목록

LCD MODULE SPECIFICATION

Customer: _____

Model Name: DNT104NF07-30IT-40A

Date: 2020/11/30

Version: V0

For Customer's Acceptance

Approved by	Comment

Approved By	Checked By	Prepared By
CoCo	CHW	CURRY

Record of Revision			
Version	Revise Date	Page	Content
V0	2020/11/30	all	First issue

Contents

1. General Specifications

No.	Item	Specification	Remark
1	LCD size	10.4 inch	
2	Driver element	a-Si TFT active matrix	
3	Resolution	1024(W) RGB x768(H)	
4	Display mode	Normally Black, Transmissive	
5	Dot pitch	0.2054(W) x 0.2054(H)	
6	Active area	210.43(W) x 157.82(H) mm	
7	Module size	238.6(W) ×175.8(H) ×6.5(D) mm	
8	View direction	ALL	O ‘clock
9	Surface treatment	Hard coating	
10	Color arrangement	RGB-stripe	
11	Interface	LVDS	
12	Lcm power consumption	6.7W	TYP.
13	Drive IC	TBD	

Note 1: Refer to Assembly Drawing.

2. Pin Assignment

2.1. Absolute Maximum Ratings

FPC Connector is used for the module electronics interface. The recommended model is P-two 187098-30091 or equivalent

Pin No	Symbol	I/O	Function	Remark
1	NC	-	No Connection	
2	GND	P	Ground	
3	RIN3+	I	+LVDS Differential Data Input	
4	RIN3-	I	-LVDS Differential Data Input	
5	GND	P	Ground	
6	CLK+	I	+LVDS Differential Clock Input	
7	CLK-	I	-LVDS Differential Clock Input	
8	GND	P	Ground	
9	RIN2+	I	+LVDS Differential Data Input	
10	RIN2-	I	-LVDS Differential Data Input	
11	GND	P	Ground	
12	RIN1+	I	+LVDS Differential Data Input	
13	RIN1-	I	-LVDS Differential Data Input	
14	GND	P	Ground	
15	RIN0+	I	+LVDS Differential Data Input	
16	RIN0-	I	-LVDS Differential Data Input	
17	GND	P	Ground	
18	NC	-	No Connection	
19	GND	P	Ground	
20	SEL6/8	I	Selection for 6 bits/8bit LVDS data input Low or NC : 8 bit input mode High : 6 bit input mode	Note 1
21	NC	-	No Connection	
22	NC	-	No Connection	
23	NC	-	No Connection	
24	RESERSE	I	Reverse panel function (Display rotation)	Note 2
25	GND	P	Ground	

26	GND	P	Ground	
27	GND	P	Ground	
28	VDD	P	Power supply: + 3.3V	
29	VDD	P	Power supply: + 3.3V	
30	VDD	P	Power supply: + 3.3V	

Note I: input; O: output; P: Power or Ground(0V).

Note 1:SEL6/8 is used for selecting 6bit/8bit LVDS data input, L or NC: 8bit; High:6bit.

Note 2:Reverse pin is used for selecting scanning direction.

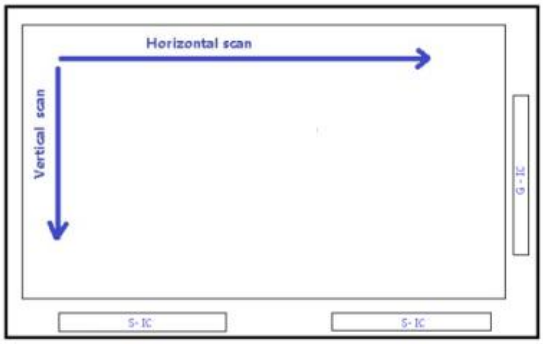


Fig. 1 Normal scan (Pin24, Reverse = Low or NC)

