

深圳市友创光显有限公司

ShenZhen You Chuang Technology Co., LTD.

PRODUCT SPECIFICATIONS

MODULE NO.: YCBOE101WSB

For Customer:	
Approved by:	
Signature:	
Date:	

Please sign the cover page of the spec for your approval and return it to our local sales **within a month** after your receipt of the spec from Fair. In the case Fair does not receive the signed spec even after one month later, in general we will consider that the spec was already accepted by your company.

Prepared	Checked	Approved

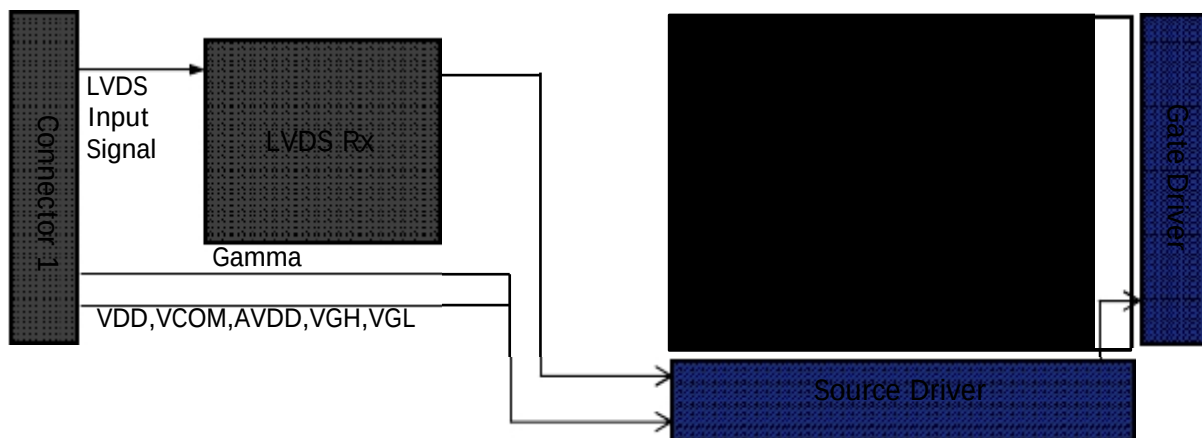
Contents

No.	Item	Page
1.0	General Description	4
2.0	Absolute Maximum Ratings	6
3.0	Electrical Specifications	7
4.0	Optical Specifications	8
5.0	Interface Connection	13
6.0	Power Sequence	18
7.0	Connector description	19
8.0	Mechanical Characteristics	20
9.0	Reliability Test	21
10.0	Handling & Cautions.	21
11.0	Label	22
12.0	Packing information	24
13.0	Mechanical Outline Dimension	25

1.0 GENERAL DESCRIPTION

1.1 Introduction

TT101WSB-NW0 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 16.7M 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
- 8-bit color depth, display 16.7M 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

- For Vehicle

1.4 General Specification

The followings are general specifications at the model TT101WSB-NW0. (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	16.7M	colors	
Display mode	Normally White		
Surface treatment	AG / Hardness 3H		

2.0 ABSOLUTE MAXIMUM RATINGS

2.1The 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>

Parameter	Symbol	Min.	Max.	Unit	Remarks
LC operating Voltage	V _{OP}		4.1	V	Ta=25+/-2°C
Operating Temperature (Humidity)	T _{OP}	-20	+70	°C	
	RH		90	%	At 60°C
Storage Temperature (Humidity)	T _{ST}	-30	+80	°C	
	RH		90	%	At 60°C

[1] Liquid Crystal driving voltage
Due to the characteristics of LC Material, this voltage varies with environmental temperature.

2.2 Backlight

ITEM	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT	NOTE
LED current	IL	Ta=25℃ (30mA/serise)	--	140	--	mA	
LED voltage	VL	Ta=25℃ (30mA/serise)		18.2	19.8	V	
Power consumption	WL	Ta=25℃ (30mA/serise)	--	3.53	--	W	
LED Lifetime	-	Ta=25℃ IF=30mA	30000	--	--	Hr	

Remarks:
*1)LED Circuit Diagram



*2) A: Anode(+), K: Cathode(-)
*3) Suggestion: Using the constant current control to avoid the leakage light and brightness quality issue.
*4) Definition of Led lifetime: Luminance < Initial luminance 50%.

