED voltage (VL)		19.8		[V]	2
LED current (IL)		380(TBD)	420	[mA]	2
LED power consumption		15		[W]	3
LED Life Time(LTLED)	50,000			[Hour]	1

Note 1: The “LED lift time” is defined as the module brightness decrease to 50% original brightness that the ambient temperature is 25°C and typical LED Current at 380 mA (Long lifetime mode).

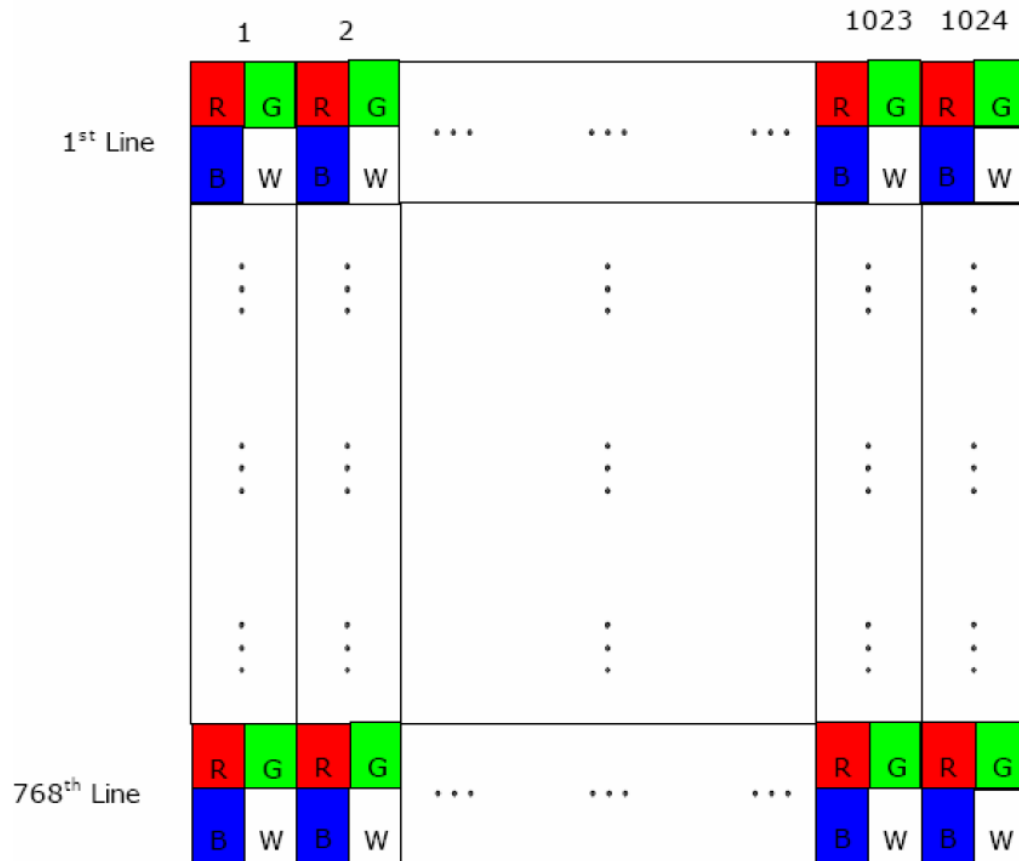
Note 2: The LED driving condition is defined for each LED module.(7 LED Serial, a LED includes 6 Chips)

Note 3: The variance of LED Light Bar power consumption is  $\pm 10\%$ . Calculator value for reference ( $IL \times VL \times 2 = P_{LED}$ )

## 6. Signal Characteristic

### 6.1 Pixel Format Image

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



### 6.2 Scanning Direction:

The following figures show the image seen from the front view. The arrow indicates the direction of scan.

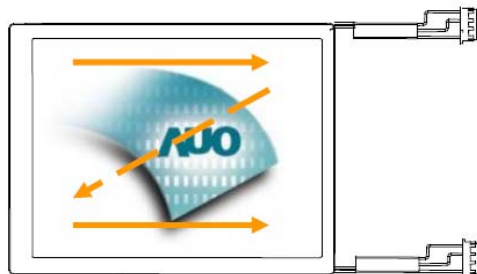


Fig. 1 Normal scan (Pin4, REV = Low or NC)



Fig. 2 Reverse scan (Pin4, REV = High)

## 6.3 Signal Description

The module using a pair of LVDS receiver SN75LVDS82(Texas Instruments) or ompatible. LVDS is a differential signal technology for LCD interface and high speed data transfer device. Transmitter shall be SN75LVDS83(negative edge sampling) or compatible. The first LVDS port(RxOxxx) transmits odd pixels while the second LVDS port(RxExxx) transmits even pixels.