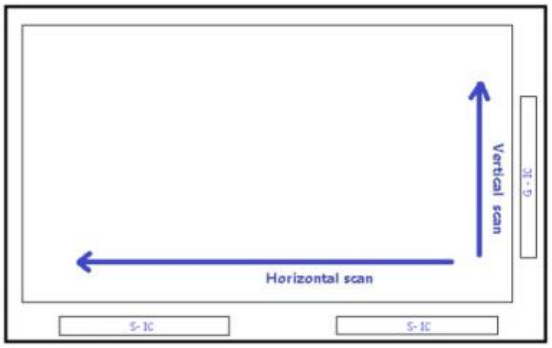


Fig. 2 Reverse scan (Pin24, Reverse = High)

2.2. Connector 2: Cillux,CI4205M2HRD-NH

5-pin connector is used for input power & control signals for BL converter power IC

Pin No	Symbol	I/O	Function	Remark
1	VLED	P	12V input	
2	VLED	P	12V input	
3	GND	P	Ground	
4	LED_PWM	I	PWM Signal	
5	LED_EN	I	Converter power IC Enable (Active High)	

3. Operation Specifications

3.1. Absolute Maximum Ratings

Test condition: GND=0V, T_A=25 °C

Note1

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Power voltage	VDD	3.0	3.3	3.6	V	
Input logic high voltage	V_{IH}	0.9 VDD	-	VDD	V	
Input logic low voltage	V_{IL}	GND	-	0.1 VDD	V	

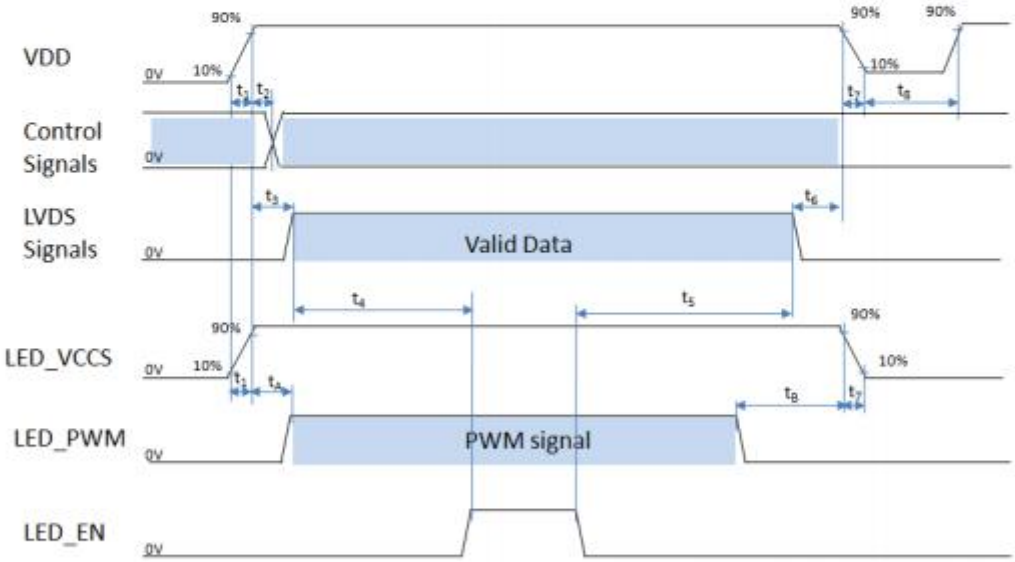
3.1.1. Current for LED Driver

Symabol	Parameter		Values			Unit	Remark
			Min.	Typ.	Max.		
VLED	Input Voltage		11	12	13	[Volt]	
I_{VLED}	Input Current		-	520	-	[mA]	100%Brightness (VLED=12V)
LED_EN	EN Control level	BL On	3.0	3.3	5	[Volt]	
		BL Off	0	-	0.3		
P_{VLED}	Power Consumption		-	6.24	-	[Watt]	100%Brightness (VLED=12V)
F_{PWM}	PWM Freqquency		1K	-	20K	[HZ]	PWM Dimming
LED_PWM	PWM High level		3.0	3.3	5.5	[Volt]	
	PWM Low level					%	
Operation Life			20,000	-	-	Hrs	(Ta=25℃),Note 1 IF=160mA

3.2. Power, Signal sequence

The power sequence specifications are shown as the following table and diagram.