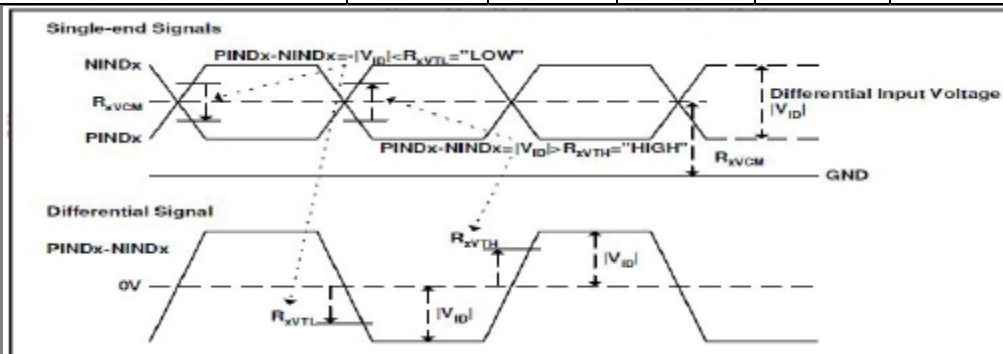
3.0 ELECTRICAL SPECIFICATIONS

3.1 Electrical Specifications

< Table 3. Electrical specifications >

Ta=25+/-2°C

Parameter		Symbol	Values			Unit	Notes
			Min	Typ	Max		
Power Supply Input Voltage		VDD	3	3.3	3.6	Vdc	
Power Supply Ripple Voltage		VRP			300	mV	
Analog Voltage		AVDD	9.4	9.6	9.8	V	
TFT Gate ON Voltage		VGH	20	21	22	V	
TFT Gate OFF Voltage		VGL	-9	-8	-7	V	
TFT Common Electrode Voltage		VCOM	2.66	3.16	3.76	V	
Power Consumption		PDD		0.33	0.45	Watt	1
Rush current		IRUSH	-	-	1	A	
LVDS Interface	Differential Input High Threshold Voltage	VLVTH	100		300	mV	
	Differential Input Low Threshold Voltage	VLVTL	-300		-100	mV	
	Common Input Voltage	VLVC	Vid /2	1.2	VDD-1.2	V	
	Differential input voltage	Vid	0.2	-	0.6		
CMOS Interface	Input High Threshold Voltage	VIH	2.6	-	3.3	V	
	Input Low Threshold Voltage	VIL	0	-	0.8	V	
Power Consumption		PDD	-	0.33	0.45	W	1



Notes : 1. The supply voltage is measured and specified at the interface connector of LCM. The current draw and power consumption specified is for VDD=3.3V, Frame rate 60Hz and Clock frequency = 51.2MHz. Test Pattern of power supply current
 a) Typ : Check Flag b) Max : Black

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 = $25 \pm 2^\circ\text{C}$) 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 $\theta_{0=0}$ ($=\theta_3$) as the 3 o'clock direction (the "right"), $\theta_{0=90}$ ($=\theta_{12}$) as the 12 o'clock direction ("upward"), $\theta_{0=180}$ ($=\theta_9$) as the 9 o'clock direction ("left") and $\theta_{0=270}$ ($=\theta_6$) as the 6 o'clock direction ("bottom"). While scanning θ and/or Φ , 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 $\pm 10\%$ at 25°C . Optimum viewing angle direction is 6 o'clock.

