BA101WS1-100

Preliminary Product Specification P0

HEFEI BOE OPTOELECTRONICS TECHNOLOGY

REVISION HISTORY

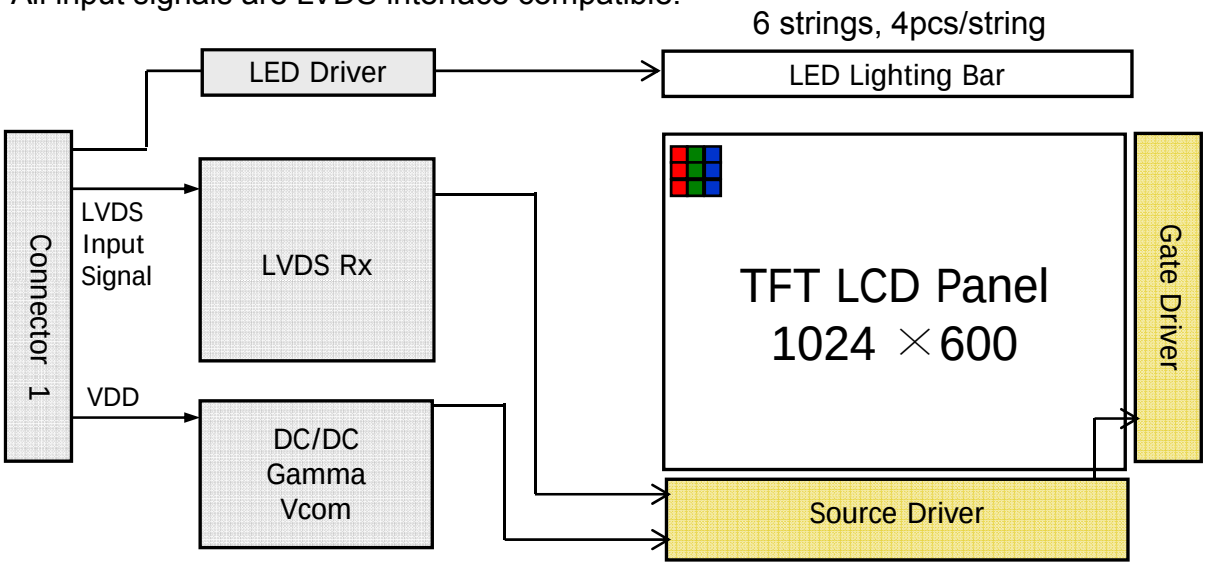
REV.	ECN No.	DESCRIPTION OF CHANGES	DATE	PREPARED
P0	-		2012.2.6	

Contents

1.0 GENERAL DESCRIPTION

1.1 Introduction

BA101WS1-100 is a color active matrix TFT LCD module using amorphous silicon TFT's (Thin Film Transistors) as an active switching devices. This module has a 10.1 inch diagonally measured active area with HD resolutions (1024horizontal by 600vertical pixel array). Each pixel is divided into RED, GREEN, BLUE dots which are arranged in vertical Stripe and this module can display 262,144 colors. The TFT-LCD panel used for this module is a low reflection and higher color type. Therefore, this module is suitable for Notebook PC. The LED Driver for back-light driving is built in this model.
All input signals are LVDS interface compatible.



1.2 Features

- 1 Channel LVDS Interface with 1 pixel / clock
- Thin and light weight
- 6-bit color depth, display 262K colors
- Single LED Lighting Bar. (Up side/Horizontal Direction)
- Data enable signal mode
- Side Mounting Frame
- Green Product (RoHS & Halogen free product)
- On board LED Driving circuit
- Low driving voltage and low power consumption
- On board EDID chip

1.3 Application

- Notebook PC (Wide type)

1.4 General Specification

The followings are general specifications at the model BA101WS1-100. (listed in Table 1.)

<Table 1. General Specifications>

Parameter	Specification	Unit	Remarks
Active area	222.72(H) ×125.28(V)	mm	
Number of pixels	1024 (H) ×600 (V)	pixels	
Pixel pitch	0.2175 (H) ×0.2088 (V)	mm	
Pixel arrangement	RGB Vertical stripe		
Display colors	262K	colors	
Display mode	Normally White		
Dimensional outline	245±0.5 (H) ×146.5±0.5 (V) ×3.6 (D:max)	mm	
Weight	170(max)	g	
Surface treatment	Glare / Hardness 3H		
Back-light	Up edge side, 1-LED Lighting Bar type		
Power consumption	P_D : 0.8(max)	W	
	P_{BL} : 1.8(max)	W	
	P_{total} : 2.6(max)	W	

2.0 ABSOLUTE MAXIMUM RATINGS

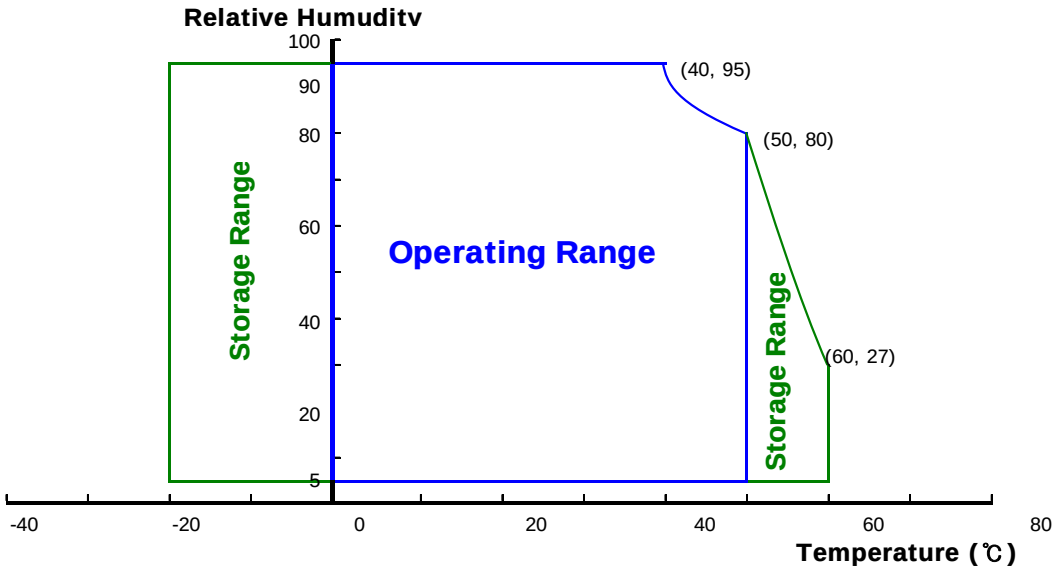
The followings are maximum values which, if exceed, may cause faulty operation or damage to the unit. The operational and non-operational maximum voltage and current values are listed in Table 2.

< Table 2. Absolute Maximum Ratings> Ta=25+/-2°C

Parameter	Symbol	Min.	Max.	Unit	Remarks
Power Supply Voltage	V_{DD}	-0.3	4.0	V	Note 1
Logic Supply Voltage	V_{BL}	4.5	16	V	
Operating Temperature	T_{OP}	0	+50	℃	Note 2
Storage Temperature	T_{ST}	-20	+60	℃	

Notes : 1. Permanent damage to the device may occur if maximum values are exceeded functional operation should be restricted to the condition described under normal operating conditions.

2. Temperature and relative humidity range are shown in the figure below.
95 % RH Max. (40 ^{O}C ≥ Ta)
Maximum wet - bulb temperature at 39 ^{O}C or less. (Ta > 40 ^{O}C) No condensation.



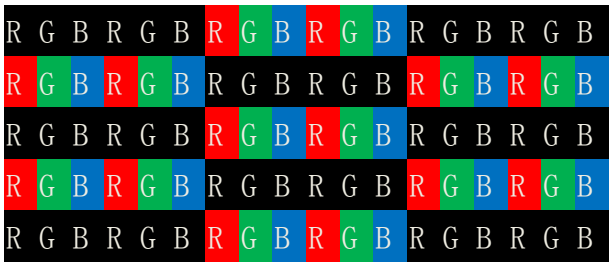
3.0 ELECTRICAL SPECIFICATIONS

3.1 Electrical Specifications

< Table 3. Electrical specifications > Ta=25+/-2°C

Parameter		Min.	Typ.	Max.	Unit	Remarks
Power Supply Voltage	V_{DD}	3.0	3.3	3.6	V	Note 1
Permissible Input Ripple Voltage	V_{RF}	-	-	100	mV	At V_{DD} = 3.3V
In-rush Current	I_{RUSH}	-	-	1.0	A	
Power Supply Current	I_{DD}	-	200	240	mA	Note 1
Positive-going Input Threshold Voltage	V_{IT+}	-	-	100	mV	V_{cm} = 1.2V typ.
Negative-going Input Threshold Voltage	V_{IT-}	-100	-	-	mV	
Differential Input Voltage	V_{ID}	100	-	600	mV	
Power Consumption	P_D	-	0.66	0.8	W	Note 1
	P_{BL}	-	1.73	1.8	W	Note 2
	P_{total}	-	2.39	2.6	W	

Notes : 1. The supply voltage is measured and specified at the interface connector of LCM.
The current draw and power consumption specified is for 3.3V at 25℃.
a) Typ : Check Flag
b) Max : 2H1V Pixel pattern