Symbol	Value		Unit
	Min.	Max.	
t_1	1	20	ms
t_2	1	5	ms
t_3	10	50	ms
t_4	200	500	ms
t_5	200	500	ms
t_6	50	200	ms
t_7	0	20	ms
t_8	500	-	ms
t_A	0	50	ms
t_B	0	50	ms



Note 1: Please don't plug the interface cable of on when system is turned on.

Note 2: Please avoid floating state of the interface signal during signal invalid period.

Note 3: It is recommended that the backlight power must be turned on after the power supply for LCD and the interface signal is valid.

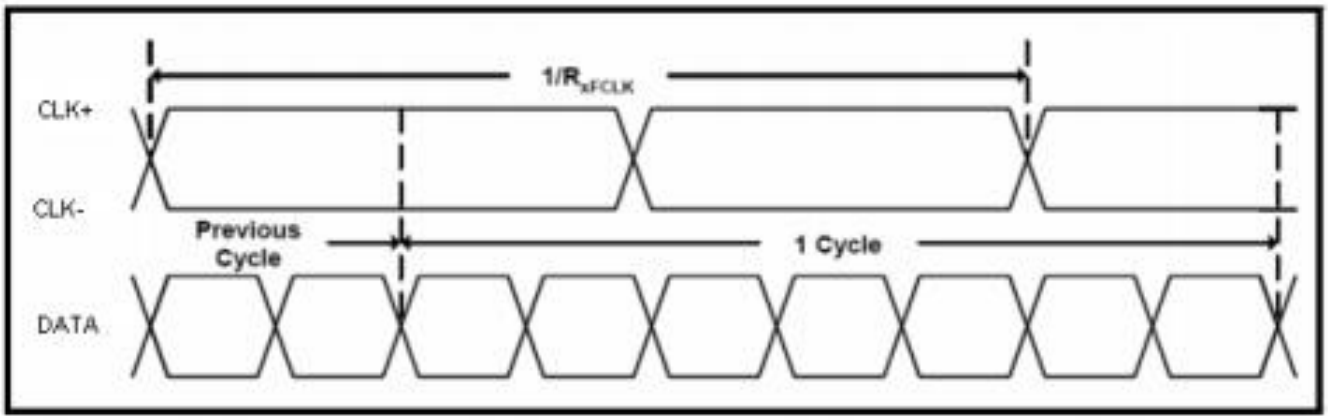
Note 4: Control signals include SEL6/8 & Reverse.