4.2 Optical Specifications

<Table 5. Optical Specifications>

Parameter			Symbol	Condition	Min	Typ	Max	Unit	Remark
Viewing Angle	Horizontal	Θ_3	CR > 10	-	80	-	Deg.	Note 1	
		Θ_9		-	80	-	Deg.		
	Vertical	Θ_{12}		-	60	-	Deg.		
		Θ_6		-	70	-	Deg.		
Color Temperature				-	-	-	K		
Color Gamut				$\Theta = 0^\circ$ (Center) Normal Viewing Angle	-	50	-	%	NTSC
Contrast ratio			CR		500	600	-		Note 2
Luminance of White	5 Points	Y_w	550		600	-	cd/m ²	Note 3	
White luminance uniformity	5 Points	ΔY_5	-		-	-	%	Note 4	
	13 Points	ΔY_{13}	-		-	-	%		
Reproduction of color	White	W_x	TYP. - 0.03		TYP. + 0.03		Note 5 Base on C-Light		
		W_y							
	Red	R_x							
		R_y							
	Green	G_x							
		G_y							
	Blue	B_x							
		B_y							
Response Time		T_g	-	25	40	ms	Note 6		
Gamma Scale				-	-	-			

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 $\theta = 0^\circ$ 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.

Luminance when displaying a white raster

Luminance when displaying a black raster

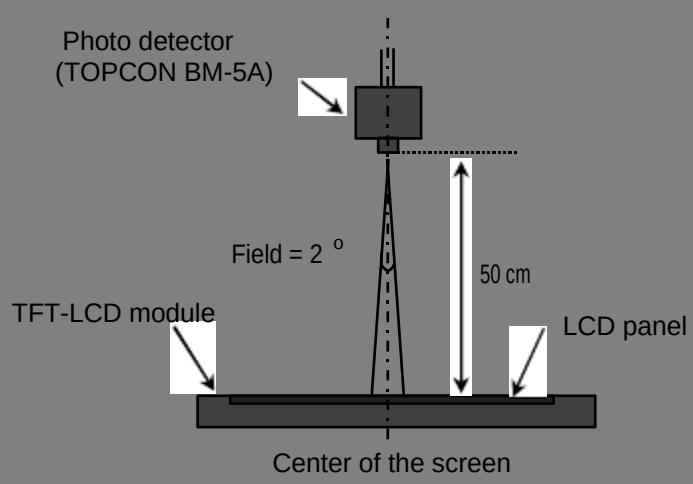
3. Center Luminance of white is defined as the LCD surface. Luminance shall be measured with all pixels in the view field set first to white. This measurement shall be taken at the locations shown in FIGURE 2 for a total of the measurements per display.
4. The White luminance uniformity on LCD surface is then expressed as :

$$\Delta Y5 = (\text{Minimum Luminance of 5 points} / \text{Maximum Luminance of 5 points}) * 100$$

$$\Delta Y13 = (\text{Minimum Luminance of 13 points} / \text{Maximum Luminance of 13 points}) * 100$$
 (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.