2. Calculated value for reference (P_{LED} /LED driver efficiency(0.9))

3.0 ELECTRICAL SPECIFICATIONS

3.2 Backlight Unit

< Table 4. LED Driving guideline specifications > Ta=25+/-2°C

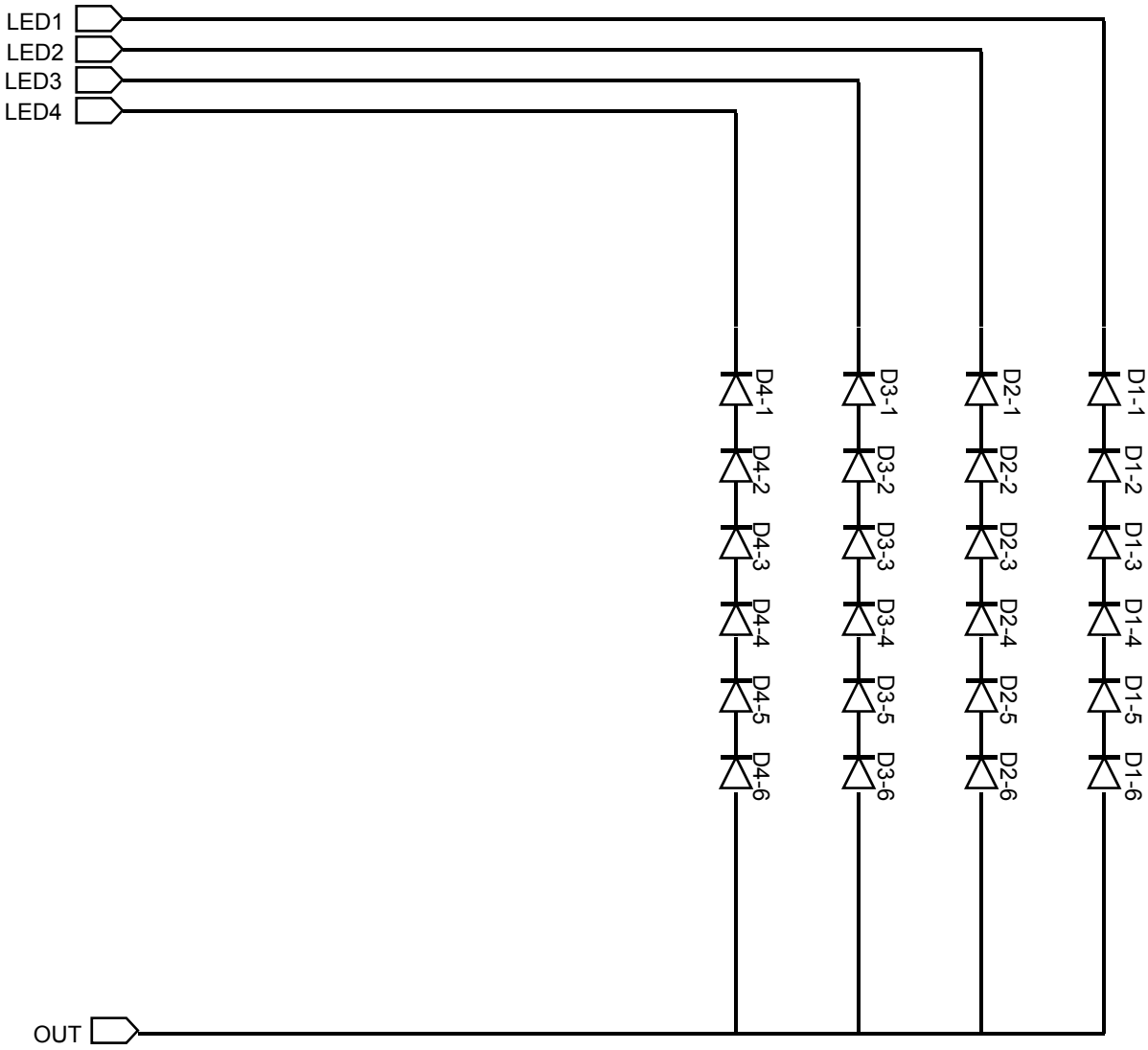
Parameter	Symbol	Condition	Values			Unit	Notes
			Min.	Typ.	Max.		
Input Voltage	VBL		4.5	5	16	V	
Input Current	IBL	V_{DIM}=3.3V	-	500	-	A	1
Rush current	IRUSH	VBL= 5V	-	-	1	A	
Power Consumption	PBL	Typ Luminance	-	2	-	Watt	
PWM Frequency	F_{PWM}		5	-	100	KHz	
PWM Level	High Level		2	3.3	4	V	
	Low Level		0	-	0.4	V	
PWM Duty	D_{PWM}		1	-	100	%	2
Life Time			30,000	-	-	Hrs	3

Notes : 1. Calculator Value for reference IF × VF ×24 = P_{LED}

2. The LED Life-time define as the estimated time to 50% degradation of initial luminance.

3. The life time of LED, 30,000Hrs, is determined as the time at which luminance of the LED is 50% compared to that of initial value at the typical LED current on condition of continuous operating at 25 ± 2° C.

3.3 LED structure



4.0 OPTICAL SPECIFICATION

4.1 Overview

The test of Optical specifications shall be measured in a dark room (ambient luminance ≤ 1 lux and temperature = 25±2℃) with the equipment of Luminance meter system (Goniometer system and TOPCON BM-5) and test unit shall be located at an approximate distance 50cm from the LCD surface at a viewing angle of θ and Φ equal to 0°. We refer to $\theta_{Ø=0}$ (=θ_3) as the 3 o'clock direction (the "right"), $\theta_{Ø=90}$ (= θ_{12}) as the 12 o'clock direction ("upward"), $\theta_{Ø=180}$ (= θ_9) as the 9 o'clock direction ("left") and $\theta_{Ø=270}$(= θ_6) as the 6 o'clock direction ("bottom"). While scanning θ and/or Ø, the center of the measuring spot on the Display surface shall stay fixed. The measurement shall be executed after 30 minutes warm-up period. VDD shall be 12.0V +/-10% at 25°C. Optimum viewing angle direction is 6 'clock.

4.2 Optical Specifications

<Table 5. Optical Specifications>

Parameter		Symbol	Condition	Min	Typ	Max	Unit	Remark
Viewing Angle	Horizontal	Θ_3	CR > 10	-	45	-	Deg.	Note 1
		Θ_9		-	45	-	Deg.	
	Vertical	Θ_{12}		-	15	-	Deg.	
		Θ_6		-	35	-	Deg.	
Color Temperature				-	-	-	K	
Color Gamut			Θ = 0° (Center) Normal Viewing Angle	-	45	-	%	NTSC
Contrast ratio		CR		-	500:1	-		Note 2
Luminance of White	5 Points	Y_w		170	200	-	cd/m^2	Note 3
White luminance uniformity	5 Points	ΔY5		80	-	–	%	Note 4
	13 Points	ΔY13		63	-	–	%	
Reproduction of color	White	W_x		TYP. - 0.3	0.313	TYP. + 0.3		Note 5
		W_y			0.329			
	Red	R_x			0.592			
		R_y			0.346			
	Green	G_x			0.329			
		G_y			0542			
	Blue	B_x			0.149			
		B_y			0.145			
Response Time		T_g		-	8	25	ms	Note 6
Gamma Scale				2.0	2.2	2.4		

Note :

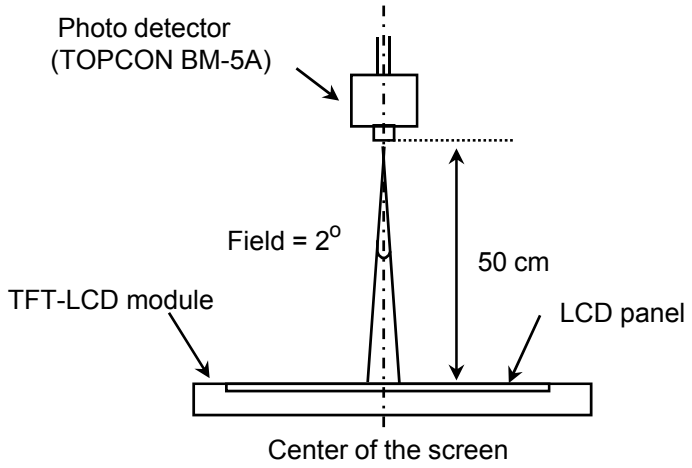
1. Viewing angle is the angle at which the contrast ratio is greater than 10. The viewing are determined for the horizontal or 3, 9 o'clock direction and the vertical or 6, 12 o'clock direction with respect to the optical axis which is normal to the LCD surface.
2. Contrast measurements shall be made at viewing angle of θ= 0° and at the center of the LCD surface. Luminance shall be measured with all pixels in the view field set first to white, then to the dark (black) state. (See FIGURE 1 shown in Appendix) Luminance Contrast Ratio (CR) is defined mathematically.

$$\text{Luminance when displaying a white raster}$$
$$\text{Luminance when displaying a black raster}$$

3. Center Luminance of white is defined as the LCD surface. Luminance shall be measured with all pixels in the view field set first to white. This measurement shall be taken at the locations shown in FIGURE 2 for a total of the measurements per display.
4. The White luminance uniformity on LCD surface is then expressed as :
   ΔY5 = (Minimum Luminance of 5 points / Maximum Luminance of 5 points) * 100
   ΔY13= (Minimum Luminance of 13 points / Maximum Luminance of 13 points) * 100
   (See FIGURE 2 and FIGURE 3 shown in Appendix).
5. The color chromaticity coordinates specified in Table 4. shall be calculated from the spectral data measured with all pixels first in red, green, blue and white. Measurements shall be made at the center of the panel.
6. The electro-optical response time measurements shall be made as FIGURE 4 shown in Appendix by switching the "data" input signal ON and OFF. The times needed for the luminance to change from 10% to 90% is Td, and 90% to 10% is Tr.