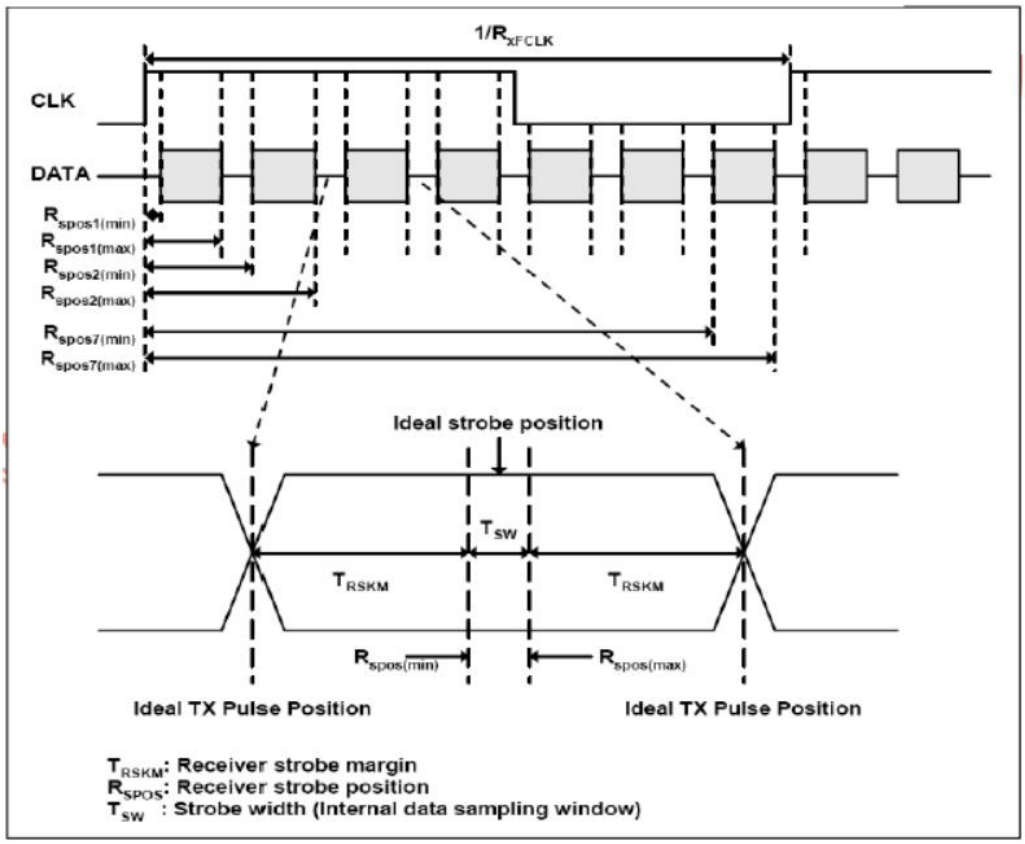
3.3. LVDS Signal timing characteristics

AC Electrical characteristics

Parameter	Symbol	Min	Typ	Max	Units	Condition
Clock frequency	RxFCLK	26.2	51.2	71	MHz	
Input data skew margin	TRSKM	500	500	1/(2*RxFCLK)	ps	Typical value for 1024*600 resolution
Clock high time	TLVCH		4/(7xRxFCLK)		ns	|VID|=400mv RxVCM=1.2V RxFCLK=71MHz VDD_LVDS=3.3V
Clock low time	TLVCL		3/(7xRxFCLK)		ns	
VSD setup time	TenPLL	0	TenPLL	150	us	

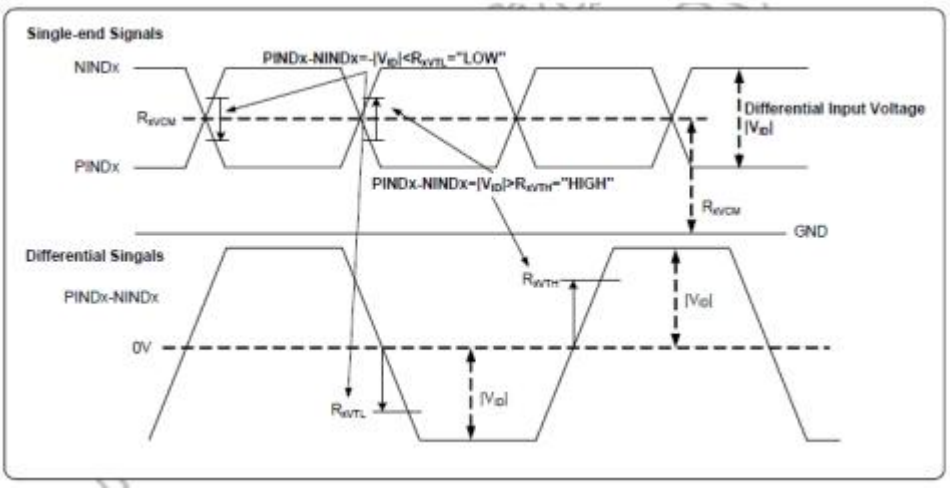
Input clock and data timing diagram





DC 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	
Input Voltage range (Singled-end)	R_{xVIN}	0	-	VDD-1.2+ $\|V_{ID}\|/2$	V	
LVDS Differential input common mode voltage	R_{xVCM}	$\|V_{ID}\|/2$	-	VDD-1.2	V	
LVDS Differential voltage	$\|V_{ID}\|$	0.2	-	0.6	V	