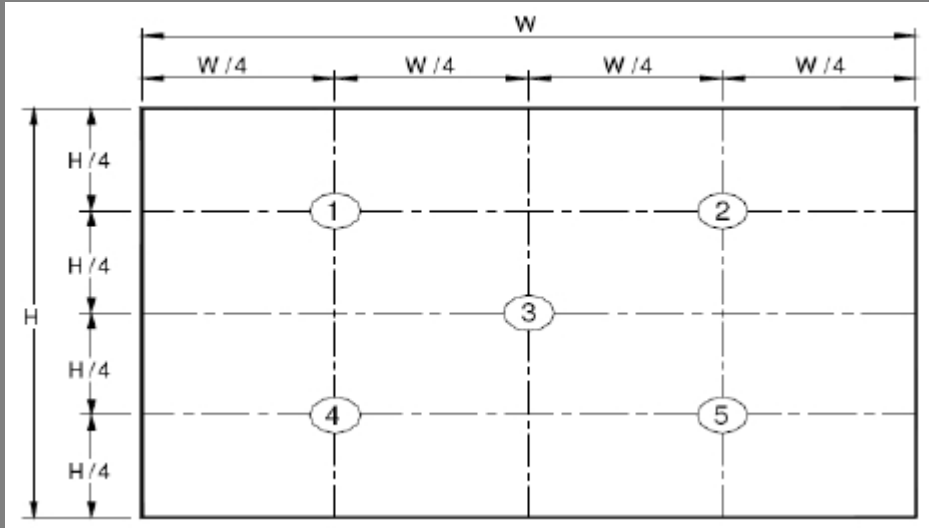
4.3 Optical measurements

Figure 1. Measurement Set Up



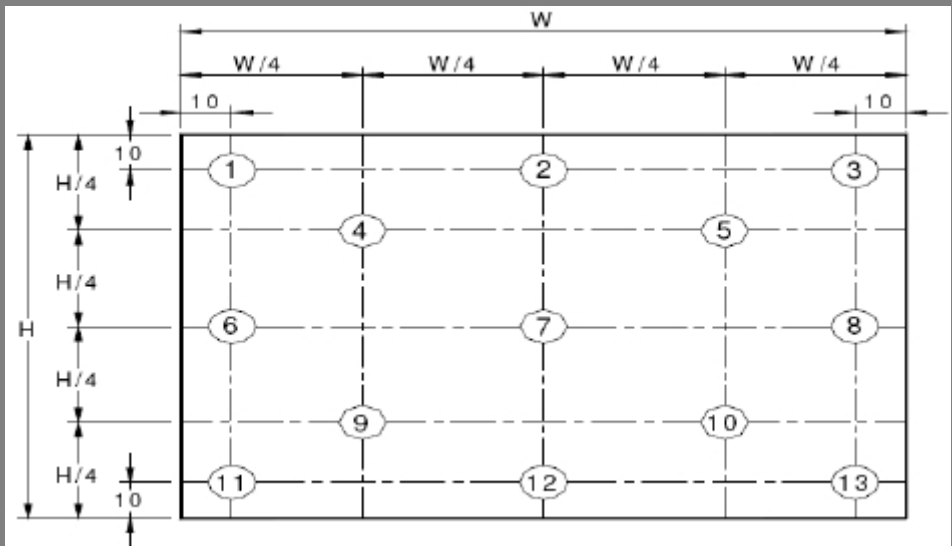
Optical characteristics measurement setup

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



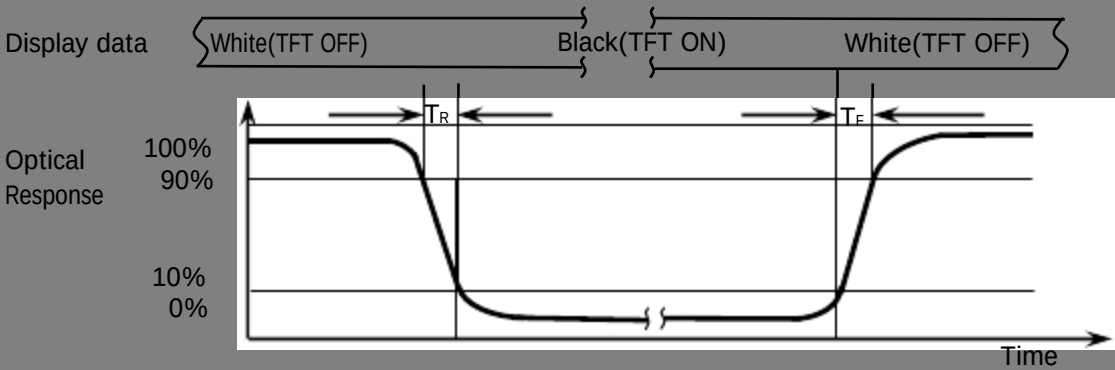
Center Luminance of white is defined as luminance values of center 5 points across the LCD surface. Luminance shall be measured with all pixels in the view field set first to white. This measurement shall be taken at the locations shown in FIGURE 2 for a total of the measurements per display.