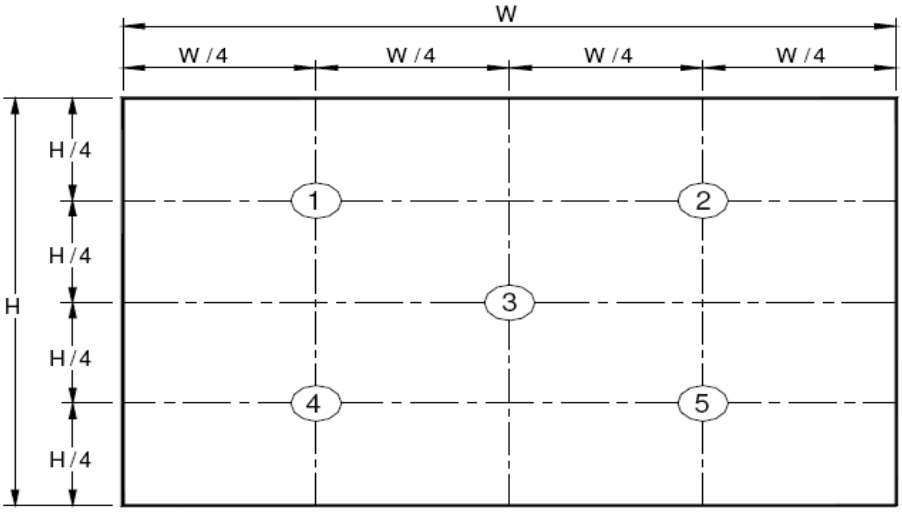
4.3 Optical measurements

Figure 1. Measurement Set Up



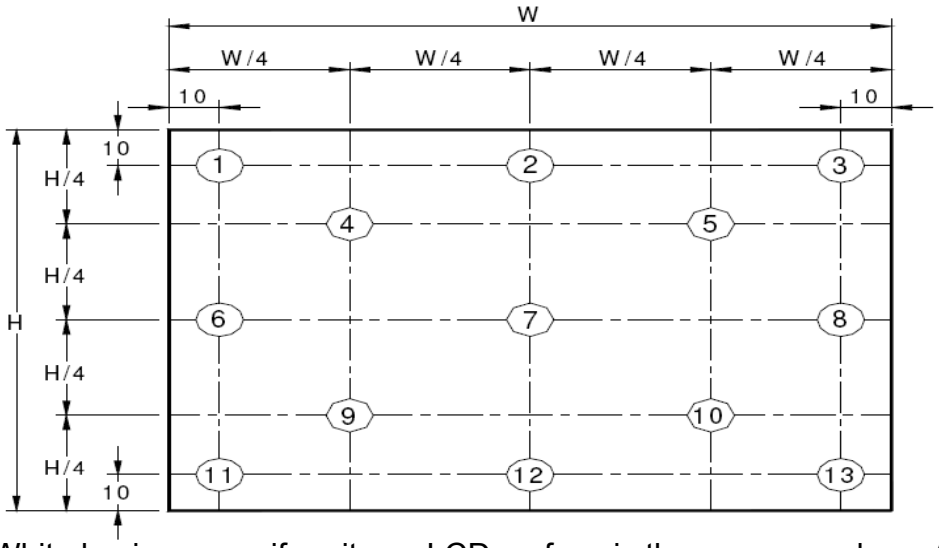
Optical characteristics measurement setup

Figure 2. White Luminance and Uniformity Measurement Locations (5 points)



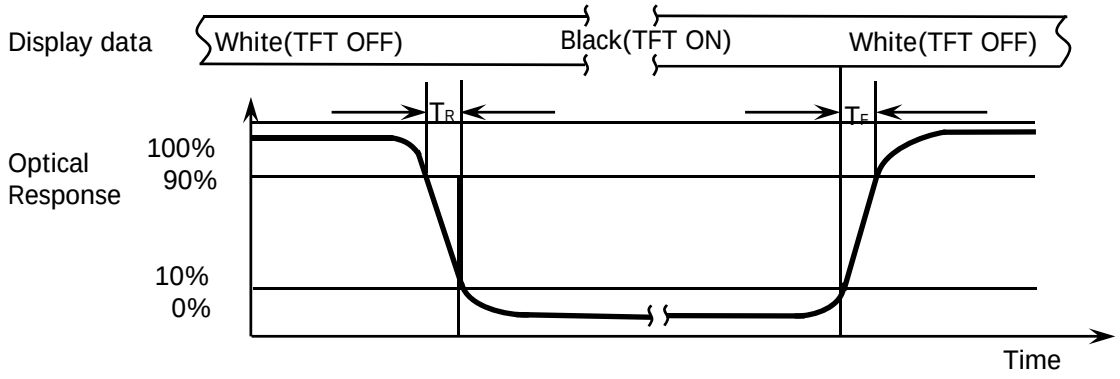
Center Luminance of white is defined as luminance values of center 5 points across the LCD surface. Luminance shall be measured with all pixels in the view field set first to white. This measurement shall be taken at the locations shown in FIGURE 2 for a total of the measurements per display.

Figure 3. Uniformity Measurement Locations (13 points)



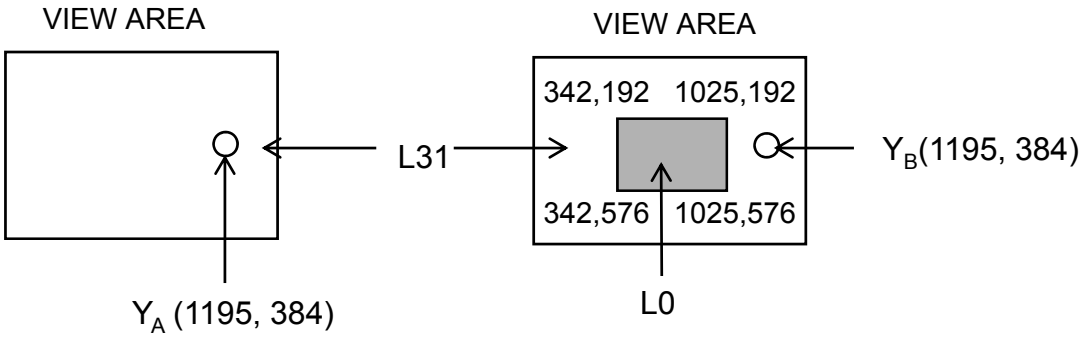
The White luminance uniformity on LCD surface is then expressed as : ΔY5 = Minimum Luminance of five points / Maximum Luminance of five points (see FIGURE 2) , ΔY13 = Minimum Luminance of 13 points /Maximum Luminance of 13 points (see FIGURE 3).

Figure 4. Response Time Testing



The electro-optical response time measurements shall be made as shown in FIGURE 4 by switching the “data” input signal ON and OFF. The times needed for the luminance to change from 10% to 90% is Td and 90% to 10% is Tr.

Figure 5. Cross Modulation Test Description



$$\text{Cross-Talk (\%)} = \left| \frac{Y_B - Y_A}{Y_A} \right| \times 100$$

Where:

Y_A = Initial luminance of measured area (cd/m^2)

Y_B = Subsequent luminance of measured area (cd/m^2)

The location measured will be exactly the same in both patterns

Cross-Talk of one area of the LCD surface by another shall be measured by comparing the luminance (Y_A) of a 25mm diameter area, with all display pixels set to a gray level, to the luminance (Y_B) of that same area when any adjacent area is driven dark (Refer to FIGURE 5).

5.0 INTERFACE CONNECTION.

5.1 Electrical Interface Connection

The electronics interface connector is STM MSAK24025P40G. The connector interface pin assignments are listed in Table 6.

<Table 6. Pin Assignments for the Interface Connector>

Terminal	Symbol	Functions
Pin No.	Symbol	Description
1	NC	No connect
2	VDD	Power Supply +3.3V
3	VDD	Power Supply +3.3V
4	VEDID	EDID +3.3V Power
5	NC	No Connect
6	CLK_EDID	EDID Clock Input
7	DATA_EDID	EDID Data Input
8	RxOIN0-	-LVDS Differential Data (Odd R0-R5, G0)
9	RxOIN0+	+LVDS Differential Data (Odd R0-R5, G0)
10	VSS	Ground
11	RxOIN1-	-LVDS Differential Data (Odd G1-G5, B0-B1)
12	RxOIN1+	+LVDS Differential Data (Odd G1-G5, B0-B1)
13	VSS	Ground
14	RxOIN2-	-LVDS Differential Data (Odd B2-B5, HS, VS, DE)
15	RxOIN2+	+LVDS Differential Data (Odd B2-B5, HS, VS, DE)
16	VSS	Ground
17	RxOCKIN-	-LVDS Odd Differential CLK
18	RxOCKIN+	+LVDS Odd Differential CLK
19	VSS	Ground
20	NC	No Connect
21	NC	No Connect
22	VSS	Ground
23	NC	No Connect
24	NC	No Connect
25	VSS	Ground
26	NC	No Connect
27	NC	No Connect
28	VSS	Ground
29	NC	No Connect
30	NC	No Connect

Terminal	Symbol	Functions
Pin No.	Symbol	Description
31	VLED_GND	LED Ground
32	VLED_GND	LED Ground
33	VLED_GND	LED Ground
34	NC	No Connect
35	S_PWMIN	System PWM signal Input
36	BL_ON	LED enable pin (+3V input, +5V tolerance)
37	NC	No Connect
38	VLED	LED Power Supply 5V-21V
39	VLED	LED Power Supply 5V-21V
40	VLED	LED Power Supply 5V-21V

