



LCD MODULE SPECIFICATION

Customer: _____
 Model Name: FT101-EDC04 V.0
 Date: 2014/08/15
 Version: 01

- Preliminary Specification
- Final Specification

Brightness: 1000nits

(From NJ101IA-01S, change backlight ,LED driver board included)

Customer	Date
Checked & Approved by	
_____	_____
Note: This Specification is subject to change without notice.	

Approved by	Date
<u>Michael Yeh</u>	<u>2014/09/19</u>
Prepared by	
_____	_____



Record of Revision

Version	Revise Date	Page	Content
Pre-Spec.01	2014/08/15	All	Initial Release



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1. General Specifications

No.	Item	Specification	Remark
1	LCD size	10.1 inch(Diagonal)	
2	Driver element	a-Si TFT active matrix	
3	Resolution	1280 × 3(RGB) × 800	
4	Display mode	Normally Black, Transmissive	
5	Dot pitch	0.0565(W) × 0.1695(H) mm	
6	Active area	216.96(W) × 135.60(H) mm	
7	Module size	229.46(W) × 149.1(H) × 4.8(D) mm	Note 1
8	Surface treatment	HC	
9	Color arrangement	RGB-stripe	
10	Interface	Digital	
11	Backlight power consumption	5.4W(Typ.)	
12	Panel power consumption	0.7W(Typ.)	Note 2
13	Weight	TBD(Typ.)	

Note 1: Refer to Mechanical Drawing.

Note 2: Including T-con Board power consumption



2. Pin Assignment

A 40pin connector is used for the module electronics interface. The recommended model is F62240-H1210B manufactured by Vigorconn.

Pin No.	Symbol	I/O	Function	Remarks
1	VCOM	P	Common Voltage	
2	VDD	P	Power Supply	
3	VDD	P	Power Supply	
4	NC	---	No connection	
5	NC	---	No connection	
6	NC	---	No connection	
7	GND	P	Ground	
8	Rxin0-	I	-LVDS Differential Data Input	R0-R5, G0
9	Rxin0+	I	+LVDS Differential Data Input	
10	GND	P	Ground	
11	Rxin1-	I	-LVDS Differential Data Input	G1~G5, B0,B1
12	Rxin1+	I	+LVDS Differential Data Input	
13	GND	P	Ground	
14	Rxin2-	I	-LVDS Differential Data Input	B2-B5, HS, VS, DE
15	Rxin2+	I	+LVDS Differential Data Input	
16	GND	P	Ground	
17	RxCLK-	I	-LVDS Differential Clock Input	LVDS CLK
18	RxCLK+	I	+LVDS Differential Clock Input	
19	GND	P	Ground	
20	Rxin3-	I	-LVDS Differential Data Input	R6, R7, G6, G7, B6, B7
21	Rxin3+	I	+LVDS Differential Data Input	
22	GND	P	Ground	
23	NC	---	No connection	
24	NC	---	No connection	
25	GND	P	Ground	
26	NC	---	No connection	
27	NC	---	No connection	
28	NC	---	No connection	
29	AVDD	P	Power for Analog Circuit	
30	GND	P	Ground	



Pin No.	Symbol	I/O	Function	Remarks
31	NC	---	No connection	
32	NC	---	No connection	
33	NC	---	No connection	
34	NC	---	No connection	
35	VGL	P	Gate OFF Voltage	
36	NC	---	No connection	
37	CABC_EN	I	CABC Enable Input	Note1
38	VGH	P	Gate ON Voltage	
39	NC	---	No connection	NC
40	NC	---	No connection	NC

I: input, O: output, P: Power

Note1: The setting of CABC function are as follows.

Pin	Enable	Disable
CABC_EN	High Voltage	Low Voltage or open



3. Operation Specifications

3.1. Absolute Maximum Ratings

(Note 1)

Item	Symbol	Values		Unit	Remark
		Min.	Max.		
Power voltage	VDD	-0.3	3.9	V	
	AVDD	-0.3	14	V	
	V _{GH}	-0.3	42.0	V	
	V _{GL}	-19	0.3	V	
	V _{GH} -V _{GL}	12	40.0	V	
Operation Temperature	T _{OP}	-20	80	°C	
Storage Temperature	T _{ST}	---	---	°C	
LED Reverse Voltage	V _R	---	5	V	Each LED
LED Light Bar Forward Current	I _F	---	300	mA	Light Bar

Note 1: The absolute maximum rating values of this product are not allowed to be exceeded at any times. Should a module be used with any of the absolute maximum ratings exceeded, the characteristics of the module may not be recovered, or in an extreme case, the module may be permanently destroyed.