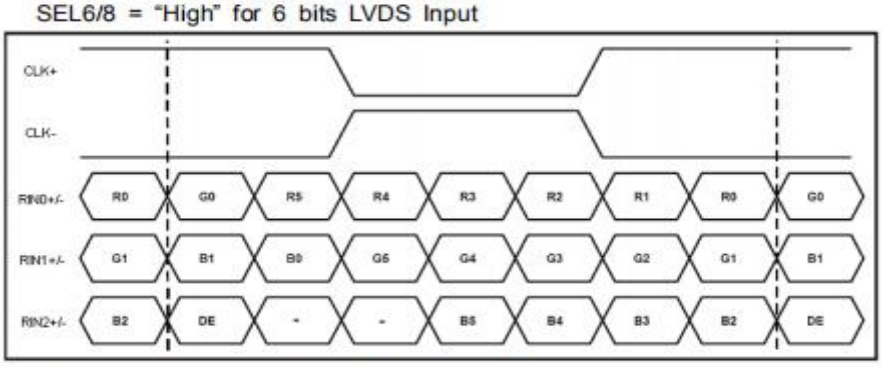


data timing

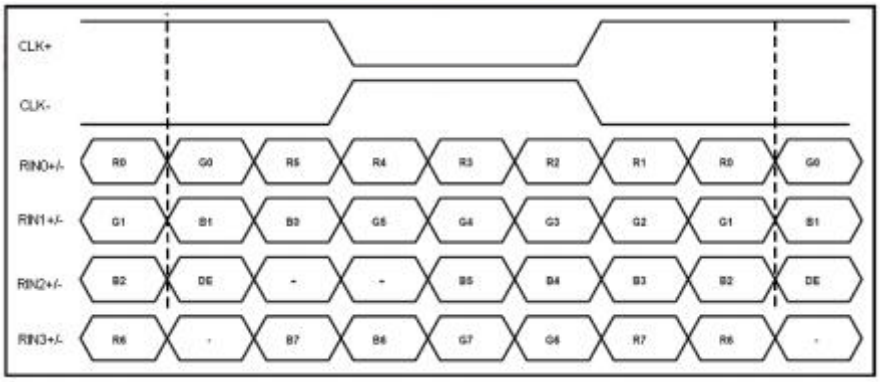
Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
DCLK frequency	fclk	52	65	71	MHz
Horizontal display area	thd		1024		DCLK
HSD period	th	1114	1344	1400	DCLK
HSD blanking	thb+thfp	90	320	376	DCLK
Vertical display area	tvd		768		T_H
VSD period	tv	778	806	845	T_H
VSD blanking	tvbp+tvfp	10	38	77	T_H

LVDS data input format

SEL6/8 = "High" for 6 bits LVDS Input



SEL6/8 = "Low" or "NC" for 8 bits LVDS Input



4. Optical Specifications

Item	Symbol	Condition	Values			Unit	Remark
			Min.	Typ.	Max.		
Viewing angle (CR≥ 10)	θ_L	Φ=180°(9 o'clock)	80	-	-	degree	Note 1
	θ_R	Φ=0°(3 o'clock)	80	-	-		
	θ_T	Φ=90°(12 o'clock)	80	-	-		
	θ_B	Φ=270°(6 o'clock)	80	-	-		
Response time	T_{ON+} T_{OFF}	Normal θ=Φ=0°	-	25	35	msec	Note 3
Contrast ratio	CR		800	1000	-	-	Note 4
Color chromaticity	W_X		0.26	0.31	0.36	-	Note 2 Note 5 Note 6
	W_Y		0.28	0.33	0.38	-	
Luminance	L		500	600	-	cd/m²	Note 6
Luminance uniformity	Y_U		70	75	-	%	Note 7
Color Gamut	NTSC	CIE1931	55	62	-	%	

The test systems refer to Note 2.