Figure 3. Uniformity Measurement Locations (13 points)



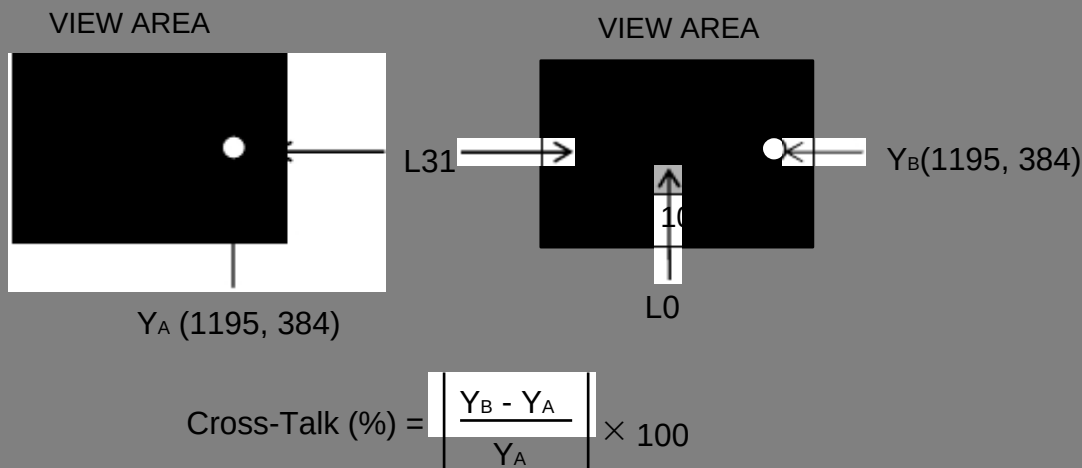
The White luminance uniformity on LCD surface is then expressed as : $\Delta Y5 = \text{Minimum Luminance of five points} / \text{Maximum Luminance of five points}$ (see FIGURE 2) , $\Delta Y13 = \text{Minimum Luminance of 13 points} / \text{Maximum Luminance of 13 points}$ (see FIGURE 3).

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 T_d and 90% to 10% is T_r .

Figure 5. Cross Modulation Test Description



Where:

Y_A = Initial luminance of measured area (cd/m²)

Y_B = Subsequent luminance of measured area (cd/m²)

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 089K60-000100-G2-R. The connector interface pin assignments are listed in Table 6.

<Table 6. Pin Assignments for the Interface Connector>

Pin No.	Symbol	Description	Remark
1	AGND	Analog ground	
2	AVDD	Analog Power	
3	DVDD	Digital Power Supply +3.3V	
4	GND	Digital ground	
5	VCOM	Common voltage	
6	DVDD	Digital Power Supply +3.3V	
7	GND	Digital ground	
8	V14	Gamma correction voltage reference	
9	V13	Gamma correction voltage reference	
10	V12	Gamma correction voltage reference	
11	V11	Gamma correction voltage reference	
12	V10	Gamma correction voltage reference	
13	V9	Gamma correction voltage reference	
14	V8	Gamma correction voltage reference	
15	GND	Digital ground	
16	DVDD_LVDS	LVDS Power , same to DVDD	
17	GND	Digital ground	
18	PIND3	Positive LVDS differential data input	
19	NIND3	Negative LVDS differential data input	
20	GND	Digital ground	
21	PINC	Positive LVDS differential clock input	
22	NINC	Negative LVDS differential clock input	
23	GND	Digital ground	
24	PIND2	Positive LVDS differential data input	
25	NIND2	Negative LVDS differential data input	
26	GND	Digital ground	
27	PIND1	Positive LVDS differential data input	
28	NIND1	Negative LVDS differential data input	
29	GND	Digital ground	
30	PIND0	Positive LVDS differential data input	

tage of these pins must be:
1<V14<V13<V12<V11<V10<V9<V8;
5<V4<V3<V2<V1< AVDD-0.1 .