Input Signal Interface		
Pin No.	Symbol	Description
1	VDD	Power Supply, 3.3V (typical)
2	VDD	Power Supply, 3.3V (typical)
3	GND	Ground
4	REV	Reverse Scan [H: Enable; L/NC: Disable]* <b>Note1,3</b>
5	Rin0-	- LVDS differential data input
6	Rin0+	+ LVDS differential data input
7	GND	Ground
8	Rin1-	- LVDS differential data input
9	Rin1+	+ LVDS differential data input
10	GND	Ground
11	Rin2-	- LVDS differential data input
12	Rin2+	+ LVDS differential data input
13	GND	Ground
14	ClkIN-	- LVDS differential clock input
15	ClkIN+	+ LVDS differential clock input
16	GND	Ground
17	Rin3-	- LVDS differential data input * <b>Note2</b>
18	Rin3+	- LVDS differential data input * <b>Note2</b>
19	NC/GND	Reserved for AUO internal test. Please set it as NC or Ground.
20	SEL68	Selection for 6 bits/8bits LVDS data input[H/NC: 6bits, L: 8bits]* <b>Note1,3</b>

Note 1: Input signals shall be in low status when VDD is off.

Note 2: For 6bits input mode, pin 17 and pin 18 must be floated.

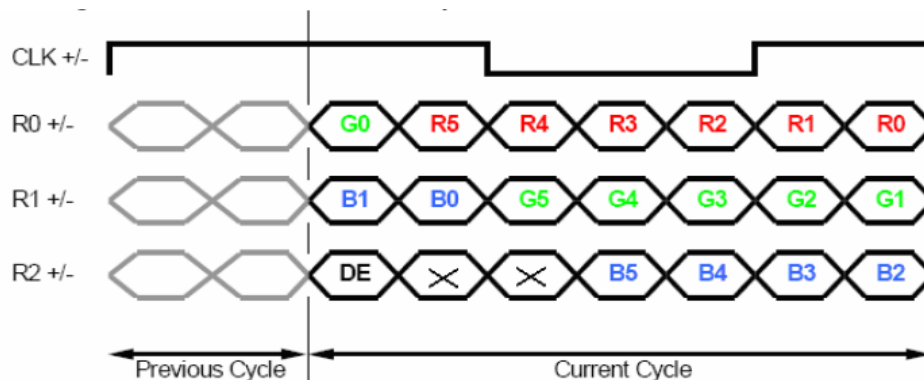
Note 3: High stands for “3.3V”, Low stands for “GND”, NC stands for “No Connection”.



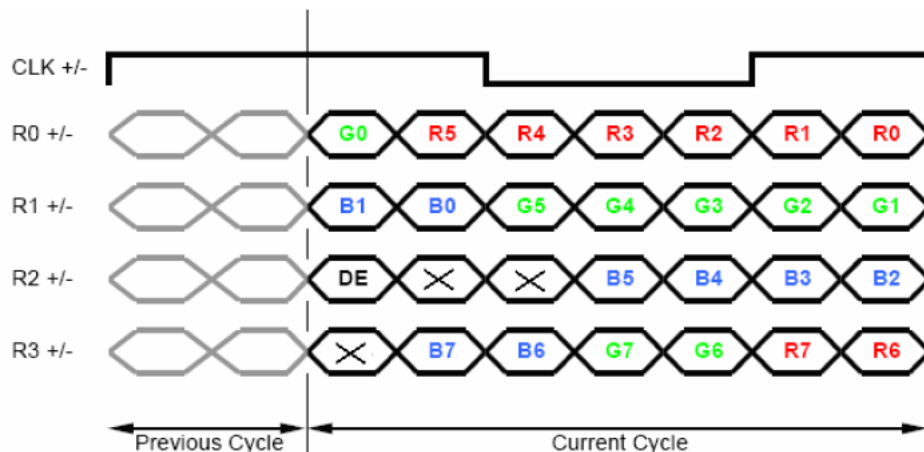
## 6.4 The Input Data Format

### 6.4.1 SEL68

SEL68 = "High" or "NC" for 6 bits LVDS Input



SEL68 = "Low" for 8 bits LVDS Input



Note1: Please follow PSWG.