**3.1.1. Current Consumption**

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Current for Driver	I_{GH}	-	705	1000	μA	$V_{GH} = 22V$
	I_{GL}	-	705	1000	μA	$V_{GL} = -7V$
	$I_{V_{DD}}$	-	95	120	mA	$V_{DD} = 2.5V$
	$I_{AV_{DD}}$	-	45	70	mA	$AV_{DD} = 8.2V$

3.1.2. Backlight Driving Conditions

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Voltage for LED light bar	V_L	---	18	---	V	Note 1
Current for LED light bar	I_L	---	300	330	mA	
LED life time	-	50000		-	Hr	Note 2

Note 1: The LED Supply Voltage is defined by the number of LED at $T_a = 25^\circ C$ and $I_L = 300mA$.

Note 2: The "LED life time" is defined as the module brightness decrease to 50% original brightness at $T_a = 25^\circ C$ and $I_L = 300mA$. The LED lifetime could be decreased if operating I_L is larger than 300mA.



3.2. Typical Operation Conditions

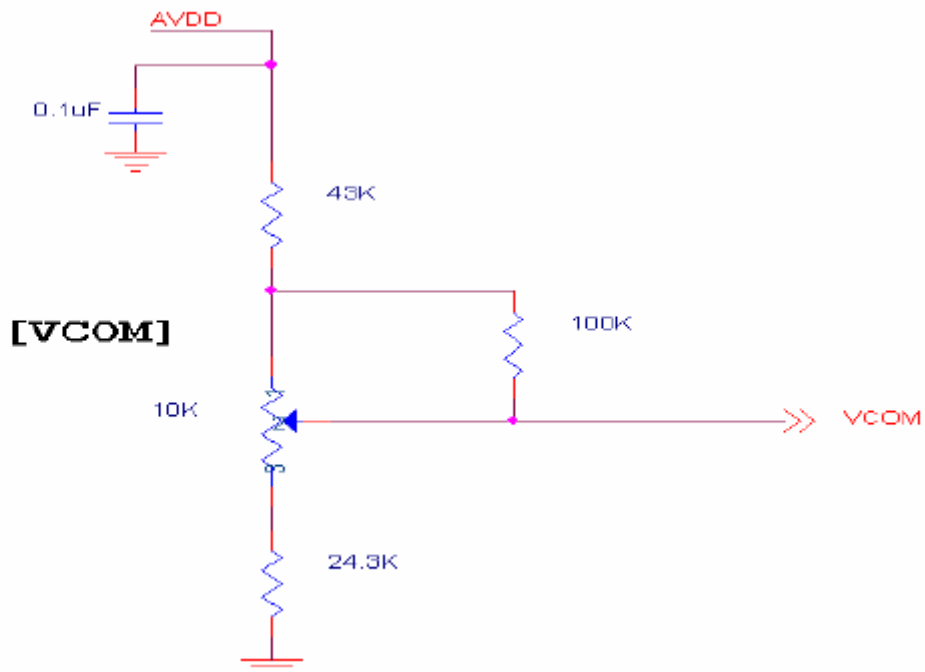
(Note 1)

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Power voltage	VDD	2.3	2.5	2.7	V	Note 2
	AVDD	8.0	8.2	8.4	V	
	V _{GH}	21.7	22	22.3	V	
	V _{GL}	-7.3	-7	-6.7	V	
Input signal voltage	VCOM	2.7	3.0	3.3	V	Note 4
Input logic high voltage	V _{IH}	0.8 VDD	-	3.6	V	Note 3
Input logic low voltage	V _{IL}	0	-	0.2 DV _{DD}	V	

Note 1: Be sure to apply VDD and V_{GL} to the LCD first, and then apply V_{GH}.

Note 2: VDD setting should match the signals output voltage (refer to Note 3) of customer's system board.