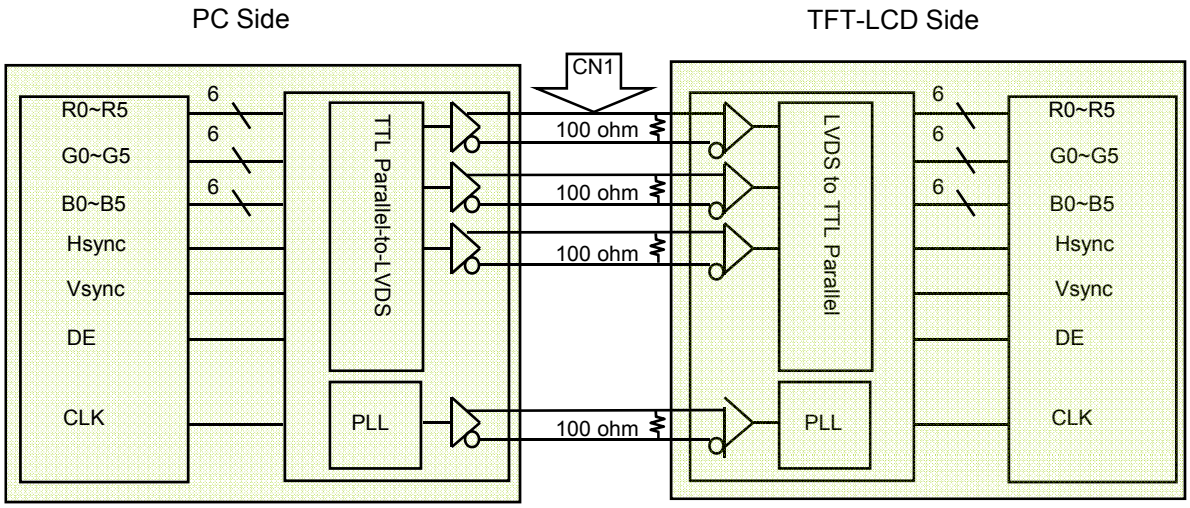
Note.1

-BIST="H (3.3V)" : Display BIST pattern @ No LVDS CLK or DE

(white->black->red->green->blue->white…)

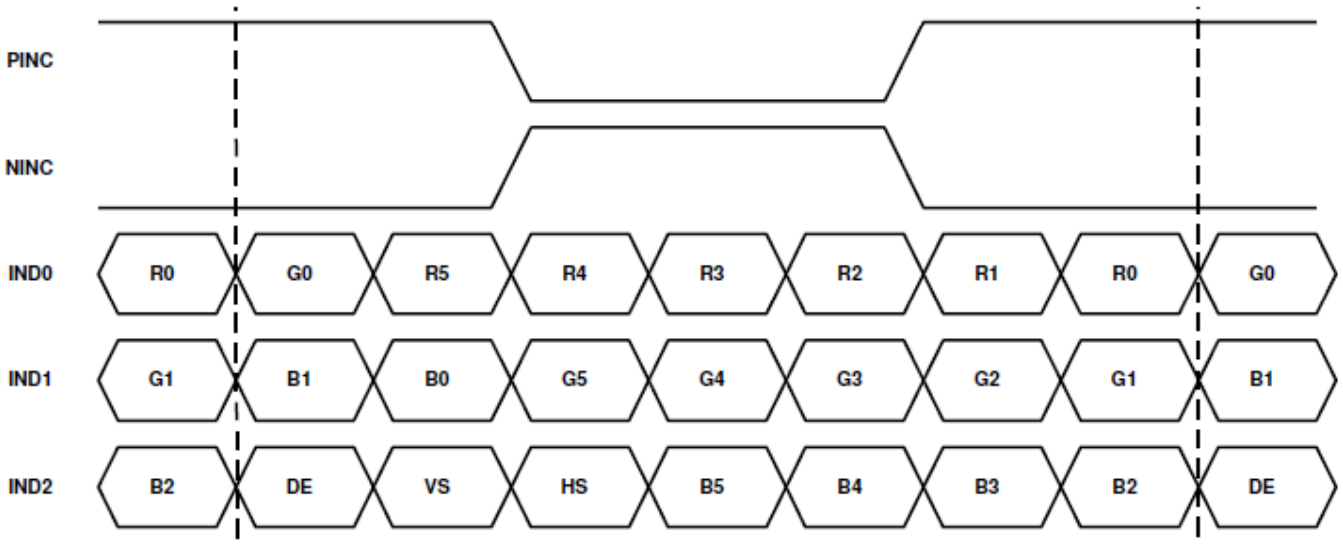
-BIST="L(GND or NC)" : Display black pattern @ No LVDS CLK or DE

5-2. LVDS Interface



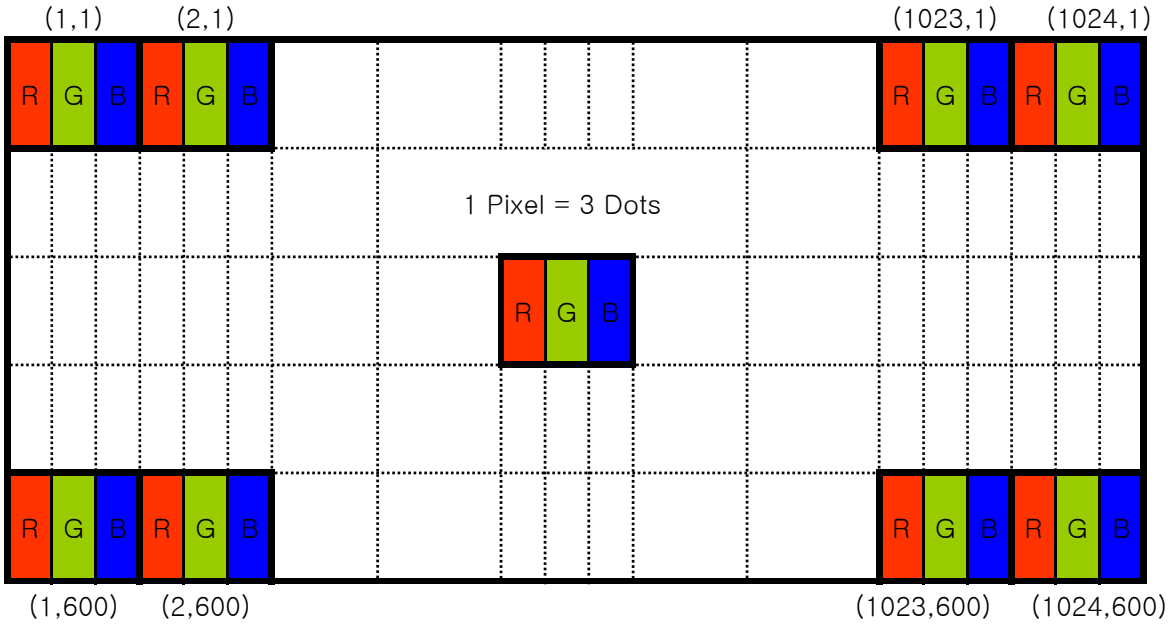
Note. Transmitter : Thine THC63LVDM63A or equivalent.
Transmitter is not contained in Module.

5.3.LVDS Input signal



Note. Pin connection in case of using Thine THC63LVDM63A

5.3 Data Input Format



Display Position of Input Data (V-H)

5.4 Back-light & LCM Interface Connection

Interface Connector: Two Hot Pad

6.0 SIGNAL TIMING SPECIFICATION

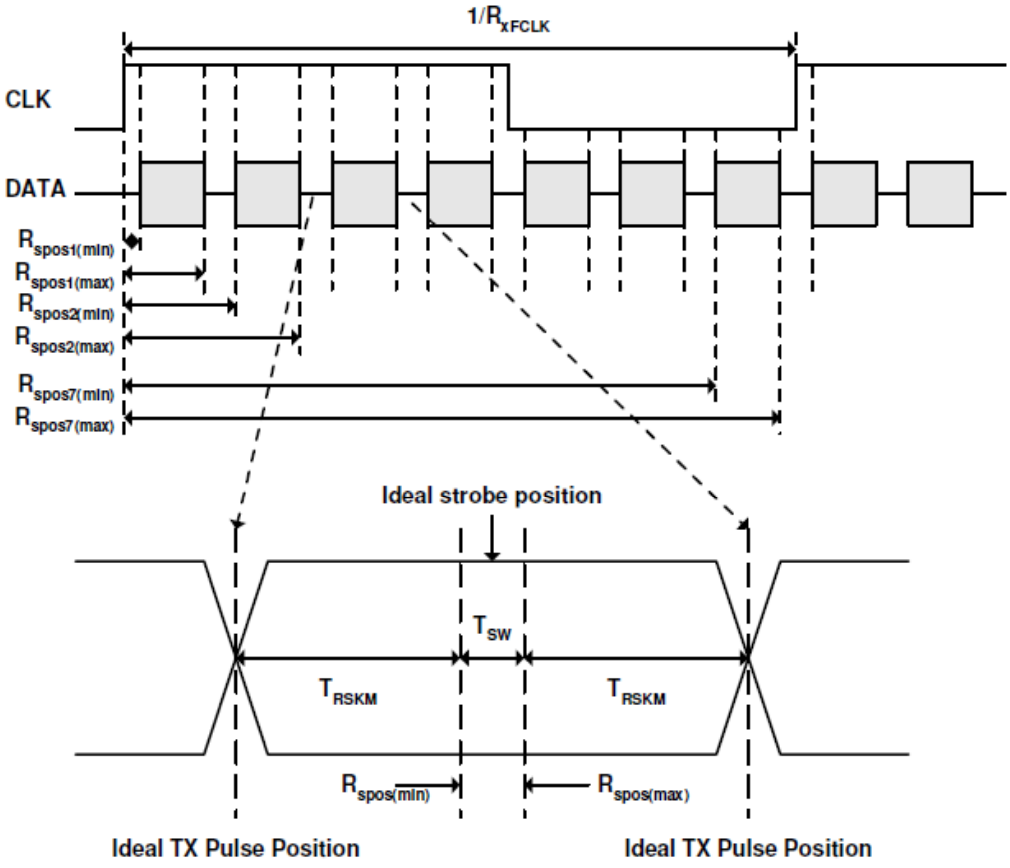
6.1 The BA101WS1-100 is operated by the DE only.