Note2: R/G/B data 7:MSB, R/G/B data 0:LSB

Signal Name	Description	Remark
R7	Red Data 7	Red-pixel Data  For 6Bits LVDS input MSB: R5 ; LSB: R0  For 8Bits LVDS input MSB: R7 ; LSB: R0
R6	Red Data 6	
R5	Red Data 5	
R4	Red Data 4	
R3	Red Data 3	
R2	Red Data 2	
R1	Red Data 1	
R0	Red Data 0	
G7	Green Data 7	Green-pixel Data  For 6Bits LVDS input MSB: G5 ; LSB: G0  For 8Bits LVDS input MSB: G7 ; LSB: G0
G6	Green Data 6	
G5	Green Data 5	
G4	Green Data 4	
G3	Green Data 3	
G2	Green Data 2	
G1	Green Data 1	
G0	Green Data 0	

B7 B6 B5 B4 B3 B2 B1 B0	Blue Data 7 Blue Data 6 Blue Data 5 Blue Data 4 Blue Data 3 Blue Data 2 Blue Data 1 Blue Data 0	Blue-pixel Data  For 6Bits LVDS input MSB: B5 ; LSB: B0  For 8Bits LVDS input MSB: B7 ; LSB: B0
RxCLKIN	LVDS Data Clock	The typical frequency is 65MHz. 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	Data Enable Signal	When the signal is high, the pixel data shall be valid to be displayed.

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

## 6.5 Interface Timing

### 6.5.1 Timing Characteristics

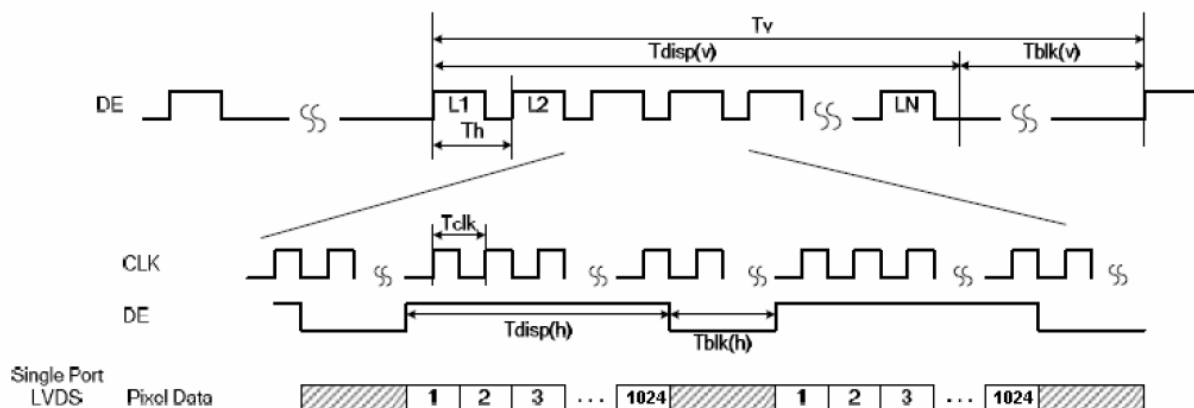
Signal	Parameter		Symbol	Min.	Typ.	Max.	Unit
Clock Timing	Clock frequency		1/ T <sub>Clock</sub>	50	65	80	MHz
Vsync Timing	Vertical Section	Period	T <sub>V</sub>	776	806	1023	T <sub>Line</sub>
		Active	T <sub>VD</sub>	-	768	-	
		Blanking	T <sub>VB</sub>	8	38	255	
Hsync Timing	Horizontal Section	Period	T <sub>H</sub>	1074	1344	2047	T <sub>Clock</sub>
		Active	T <sub>HD</sub>	-	1024	-	
		Blanking	T <sub>HB</sub>	50	320	1023	
Frame Rate			F	50	60	75	Hz

Note: Frame rate is 60 Hz.

Note: DE mode.