Note 1: Definition of viewing angle range

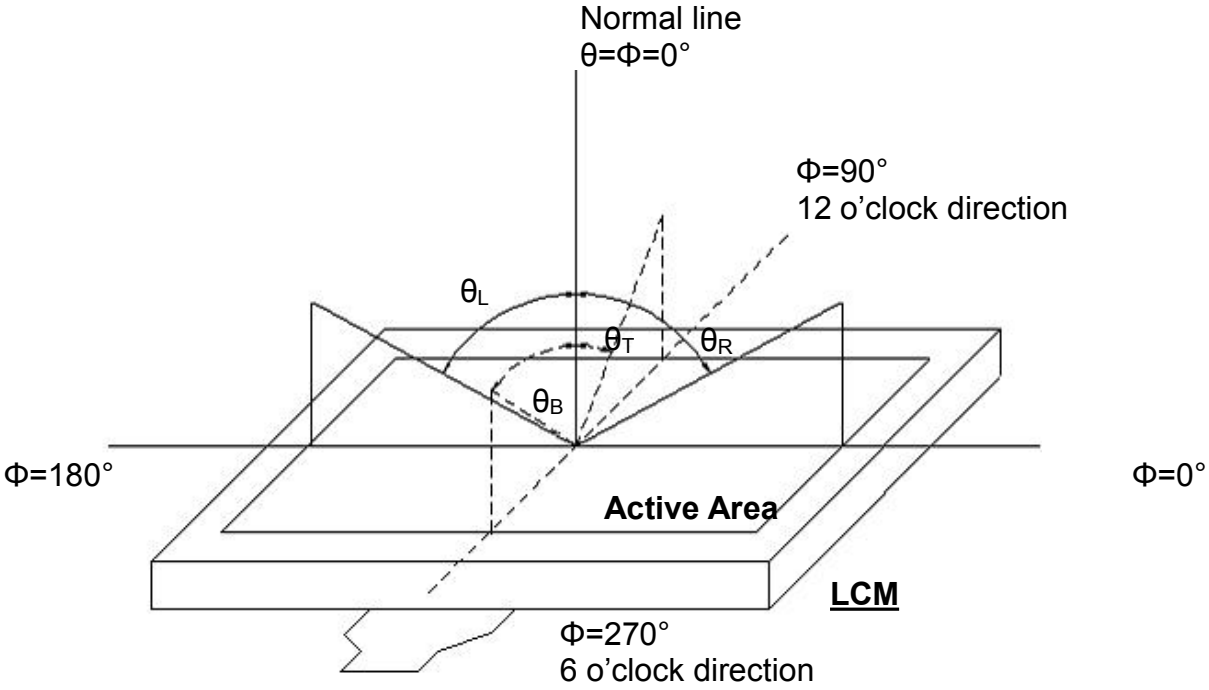


Fig. 4-1 Definition of viewing angle

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.) or CA-210.