Item		Symbols	Min	Typ	Max	Unit
Clock	Frequency	1/Tc	40.8	51.2	67.2	MHz
	High Time	Tch	-	4/7	-	Tc
	Low Time	Tcl	-	3/7	-	Tc
Frame Period		Tv	610	635	800	lines
			-	60	-	Hz
			-	16.7	-	ms
Vertical Display Period		Tvd	600	600	600	lines
One line Scanning Period		Th	1114	1344	1400	clocks
Horizontal Display Period		Thd	1024	1024	1024	clocks

6.2 LVDS Rx Interface Timing Parameter

The specification of the LVDS Rx interface timing parameter is shown in Table 8.

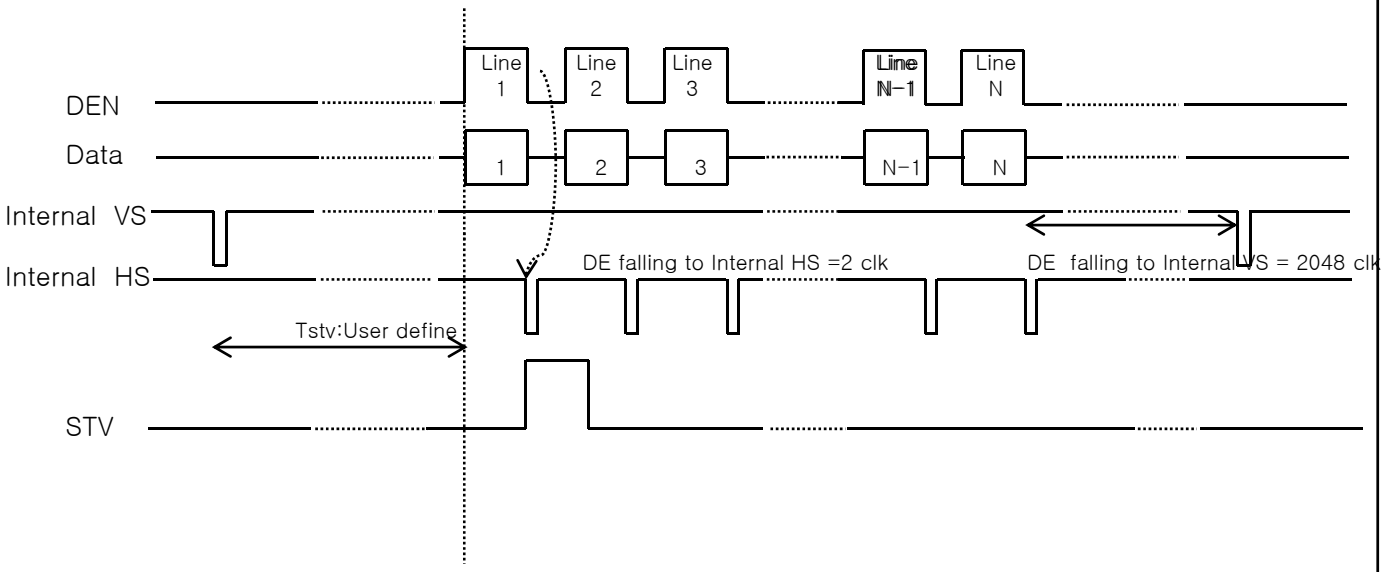
Parameters	Symbols	Min	Typ	Max	Unit	Condition
Clock frequency	R_{xFCLK}	20	-	71	MHz	
Input data skew margin	T_{RSKM}	500	-	-	ps	$\|V_{ID}\|$=400mV R_{xVCM}=1.2V R_{xFCLK}=71MHz
Clock high time	T_{LVCH}	-	4/(7*R_{xFCLK})		ns	
Clock low time	T_{LVCL}		3/(7*R_{xFCLK})		ns	
PLL wake-up time	T_{enPLL}			150	us	



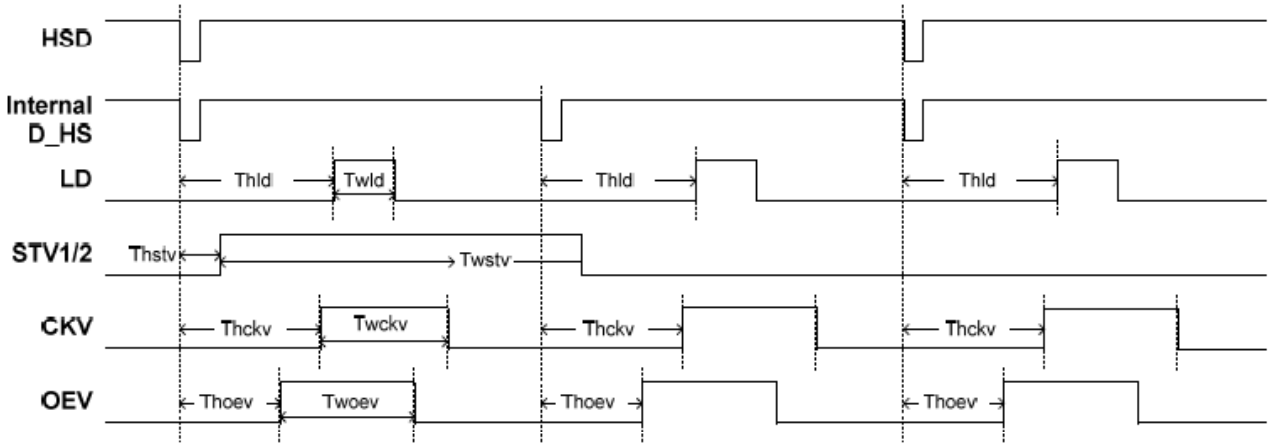
T_{RSKM}: Receiver strobe margin
R_{SPOS}: Receiver strobe position
T_{SW} : Strobe width (Internal data sampling window)

7.0 SIGNAL TIMING WAVEFORMS OF INTERFACE SIGNAL

7.1 Vertical Timing Diagram DE (Dual Gate)



7.2 Gate output timing diagram (Dual Gate)



7.3 Output Timing Table

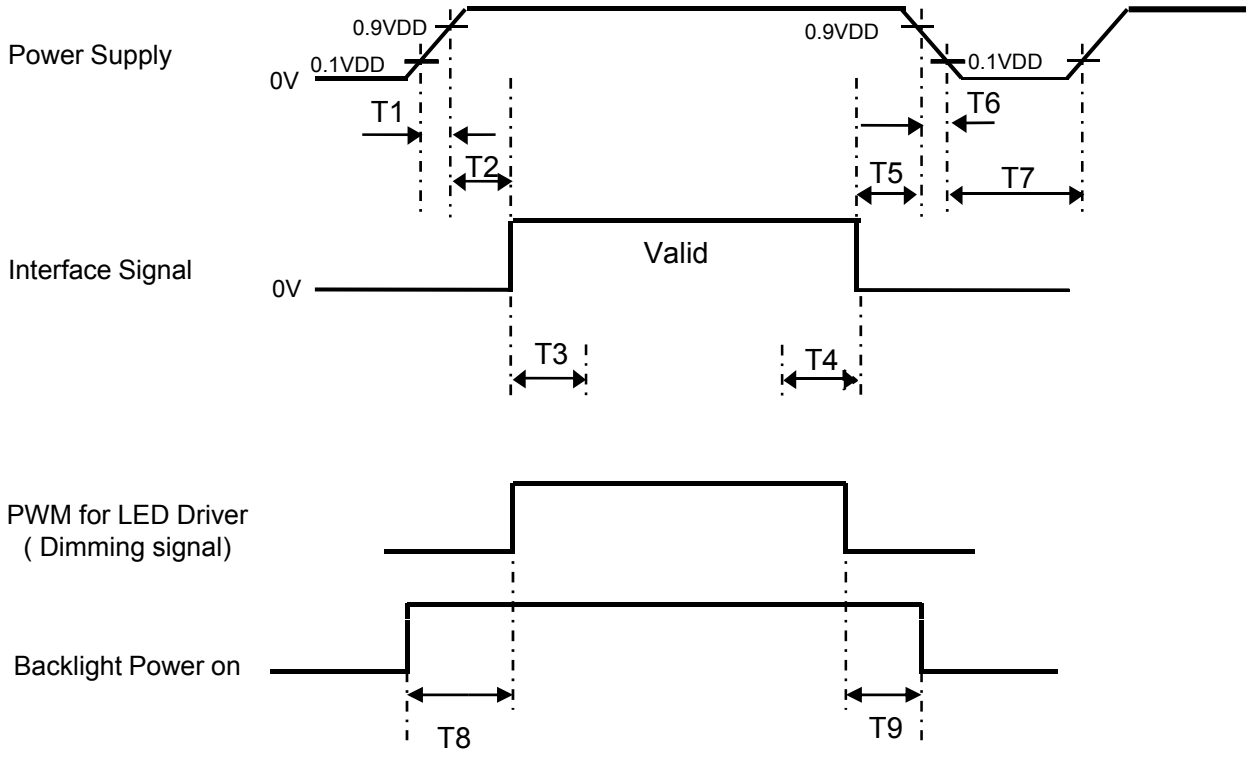
Parameters	Symbols	Min	Typ	Max	Unit	Condition
DCLK Frequency	F_{clk}	-	65	71	MHz	VDD=2.3V~3.6V
DCLK Cycle TIme	T_{Clk}	14.1	15.4	-	ns	
DCLK Pulse Duty	T_{Cwh}	40	50	60	%	Tclk
Time from HSD to Source Output	T_{hso}		64		DCLK	
Time from HSD to LD	T_{hld}		64	150	DCLK	
Time from HSD to STV	T_{hstv}		2		DCLK	
Time from HSD to CKV	T_{hckv}		20		DCLK	
Time from HSD to OEV	T_{hoev}		4		DCLK	
LD Pulse Width	T_{wld}		10		DCLK	
CKV Pulse Width	T_{wckv}		66		DCLK	
OEV Pulse Width	T_{woev}		74		DCLK	