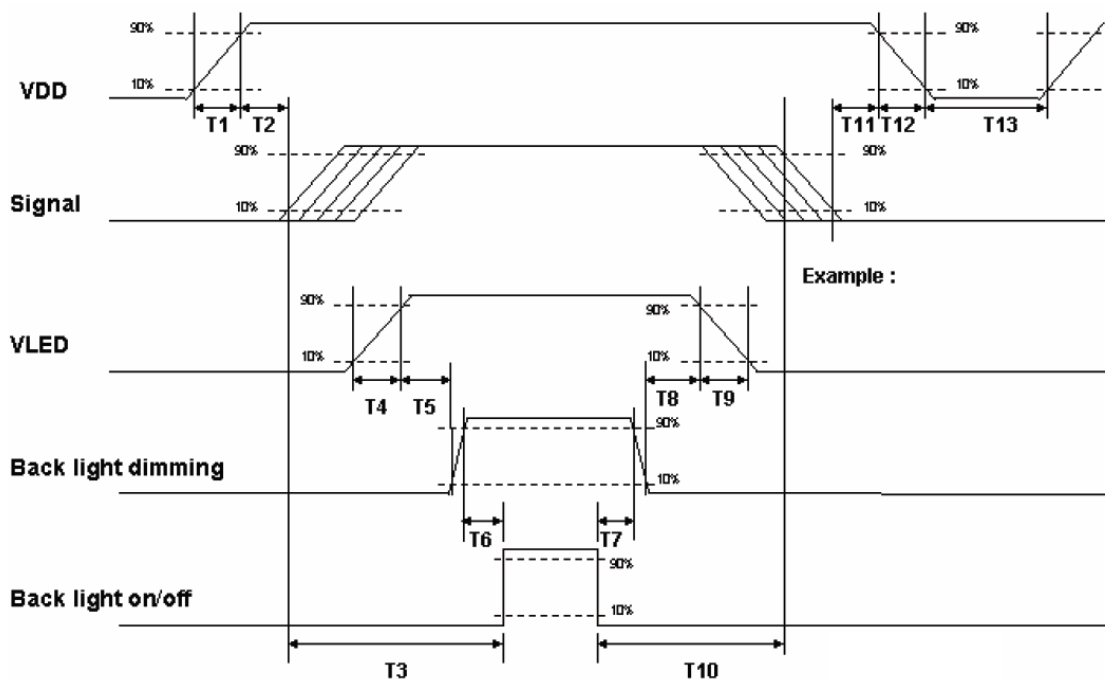
Note: Typical value refer to VESA STANDARD

### 6.5.2 Input Timing Diagram



## 6.6 Power ON/OFF Sequence

VDD power and lamp on/off sequence is as below. 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 ON/OFF sequence timing

Parameter	Value			Units
	Min.	Typ.	Max	
T1	0.5		10	ms
T2	30	40	50	ms
T3	200			ms
T4	0.5		10	ms
T5	10			ms
T6	10			ms
T7	0			ms
T8	10			ms
T9			10	ms
T10	110			ms
T11	0	16	50	ms
T12			10	ms
T13	1000			ms

The above on/off sequence should be applied to avoid abnormal function in the display. Please make sure to turn off the power when you plug the cable into the input connector or pull the cable out of the connector.

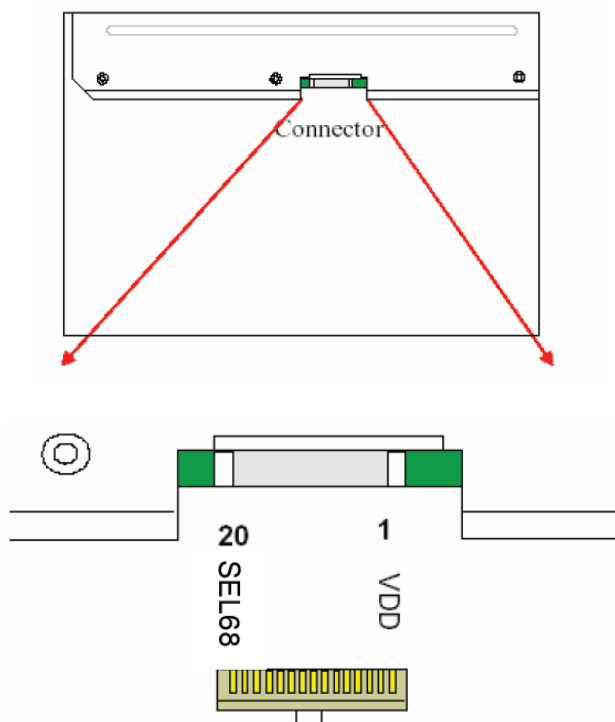
## 7.0 Connector & Pin Assignment

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: LVDS interface connector

Connector Name / Designation	Signal Connector
Manufacturer	STM or compatible
Connector Model Number	MSB240420-E
Mating Housing Part Number	P240420 or compatible