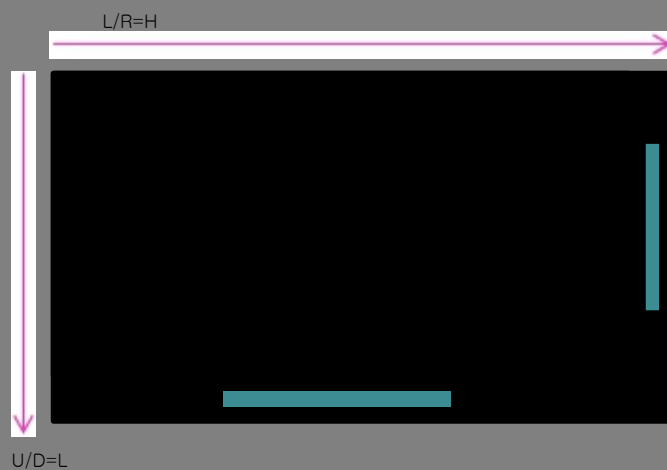
理论计算值									
电压	数值	单位		电阻	数值	单位			
AVDD	9.6	伏特		R301	700	欧姆	R302	0	欧姆
V1	8.2	伏特		R303	100	欧姆			
V2	8	伏特		R304	655	欧姆			
V3	6.69	伏特		R305	245	欧姆			
V4	6.2	伏特		R306	180	欧姆			
V5	5.84	伏特		R307	370	欧姆			
V6	5.1	伏特		R308	350	欧姆			
V7	4.4	伏特		R309	200	欧姆			
V8	4	伏特		R311	350	欧姆			
V9	3.3	伏特		R312	370	欧姆	R310	0	欧姆
V10	2.56	伏特		R313	180	欧姆			
V11	2.2	伏特		R314	245	欧姆			
V12	1.71	伏特		R315	655	欧姆			
V13	0.4	伏特		R316	100	欧姆			
V14	0.2	伏特		R317	100	欧姆	R318	0	欧姆

Note.1
Suggest to connection with an RC reset circuit for stability , Normally pull high . (R=10K , C=0.1uF)

Note. 2
-STBYB="H (3.3V)": normal operation ;
-STBYB="L (GND)": timing controller, source driver will turn off, all output are High-Z

Note.3

Scan Control Input		Scanning direction
L/R	U/D	
VDD	GND	Up to Down, Left to Right
GND	GND	Up to Down, Right to Left
VDD	VDD	Down to Up, Left to Right
GND	VDD	Down to Up, Right to Left



Note. 4

- DITH="1" , Enable internal dithering function
- DITH="0" , Disable internal dithering function