8.0 INPUT SIGNALS, BASIC DISPLAY COLORS & GRAY SCALE OF COLORS

	Colors & Gray scale	Data signal																	
		R0	R1	R2	R3	R4	R5	G0	G1	G2	G3	G4	G5	B0	B1	B2	B3	B4	B5
Basic colors	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
	Green	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
	Light Blue	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
	Red	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	Purple	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Gray scale of Red	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Darker	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△ ▽			↑ ↓						↑ ↓						↑ ↓			
	Brighter	1	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	▽	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	Red	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Gray scale of Green	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
	Darker	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
	△ ▽			↑ ↓						↑ ↓						↑ ↓			
	Brighter	0	0	0	0	0	0	1	0	1	1	1	1	0	0	0	0	0	0
	▽	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0
	Green	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
Gray scale of Blue	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
	Darker	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
	△ ▽			↑ ↓						↓ ↓						↑ ↓			
	Brighter	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	1
	▽	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
Gray scale of White & Black	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0
	Darker	0	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0
	△ ▽			↑ ↓						↑ ↓						↑ ↓			
	Brighter	1	0	1	1	1	1	1	0	1	1	1	1	1	0	1	1	1	1
	▽	0	1	1	1	1	1	0	1	1	1	1	1	0	1	1	1	1	1
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

9.0 POWER SEQUENCE

To prevent a latch-up or DC operation of the LCD module, the power on/off sequence shall be as shown in below



- 0.5ms ≤ T1 ≤ 10 ms
- 0 ms ≤ T2 ≤ 50 ms
- 200 ms ≤ T3
- 0 ms ≤ T4
- 0 ms ≤ T5
- 0 ms ≤ T6 ≤ 10ms
- 150ms ≤ T7
- 0ms ≤ T8
- 0 ms ≤ T9

Notes:

1. When the power supply VDD is 0V, keep the level of input signals on the low or keep high impedance.
2. Do not keep the interface signal high impedance when power is on. Back Light must be turn on after power for logic and interface signal are valid.

10.0 Connector Description

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

10.1 TFT LCD Module

Connector Name /Description	For Signal Connector
Manufacturer	STM
Type/ Part Number	MSAK24025P40G
Mating housing/ Part Number	-

11.0 MECHANICAL CHARACTERISTICS

11.1 Dimensional Requirements

FIGURE 6 shows mechanical outlines for the model BA101WS1-100.
Other parameters are shown in Table 9.

<Table 9. Dimensional Parameters>

Parameter	Specification	Unit
Active Area	222.72 x 125.28	
Number of pixels	1024(H) X 600 (V) (1 pixel = R + G + B dots)	
Pixel pitch	0.2175X0.2088	
Pixel arrangement	RGB Vertical stripe	
Display colors	262,144	
Display mode	Normally white	
Dimensional outline	245±0.5×146.5±0.5×3.6(max)	mm
Weight	170	gram
Back Light	Connector : Hot Pad	
	LED, Horizontal LED Array type	

11.2 Mounting

See FIGURE 6.

11.3 Glare and Polarizer Hardness.

The surface of the LCD has a glare coating to maximize readability and hard coating to reduce scratching.

11.4 Light Leakage

There shall not be visible light from the back-lighting system around the edges of the screen as seen from a distance 50cm from the screen with an overhead light level of 350lux.

12.0 RELIABILITY TEST

The Reliability test items and its conditions are shown in below.

<Table 10. Reliability test>

No	Test Items	Conditions
1	High temperature storage test	Ta = 50 ℃, 240 hrs
2	Low temperature storage test	Ta = -20 ℃, 240 hrs
3	High temperature & high humidity operation test	Ta = 40 ℃, 90%RH, 240 hrs
4	High temperature operation test	Ta = 50 ℃, 240 hrs
5	Low temperature operation test	Ta = 0 ℃, 240 hrs
6	Thermal shock	Ta = -20 ℃ ↔ 60 ℃ (0.5 hr), 100 cycle
7	Vibration test (non-operating)	1.5G, 10~500Hz sine +X,+Y+Z Sweep rate : 60min.
8	Shock test (non-operating)	220G, Half Sine Wave 2msec ±X,±Y,±Z Once for each direction
9	Electro-static discharge test (non-operating)	Air : 150 pF, 330Ω, +-15 KV Contact : 150 pF, 330Ω, +-8 KV

13.0 HANDLING & CAUTIONS

(1) Cautions when taking out the module
- Pick the pouch only, when taking out module from a shipping package.

(2) Cautions for handling the module
- As the electrostatic discharges may break the LCD module, handle the LCD module with care. Peel a protection sheet off from the LCD panel surface as slowly as possible.
- As the LCD panel and back - light element are made from fragile glass material, impulse and pressure to the LCD module should be avoided.
- As the surface of the polarizer is very soft and easily scratched, use a soft dry cloth without chemicals for cleaning.
- Do not pull the interface connector in or out while the LCD module is operating.
- Put the module display side down on a flat horizontal plane.
- Handle connectors and cables with care.

(3) Cautions for the operation
- When the module is operating, do not lose CLK, ENAB signals. If any one of these signals is lost, the LCD panel would be damaged.
- Obey the supply voltage sequence. If wrong sequence is applied, the module would be damaged.

(4) Cautions for the atmosphere

- Dew drop atmosphere should be avoided.
- Do not store and/or operate the LCD module in a high temperature and/or humidity atmosphere. Storage in an electro-conductive polymer packing pouch and under relatively low temperature atmosphere is recommended.

(5) Cautions for the module characteristics

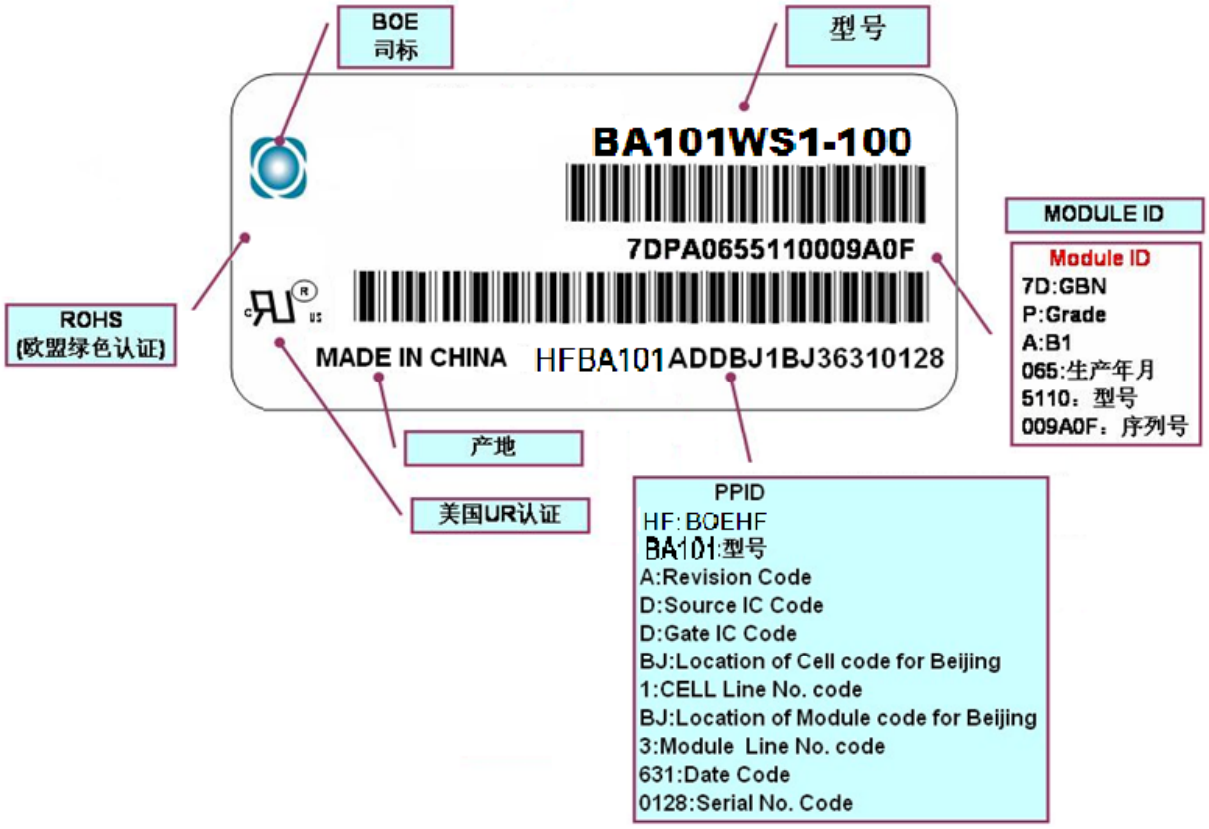
- Do not apply fixed pattern data signal to the LCD module at product aging.
- Applying fixed pattern for a long time may cause image sticking.

(6) Other cautions

- Do not disassemble and/or re-assemble LCD module.
- Do not re-adjust variable resistor or switch etc.
- When returning the module for repair or etc., Please pack the module not to be broken. We recommend to use the original shipping packages.