Pin#	Signal Name	Pin#	Signal Name
1	VDD	2	VDD
3	GND	4	REV
5	Rin0-	6	Rin0+
7	GND	8	Rin1-
9	Rin1+	10	GND
11	Rin2-	12	Rin2+
13	GND	14	ClkIN-
15	ClkIN+	16	GND
17	Rin3-	18	Rin3+
19	NC/GND	20	SEL68



## 7.2 Backlight Unit: LED Connector

For Upper / Lower connectors

Pin No.	Symbol	I/O	Function	Remark
1	VLED+	P	Power for LED backlight anode	White
2	VLED-	P	Power for LED backlight cathode	Black

LED Light Bar Connector is used for the integral backlight system. The recommended model is BHSR-02VS-1 manufactured by JST.

## 8. Reliability Test

Environment test conditions are listed as following table.

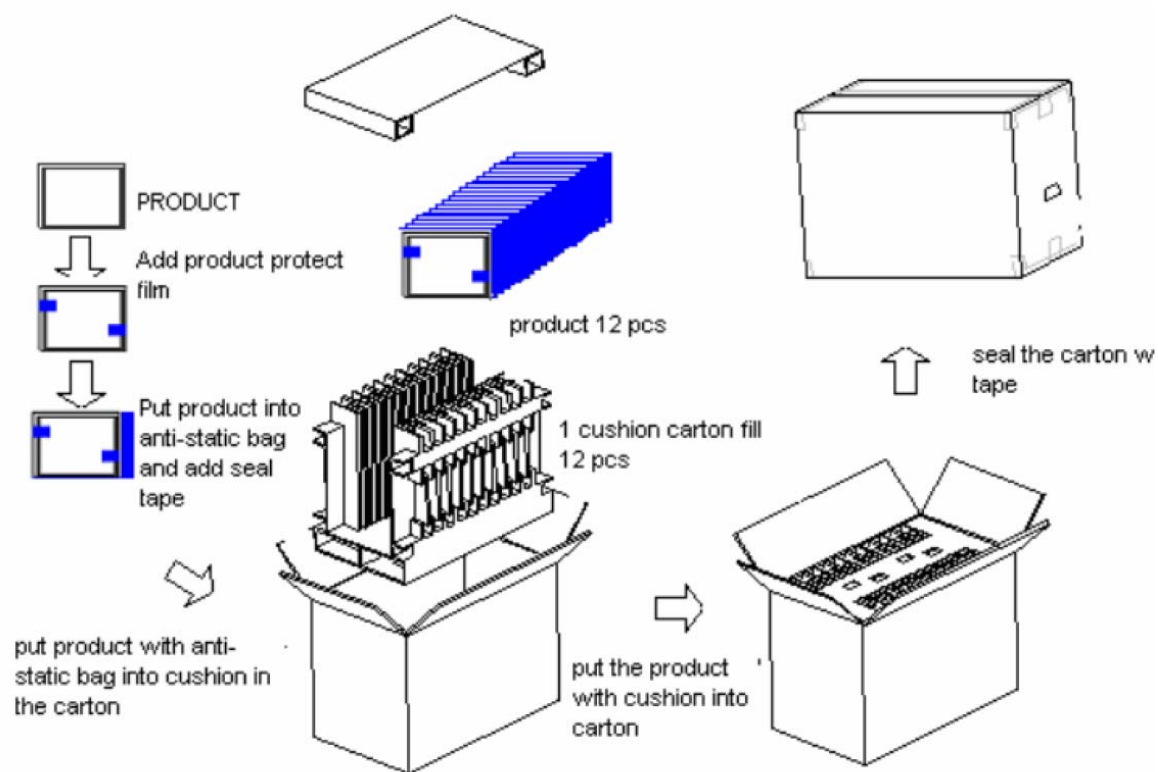
Items	Required Condition	Note
Temperature Humidity Bias (THB)	Ta= 50℃ , 80%RH, 300hours	
High Temperature Operation (HTO)	Ta= 85℃ , 50%RH, 300hours	3
Low Temperature Operation (LTO)	Ta= -30℃ , 300hours	
High Temperature Storage (HTS)	Ta= 85℃ , 300hours	
Low Temperature Storage (LTS)	Ta= -30℃ , 300hours	
Drop Test	Height: 60 cm, package test	
Thermal Shock Test (TST)	-20℃/30min, 60℃/30min, 100 cycles	1
On/Off Test	On/10sec, Off/10sec, 30,000 cycles	
ESD (ElectroStatic Discharge)	Contact Discharge: ± 8KV, 150pF(330Ω ) 1sec, 9 points, 25 times/ point.	2
	Air Discharge: ± 15KV, 150pF(330Ω ) 1sec 9 points, 25 times/ point.	2