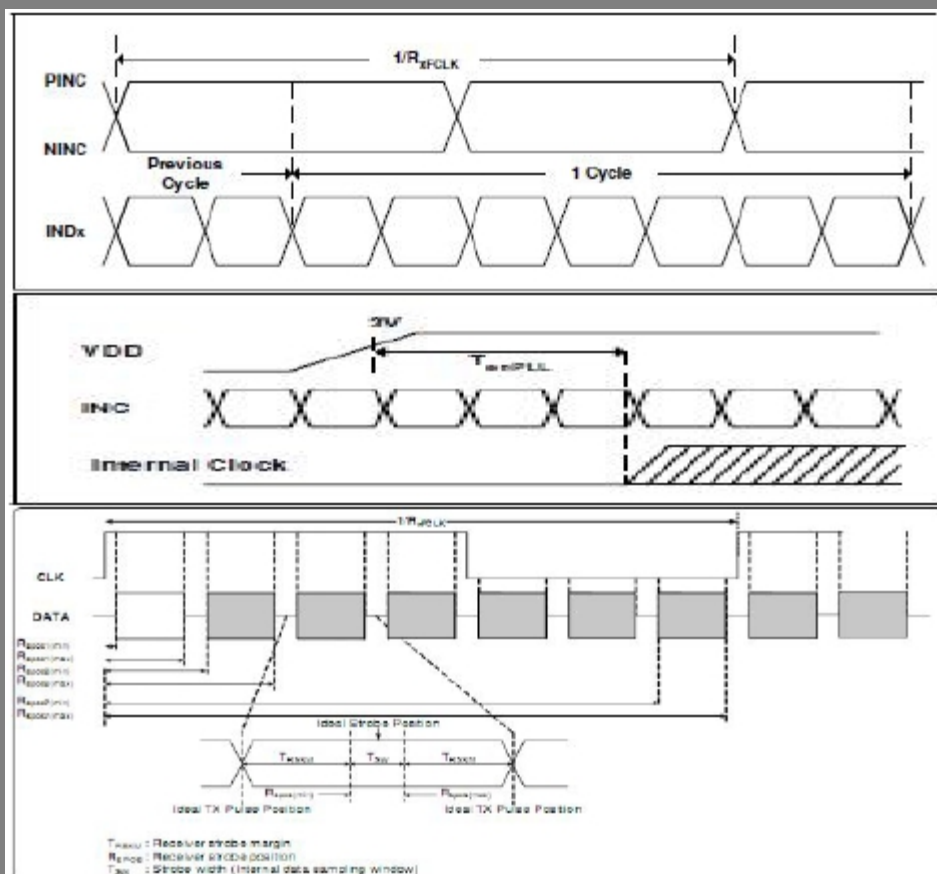
Note. 5

- SELB="H (3.3V)": 6 bit ;
- SELB="L (GND)": 8 bit ;

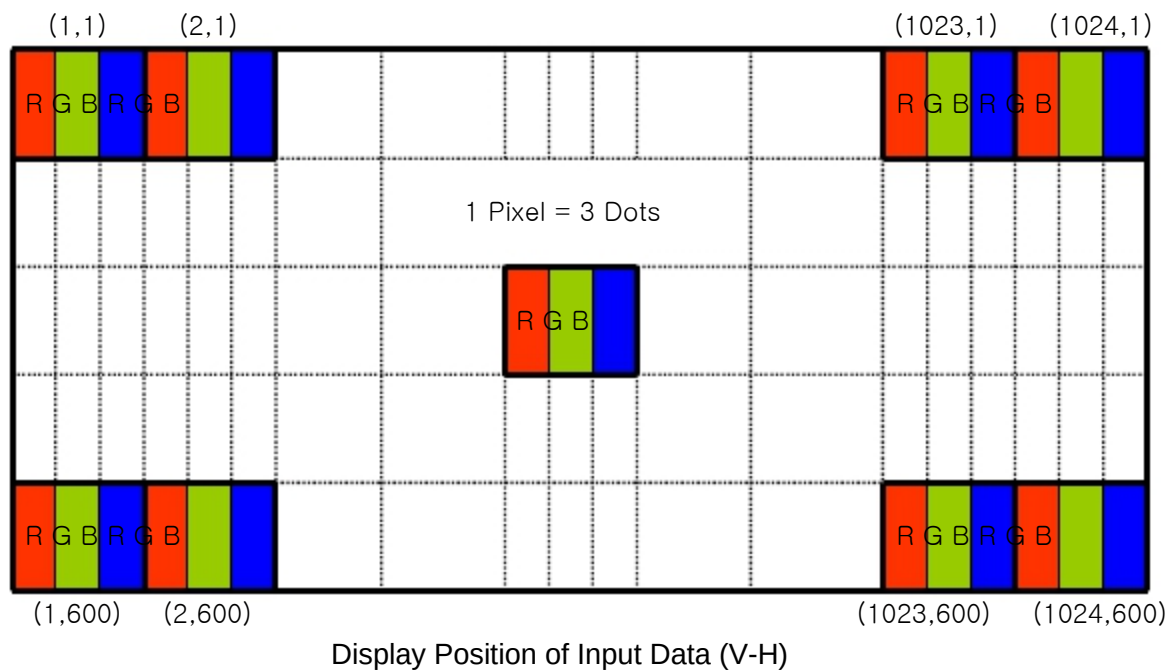
5-2. LVDS signal

< Table 5. AC Electrical Characteristics>

Parameter	Symbol	Min	Typ	Max	Unit	Condition
Clock frequency	RxFCLK	40.8	51.2	67.2	MHz	
Input data skew margin	TRSKM	500	-	-	ps	VID =400mV RxVCM=1.2V RxFCLK=71MHz
Clock high time	TLVCH	-	$\frac{4}{(7 \cdot RxFCLK)}$		ns	
Clock low time	TLVCL		$\frac{3}{(7 \cdot RxFCLK)}$		ns	
PLL wake-up time	TenPLL			150	us	