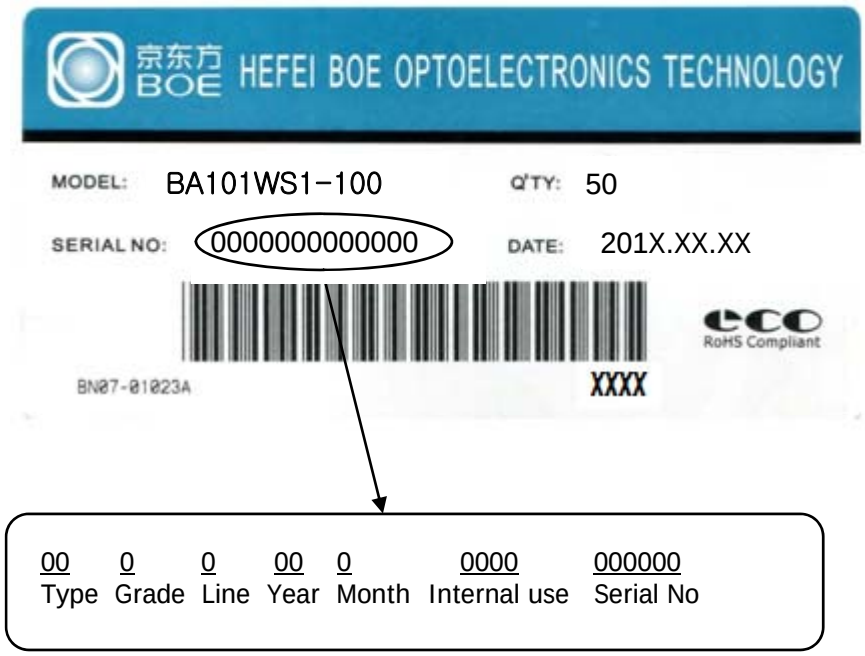
14.0 LABEL

(1) Product label



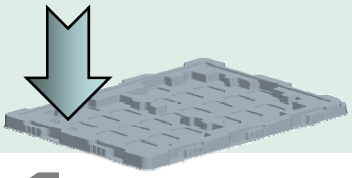
(2) Box label

Label Size: 110 mm (L) × 56 mm (W)
Contents
Model: BA101WS1-100
Q`ty: Module Q`ty in one box
Serial No.: Box Serial No. See next figure for detail description.
Date: Packing Date
Internal use of Product



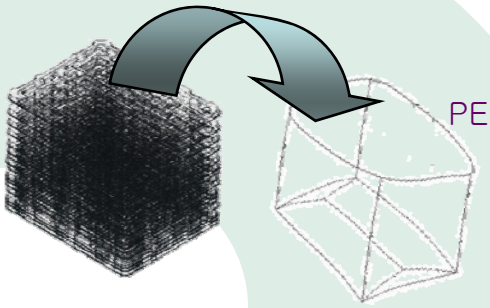
15.0 PACKING INFORMATION

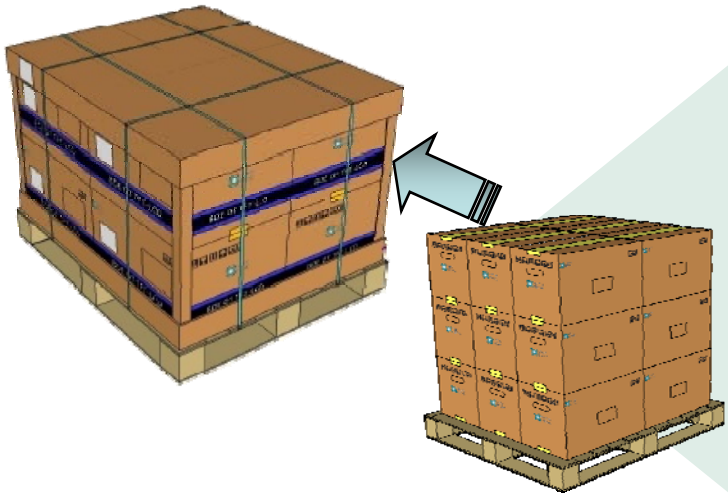
-. 将2pcs MDL依次平放入PET Tray
-. 人工方式；
-. 容量: 2pcs MDL/ PET Tray



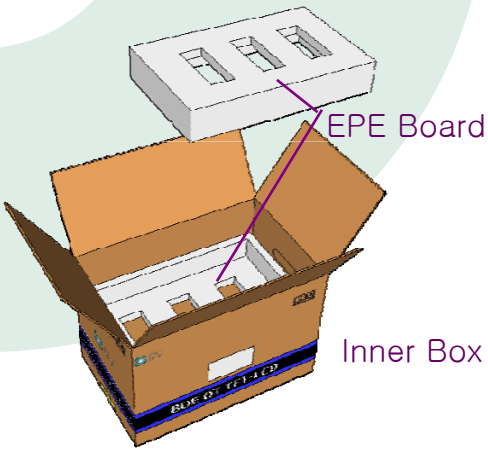
step 1 PET Tray

-. 将26pcs PET Tray 平放入PE Bag
-. 人工方式；
-. 容量: 50pcs/PE Bag





-. 每个Pallet上放3层Box，1层6箱,共计18ea Box
-. Pallet外包装 Top Cover & Paper Corner
-. 人工方式
-. 容量: 900pcs/Pallet



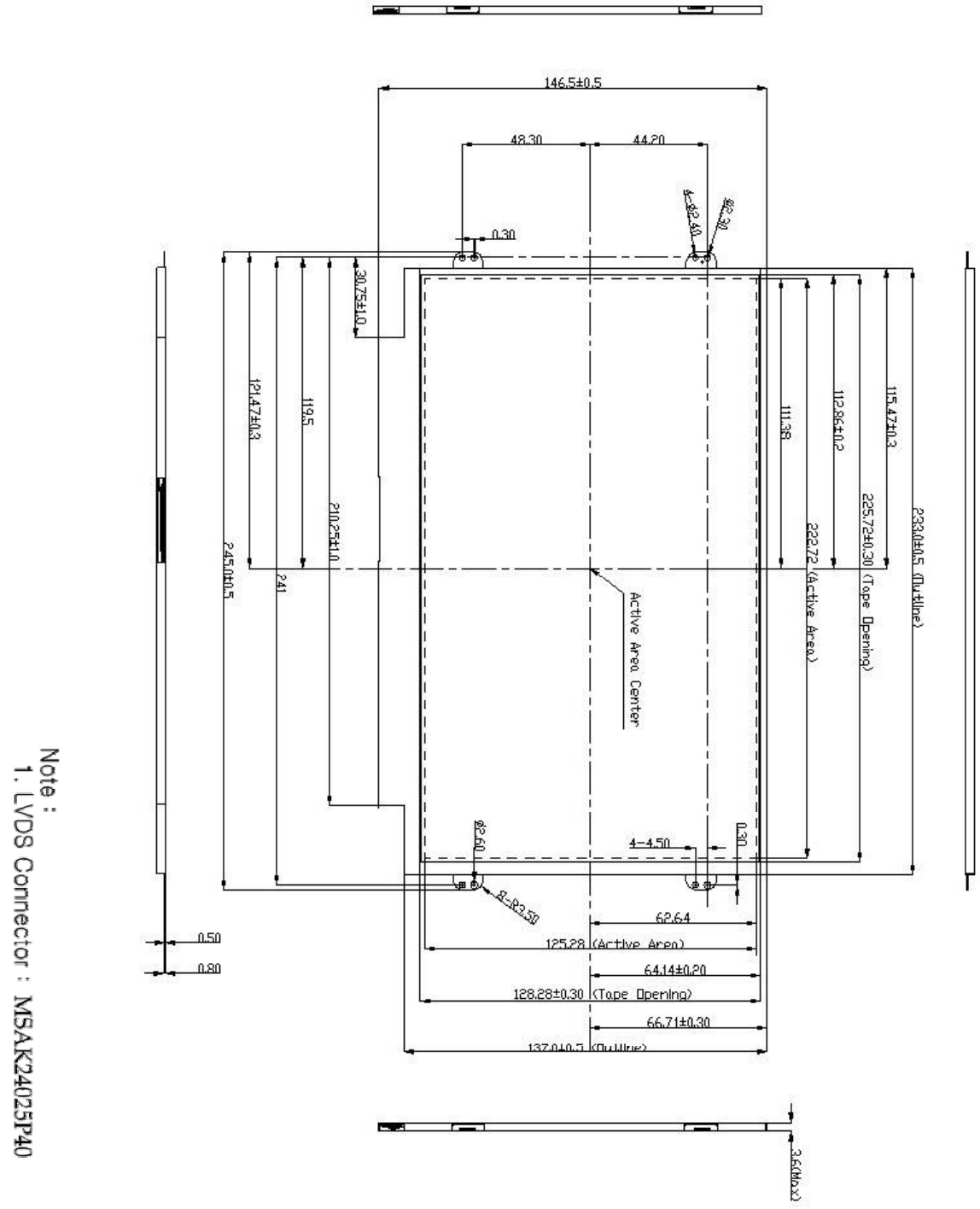
-.将PET Tray堆码后平放入Inner Box 上下放置EPE Board
-. 人工方式
-. 容量：50pcs/Inner Box

15.2 Notes

- Box Dimension: 496mm(W) x 396mm(D) x 290mm(H)
- Package Quantity in one Box: 50pcs
- Total Weight: 12kg ?