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℃ to 60℃ , 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: According to EN61000-4-2 , ESD class B: Some performance degradation allowed. No data lost. Self-recoverable. No hardware failures.

Note 3: The test items are tested by open frame type chassis.

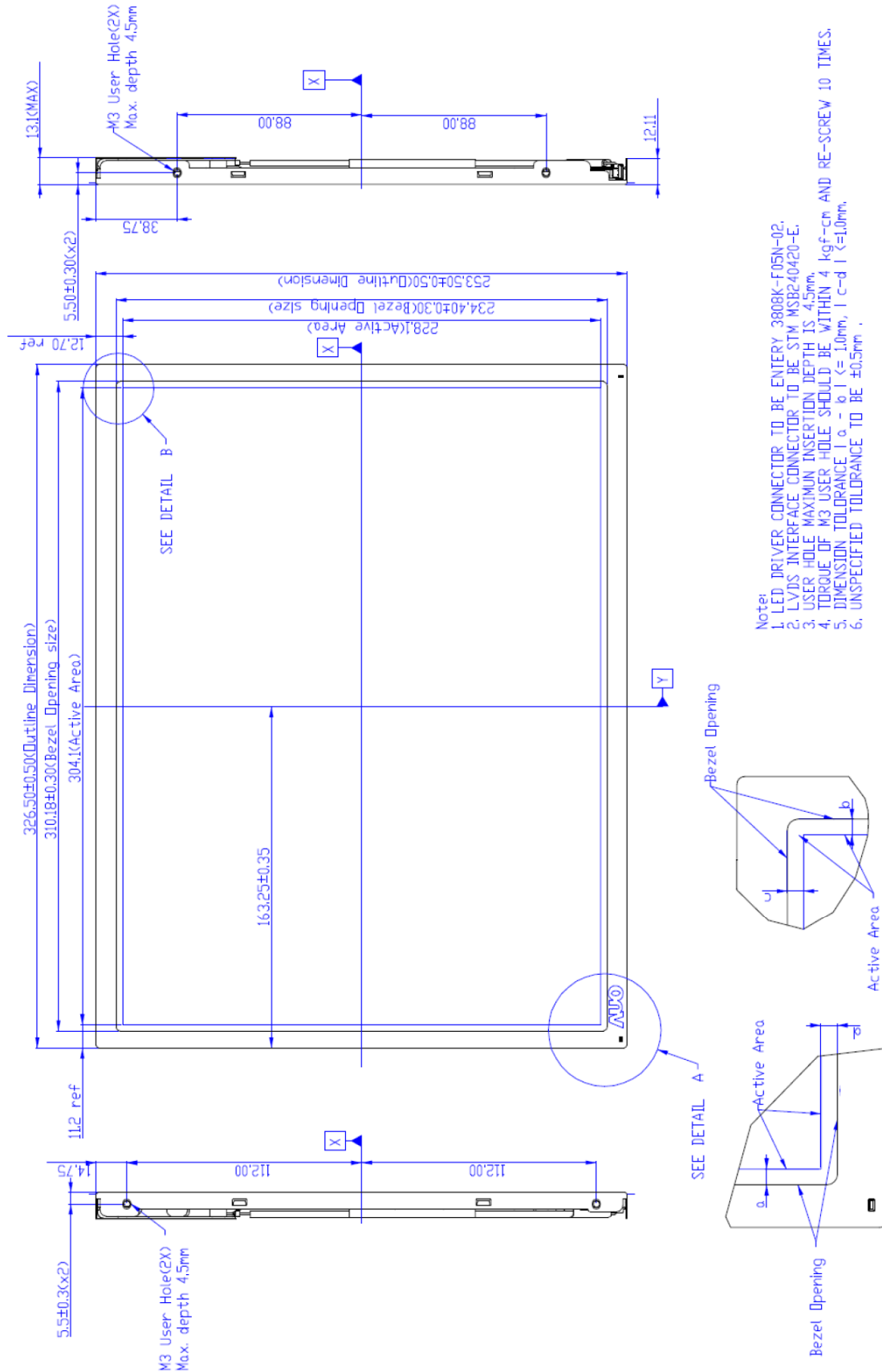
## 9. Shipping Label & Package (TBD)