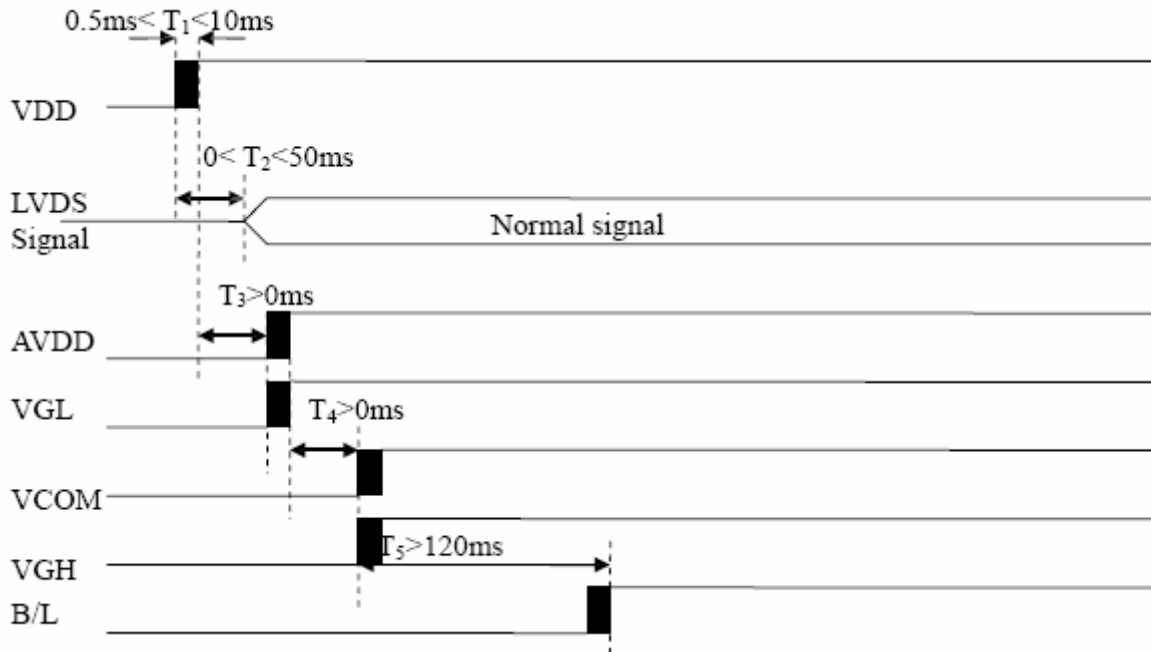
Note 4: Typical VCOM is only a reference value, it must be optimized according to each LCM. Be sure to use VR.



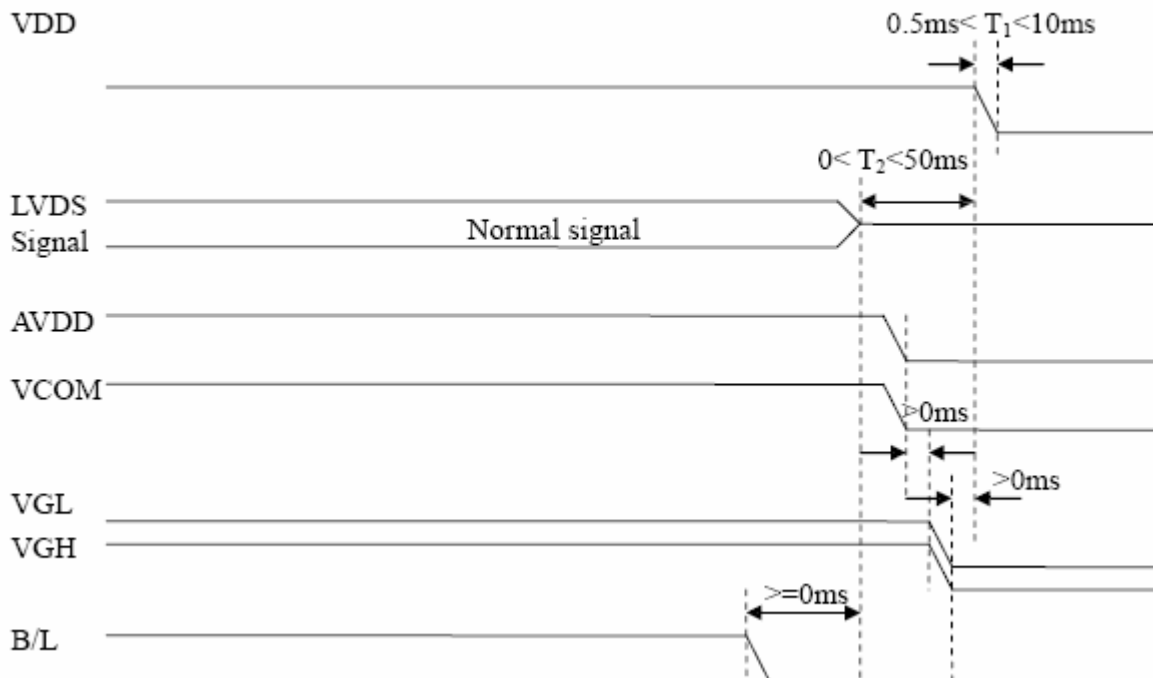


3.3. Power Sequence

a. Power on:



b. Power off:

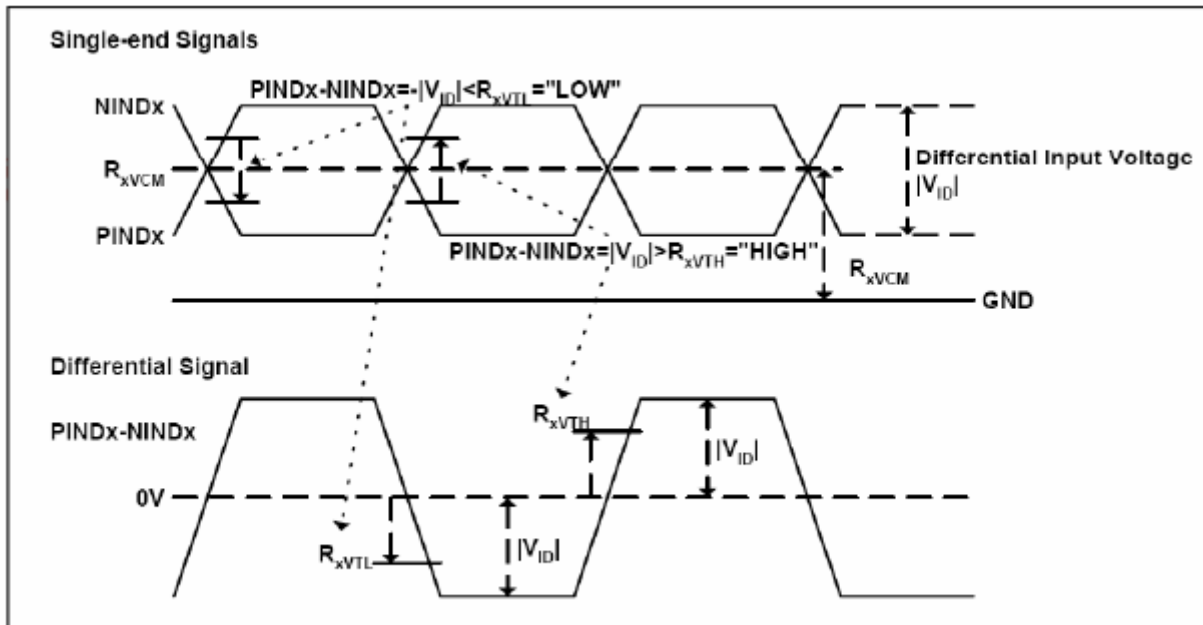




3.4. LVDS Signal Timing Characteristics

3.4.1. AC Electrical Characteristics

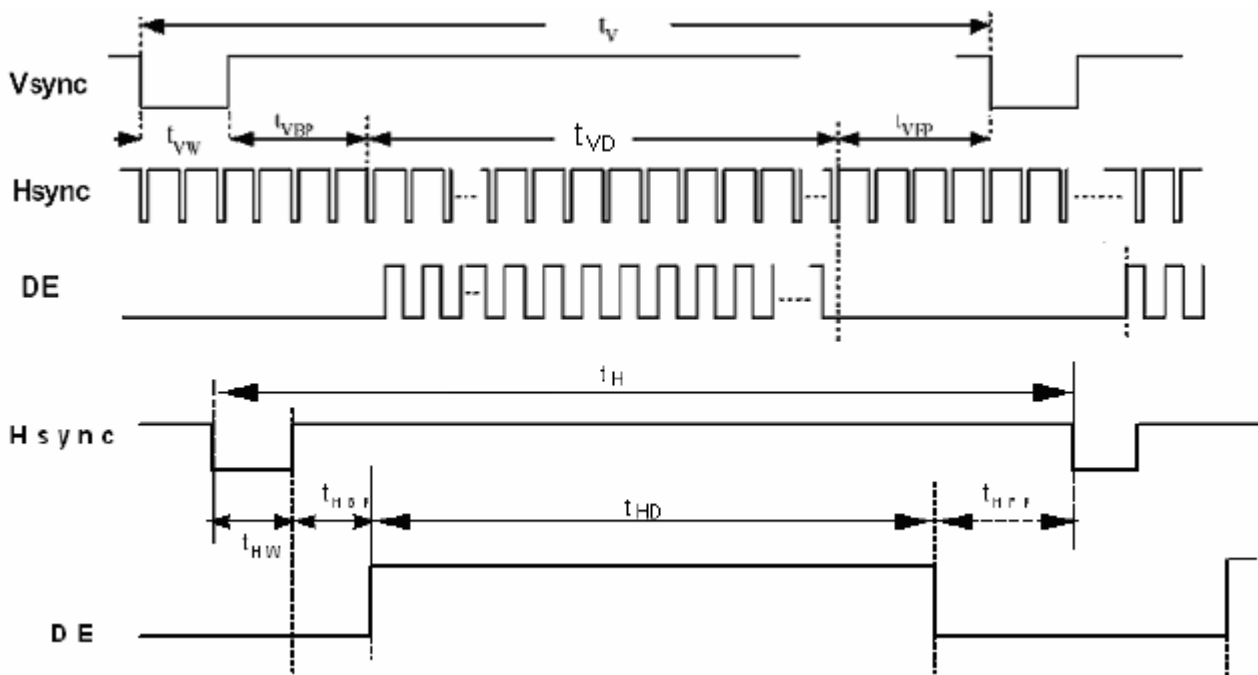
Parameter	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
LVDS Differential input high Threshold voltage	R_{xVTH}	-	-	+100	mV	$R_{xVCM}=1.2V$
LVDS Differential input low Threshold voltage	R_{xVTL}	-100	-	-	mV	
LVDS Differential input common mode voltage	R_{xVCM}	0.7	-	1.6	V	
LVDS Differential voltage	$ V_{ID} $	200	-	600	mV	