5.3 Data Input Format

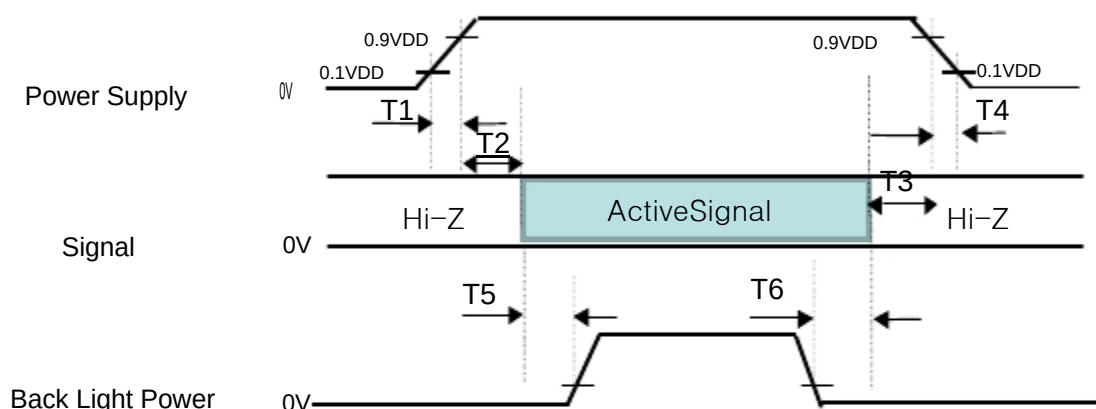


5.4 Back-light & LCM Interface Connection

Interface Connector: Two Hot Pad

6.0 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



- $0.5\text{ms} \leq T1 \leq 10\text{ms}$
- $0\text{ms} \leq T2$
- $0\text{ms} \leq T3$
- $0\text{ms} \leq T4 \leq 10\text{ms}$
- $100\text{ms} \leq T5 \leq 300\text{ms}$
- $100\text{ms} \leq T6 \leq 300\text{ms}$

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.

7.0 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.

7.1 TFT LCD Module

Connector Name /Description	For Signal Connector
Manufacturer	STARCONN
Type/ Part Number	089K60-000100-G2-R
Mating housing/ Part Number	-

8.0 MECHANICAL CHARACTERISTICS

8.1 Dimensional Requirements

FIGURE 6 shows mechanical outlines for the model TT101WSB-NW0.
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	

8.2 Mounting

See FIGURE 6.

8.3 Glare and Polarizer Hardness.

The surface of the LCD has a Anti-glare coating and hard coating to reduce scratching.

8.4 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.

9.0 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 = 80 °C, 240 hrs
2	Low temperature storage test	Ta = -30 °C, 240 hrs
3	High temperature & high humidity operation test	Ta = 60 °C, 90%RH, 240hrs
4	High temperature operation test	Ta = 70 °C, 240hrs
5	Low temperature operation test	Ta = -20 °C, 240hrs
6	Thermal shock	Ta = -30 °C ↔ 80 °C (0.5 hr), 100 cycle
7	Vibration test (non-operating)	1.47G, 5~500Hz sine +X,+Y+Z Sweep rate : 30min.
8	Shock test (non-operating)	100G, Half Sine Wave 2msec ±X,±Y,±Z Once for each direction
9	Electro-static discharge test (non-operating)	Air : 150 pF, 330Ω, +-6 KV Contact : 150 pF, 330Ω, +-4 KV

10.0 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.

13.0 MECHANICAL OUTLINE DIMENSION

Figure 6. TFT-LCD FOG Outline Dimension