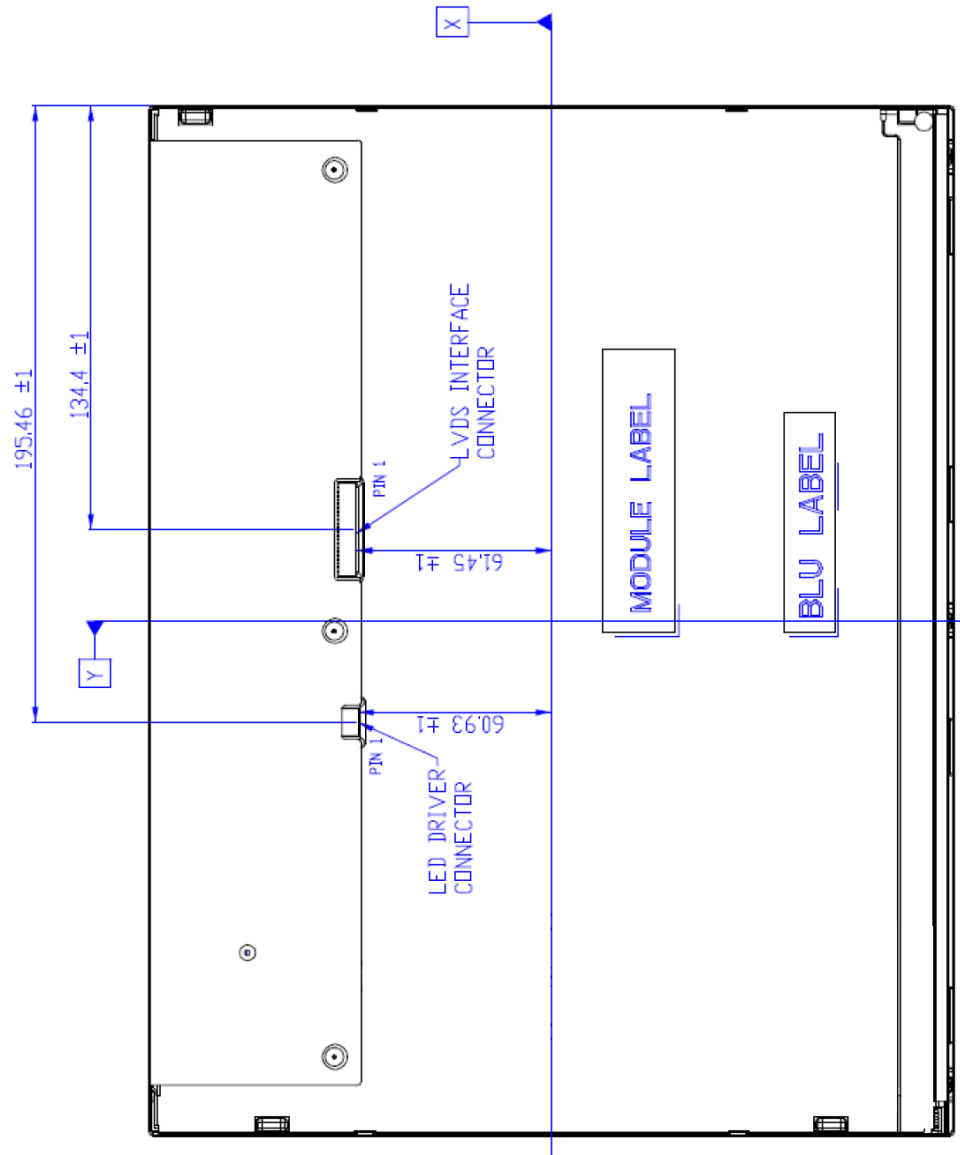


Carton capacity: 12 pcs  
Carton weight: 12.56Kg  
Carton outline: 430mm\*384mm\*350mm



## 10. Mechanical Characteristic





NOTE: The Backlight connector is not shown