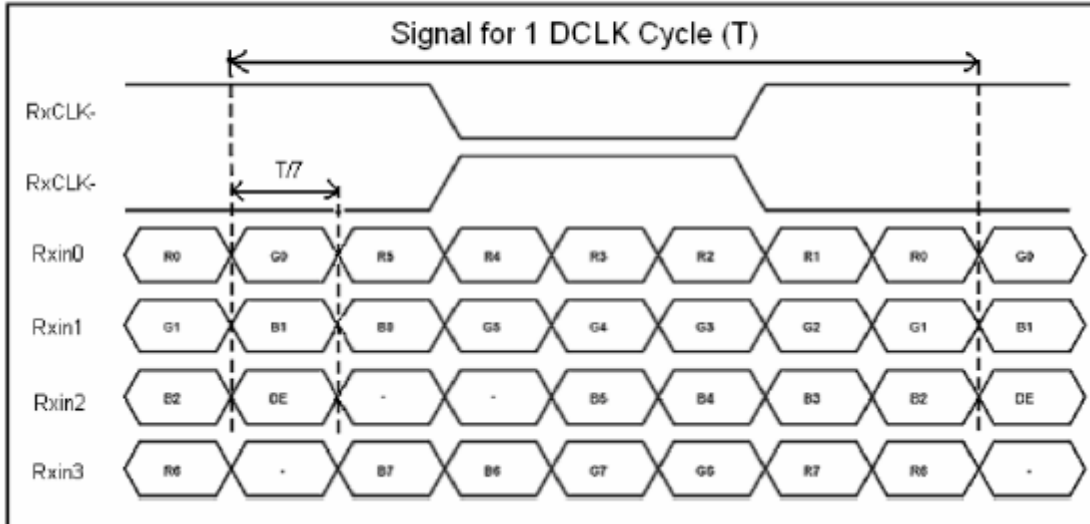
3.4.2. Timing Table

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Clock Frequency	1/Tc	68.9	71.1	73.4	MHz	Frame rate =60Hz
Horizontal display area	tHD	1280			Tc	
HS period time	tH	1410	1440	1470	Tc	
HS Width +Back Porch +Front Porch	tHW+ tHBP +tHFP	130	160	190	Tc	
Vertical display area	tVD	800			tH	
VS period time	tV	815	823	833	tH	
VS Width +Back Porch +Front Porch	tVW+ tVBP +tVFP	15	23	33	tH	





3.4.3. LVDS Data Input Format





4. Optical Specifications

Item	Symbol	Condition	Values			Unit	Remark
			Min.	Typ.	Max.		
Viewing angle (CR \geq 10)	θ_L	$\theta=180^\circ$ (9 o'clock)	75	85	-	degree	Note 1
	θ_R	$\theta=0^\circ$ (3 o'clock)	75	85	-		
	θ_T	$\theta=90^\circ$ (12 o'clock)	75	85	-		
	θ_B	$\theta=270^\circ$ (6 o'clock)	75	85	-		
Response time	T_{ON}	Normal $\theta=0^\circ$	-	10	20	msec	Note 3
	T_{OFF}		-	15	30	msec	Note 3
Contrast ratio	CR		600	800	-	-	Note 4
Color chromaticity	W_X		0.26	0.31	0.36	-	Note 2 Note 5 Note 6
	W_Y		0.27	0.32	0.37	-	
Luminance	L		900	1000	-	cd/m ²	Note 6
Luminance uniformity	Y_U		75	80	-	%	Note 7

Test Conditions:

1. VDD=2.5V, the ambient temperature is 25°C.
2. The test systems refer to Note 2.



Note 1: Definition of viewing angle range

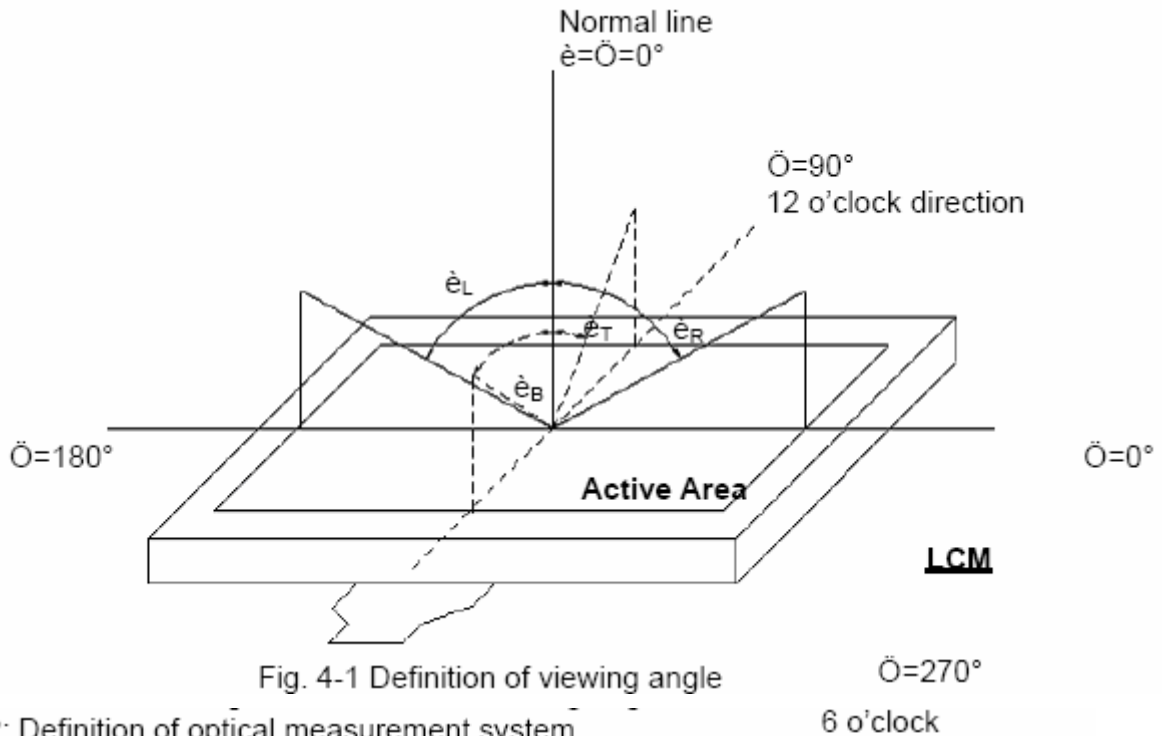


Fig. 4-1 Definition of viewing angle

Note 2: Definition of optical measurement system.

The optical characteristics should be measured in dark room. After 30 minutes operation, the optical properties are measured at the center point of the LCD screen. (Viewing angle is measured by ELDIM-EZ contrast/Height : 1.2mm, Response time is measured by Photo detector TOPCON BM-7, other items are measured by BM-5A/ Field of view: 1° /Height: 500mm.)

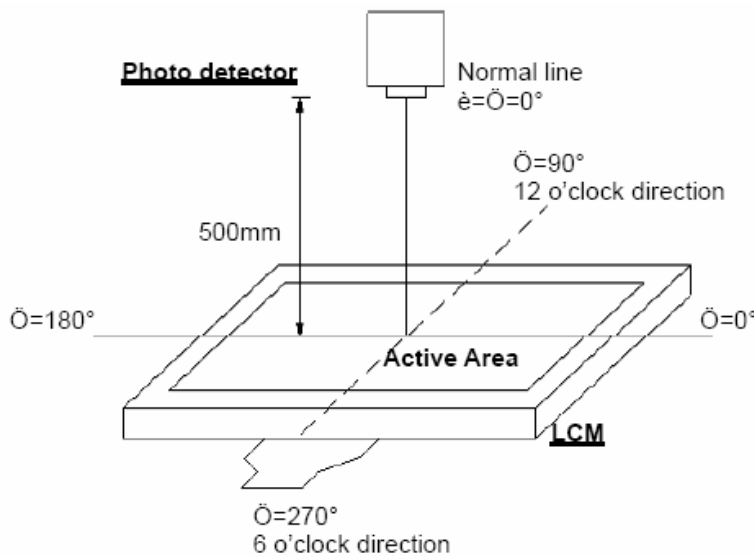


Fig. 4-2 Optical measurement system setup

**Note 3: Definition of Response time**

The response time is defined as the LCD optical switching time interval between "White" state and "Black" state. Rise time (T_{ON}) is the time between photo detector output intensity changed from 90% to 10%. And fall time (T_{OFF}) is the time between photo detector output intensity changed from 10% to 90%.