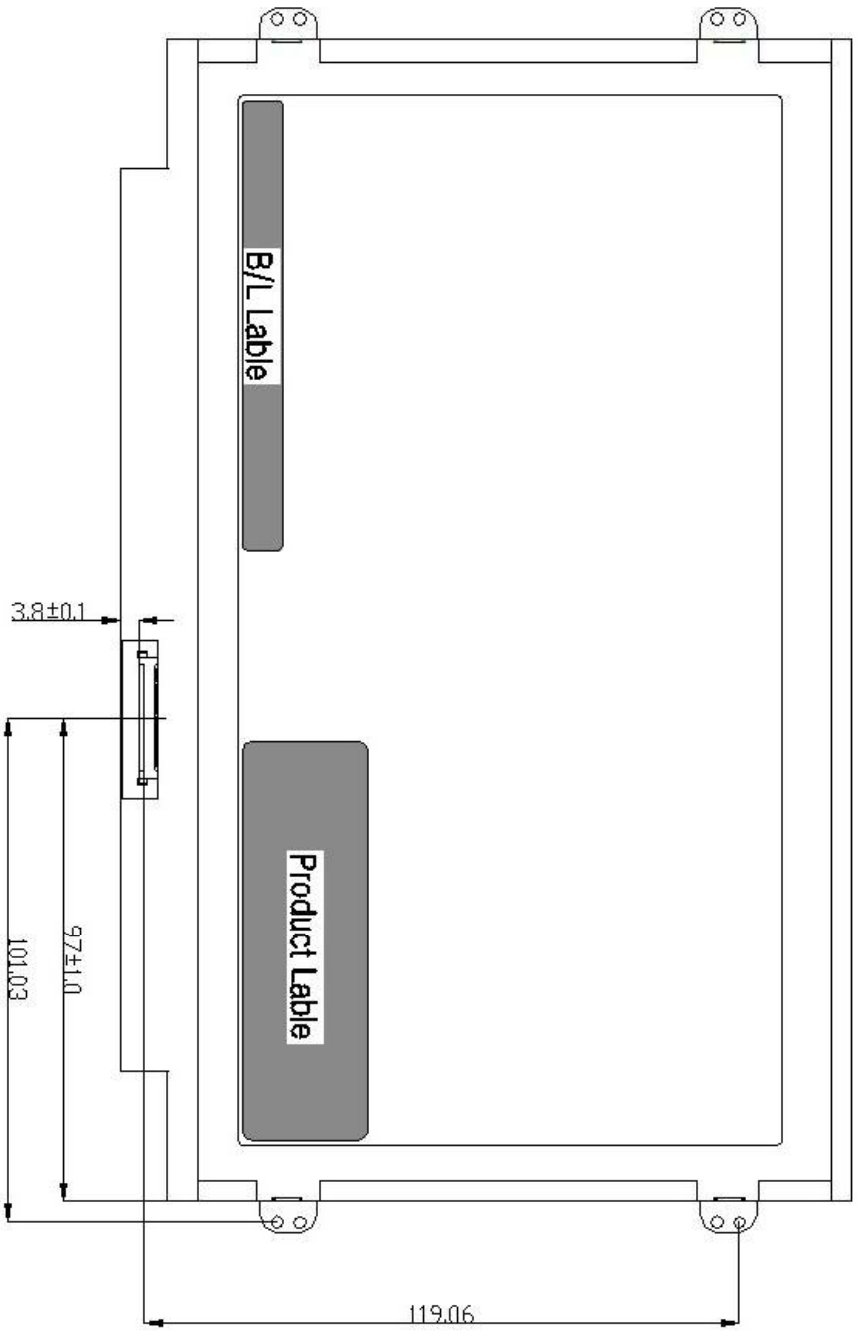
16.0 MECHANICAL OUTLINE DIMENSION

Figure 6. TFT-LCD Module Outline Dimension (Front View)



Note :
1. LVDS Connector : MSAK24025P40

Figure 7. TFT-LCD Module Outline Dimensions (Rear view)



Note :
1. LVDS Connector : MSAK24025P40

17.0 EDID Table

Address (HEX)	Function	Hex	Dec	crc	Input values.	Notes
00	Header	00	0		0	EDID Header
01		FF	255		255	
02		FF	255		255	
03		FF	255		255	
04		FF	255		255	
05		FF	255		255	
06		FF	255		255	
07		00	0		0	
08	ID Manufacturer Name	09	9		BOE	ID = BOE
09		E5	229			
0A	ID Product Code	B3	179		1459	ID = 1459
0B		05	5			
0C	32-bit serial No.	00	0			
0D		00	0			
0E		00	0			
0F		00	0			
10	Week of manufacture	1	1		1	
11	Year of Manufacture	15	21		2011	Manufactured in 2011
12	EDID Structure Ver.	01	1		1	EDID Ver 1.0
13	EDID revision #	04	4		4	EDID Rev. 0.4
14	Video input definition	90	144		-	
15	Max H image size	22	34		34	34 cm (Approx)
16	Max V image size	13	19		19	19 cm (Approx)
17	Display Gamma	78	120		2.2	Gamma curve = 2.2
18	Feature support	0A	10			RGB display, Preferred Timming mode
19	Red/Green low bits	F8	248		-	Red / Green Low Bits
1A	Blue/White low bits	90	144		-	Blue / White Low Bits
1B	Red x high bits	9E	158	631	0.617	Red (x) = 10011110 (0.617)
1C	Red y high bits	59	89	359	0.351	Red (y) = 01011001 (0.351)
1D	Green x high bits	55	85	342	0.334	Green (x) = 01010101 (0.334)
1E	Green y high bits	9C	156	624	0.610	Green (y) = 10011100 (0.61)
1F	Blue x high bits	26	38	154	0.151	Blue (x) = 00100110 (0.151)
20	BLue y high bits	1A	26	105	0.103	Blue (y) = 00011010 (0.103)
21	White x high bits	50	80	320	0.313	White (x) = 01010000 (0.313)
22	White y high bits	54	84	336	0.329	White (y) = 01010100 (0.329)

Address (HEX)	Function	Hex	Dec	crc	Input values.	Notes
23	Established timing 1	00	0		-	
24	Established timing 2	00	0		-	
25	Established timing 3	00	0		-	
26	Standard timing #1	01	1			Not Used
27		01	1			
28	Standard timing #2	01	1			Not Used
29		01	1			
2A	Standard timing #3	01	1			Not Used
2B		01	1			
2C	Standard timing #4	01	1			Not Used
2D		01	1			
2E	Standard timing #5	01	1			Not Used
2F		01	1			
30	Standard timing #6	01	1			Not Used
31		01	1			
32	Standard timing #7	01	1			Not Used
33		01	1			
34	Standard timing #8	01	1			Not Used
35		01	1			
36	Detailed timing/monitor descriptor #1	04	4		71.72	71.72MHz Main clock
37		1C	28			
38		56	86		1366	Hor Active = 1366
39		93	147		147	Hor Blanking = 147
3A		50	80		-	4 bits of Hor. Active + 4 bits of Hor. Blanking
3B		00	0		768	Ver Active = 768
3C		16	22		22	Ver Blanking = 22
3D		30	48		-	4 bits of Ver. Active + 4 bits of Ver. Blanking
3E		30	48		48	Hor Sync Offset = 48
3F		20	32		32	H Sync Pulse Width = 32
40		36	54		3	V sync Offset = 3 line
41		00	0		6	V Sync Pulse width : 6 line
42		58	88		344	Horizontal Image Size = 344 mm (Low 8 bits)
43		C1	193		193	Vertical Image Size = 193 mm (Low 8 bits)
44		10	16		-	4 bits of Hor Image Size + 4 bits of Ver Image Size
45		00	0		0	Hor Border (pixels)
46		00	0		0	Vertical Border (Lines)
47		1A	26			Refer to right table

Address (HEX)	Function	Hex	Dec	crc	Input values.	Notes
48	Detailed timing/monitor descriptor #2	D6	214		48.22	48.22MHz Main clock
49		12	18			
4A		56	86		1366	Hor Active = 1366
4B		A0	160		160	Hor Blanking = 160
4C		50	80		-	4 bits of Hor. Active + 4 bits of Hor. Blanking
4D		00	0		768	Ver Active = 768
4E		16	22		22	Ver Blanking = 22
4F		30	48		-	4 bits of Ver. Active + 4 bits of Ver. Blanking
50		30	48		48	Hor Sync Offset = 48
51		20	32		32	H Sync Pulse Width = 32
52		36	54		3	V sync Offset = 3 line
53		00	0		6	V Sync Pulse width : 6 line
54		58	88		344	Horizontal Image Size = 344 mm (Low 8 bits)
55		C1	193		193	Vertical Image Size = 193 mm (Low 8 bits)
56		10	16		-	4 bits of Hor Image Size + 4 bits of Ver Image Size
57		00	0		0	Hor Border (pixels)
58		00	0		0	Vertical Border (Lines)
59		1A	26			
5A	Detailed timing/monitor descriptor #3	00	0			ASCII Data Sting Tag
5B		00	0			
5C		00	0			
5D		FE	254			
5E		00	0			
5F		36	54		6	D/PN: 6D6V7
60		44	68		D	
61		36	54		6	
62		56	86		V	
63		37	55		7	
64		0A	10		1010	EDID: X10
65		48	72		H	BOE PN
66		42	66		B	
67		31	49		1	
68		35	53		5	
69		31	49		1	
6A		30	48		0	
6B		30	48		0	

Address (HEX)	Function	Hex	Dec	crc	Input values.	Notes
6C	Detailed timing/monitor descriptor #4	00	0			Product Name Tag (ASCII)
6D		00	0			
6E		00	0			
6F		00	0			
70		00	0			
71		00	0		00000000	6-bit Color Depth & no FRC
72		41	65		01000001	WLED & singal light bar & one light bar
73		01	1		00000001	Frame rate 40Hz~65Hz
74		94	148		10010110	Light Controller:PWM & Max. Luminance 220
75		01	1		00000001	Front Surface:Glossy & RGB v-stripe
76		00	0		00000000	no NTSC & no DBC
77		00	0		00000000	no Motion Blur & no Active Gamma
78		00	0		00000000	no Wireless Enhancement & no In-Cell Scanner
79		01	1		00000001	Single LVDS
7A		01	1		00000001	Built-In Self Test
7B		0A	10			
7C		20	32			
7D		20	32			
7E	Extension flag	00	0			
7F	Checksum	43	43	67	-	