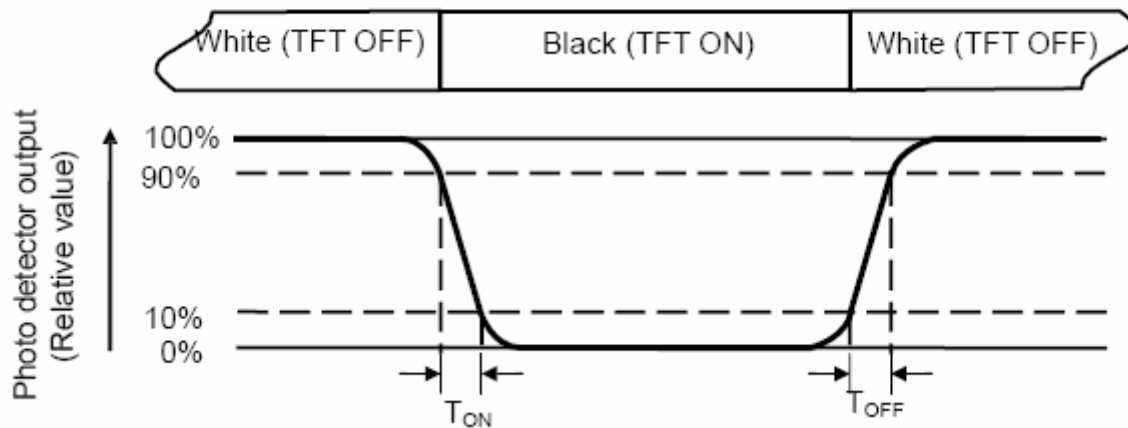


Fig. 4-3 Definition of response time

Note 4: Definition of contrast ratio

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD on the "White" state}}{\text{Luminance measured when LCD on the "Black" state}}$$

Note 5: Definition of color chromaticity (CIE1931)

Color coordinates measured at center point of LCD.

Note 6: All input terminals LCD panel must be ground while measuring the center area of the panel. The LED driving condition is $I_L=300\text{mA}$.

**Note 7: Definition of Luminance Uniformity**

Active area is divided into 5 measuring areas (Refer to Fig. 4-4).Every measuring point is placed at the center of each measuring area.

$$\text{Luminance Uniformity (Yu)} = \frac{B_{\min}}{B_{\max}}$$

L-----Active area length W----- Active area width

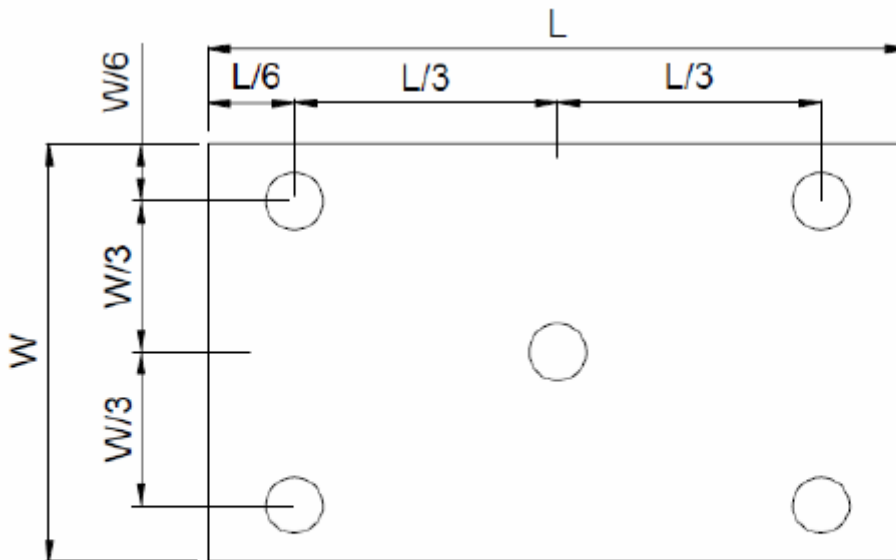


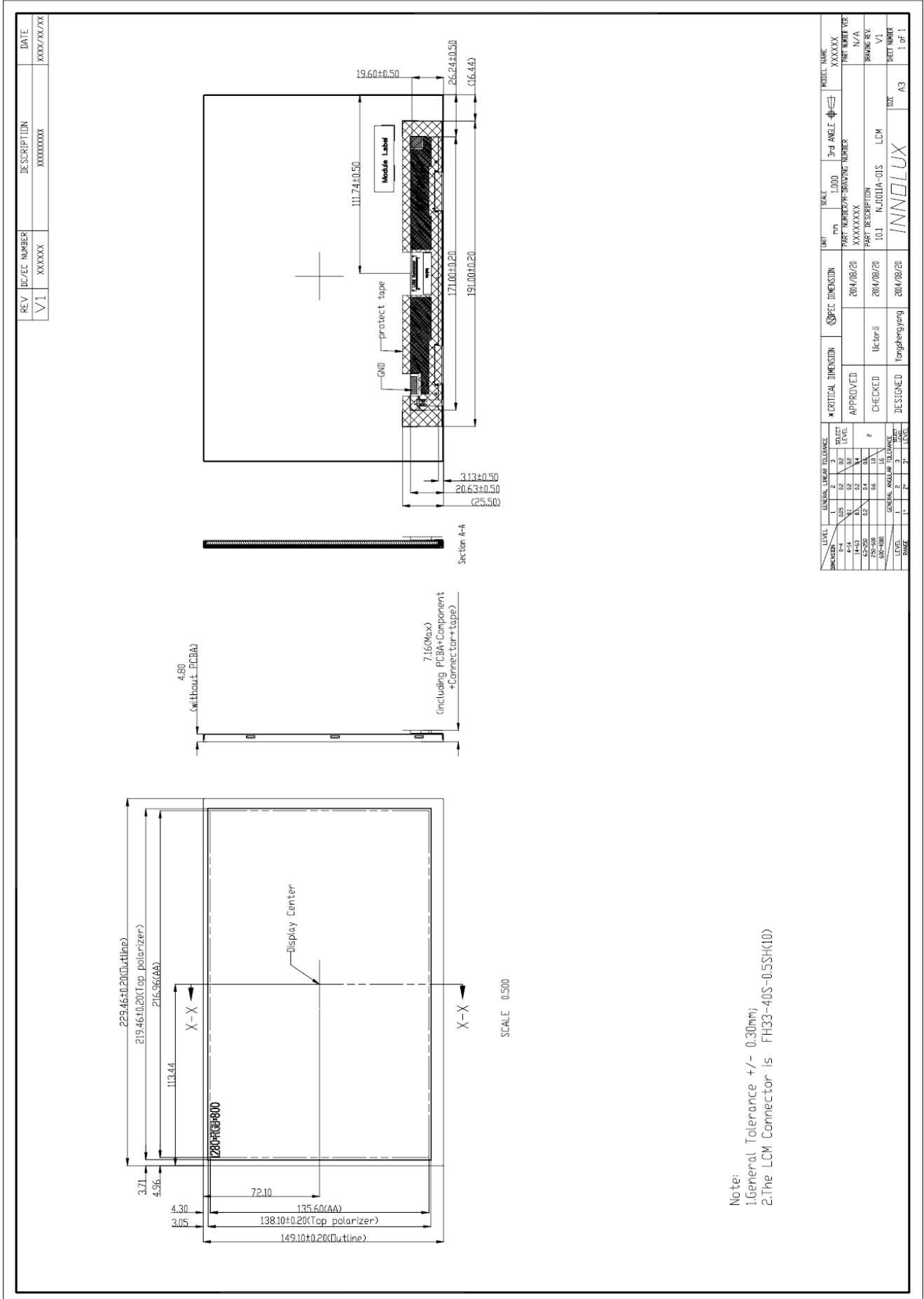
Fig. 4-4 Definition of measuring points

B_{max}: The measured maximum luminance of all measurement position.

B_{min}: The measured minimum luminance of all measurement position.

5. Mechanical Drawing

5. Mechanical Drawing



Note:
 1.General Tolerance +/- 0.30mm;
 2.The LCM Connector is FH33-40S-05SH(10)

SCALE 0.5/00



6. Backlight Unit

6.1 Light Bar Connector:

Connector Name / Designation	Lamp Connector
Manufacturer	
Connector Model Number	A200/HD2-2P
Mating Model Number(CN3)	S2B-PH-SM4-TB or compatible

Pin No.	symbol	Description	Color
Pin1	H	LED anode	Red
Pin2	L	LED cathode	Black

6.2 LED Driver:

Model Name : S7B-PH-SM4-TB(JST)

(J1)

Connector Type: 2.0mm 7pin Wafer (SMD)

Pin No.	Description
1	+12V
2	+12V
3	+12V
4	Ground
5	PWM or Vadj control
6	Ground
7	ON/OFF Control



(pin1)

Output connector : J2 , J3

Model Name : S2B-PH-SM4-TB(JST)

(J2)

Connector Type: 2.0mm 2pin Wafer (SMD)

Pin No.	Description
1	VLED+
2	VLED-

(J3)

Connector Type: 2.0mm 2pin Wafer (SMD)

Pin No.	Description
1	VLED+
2	VLED-

Note: J2 = J3 , only one connector for single light bar use



LED Driving Board Outline Dimension (Rear View)

Dimension : 75(L)*30(W)*8.65(H)mm