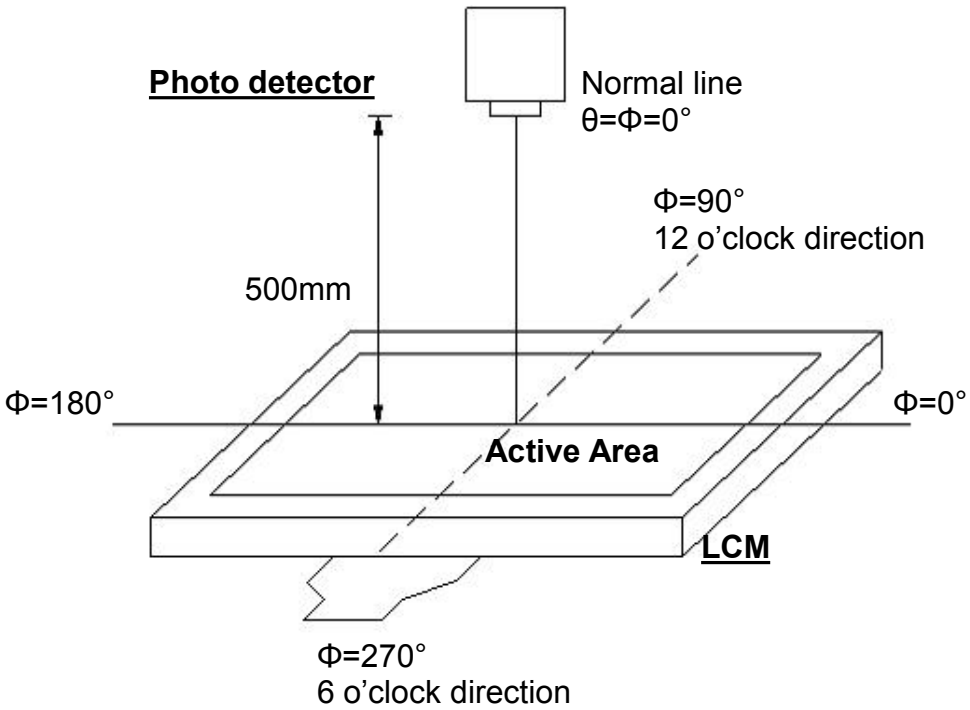


Fig. 4-2 Optical measurement system setup

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%.

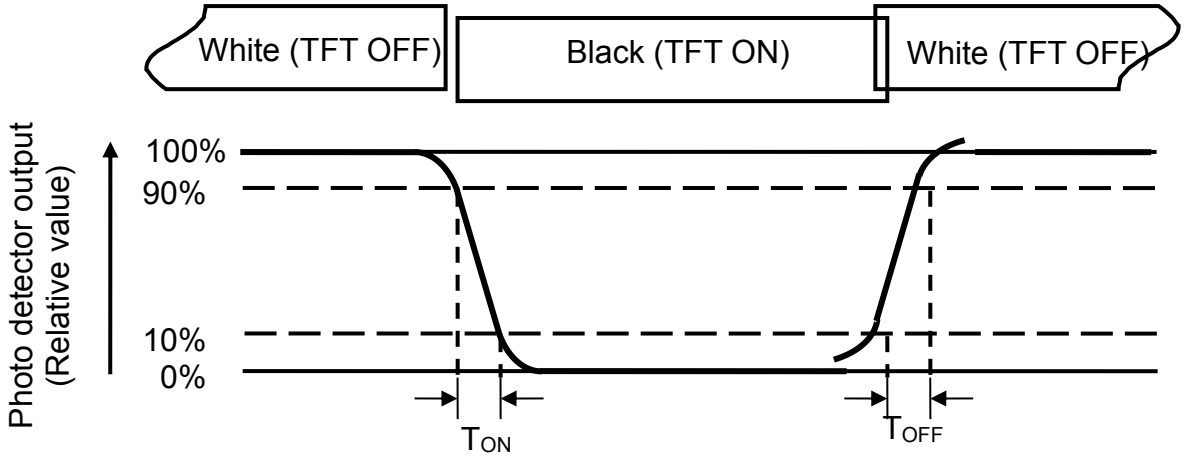


Fig. 4- 3 Definition of response time

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=520mA .

Note 7: Definition of Luminance Uniformity

Active area is divided into 9 measuring areas(Refer to Fig. 4-4).

Every measuring point is placed at the center of each measuring area.

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

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

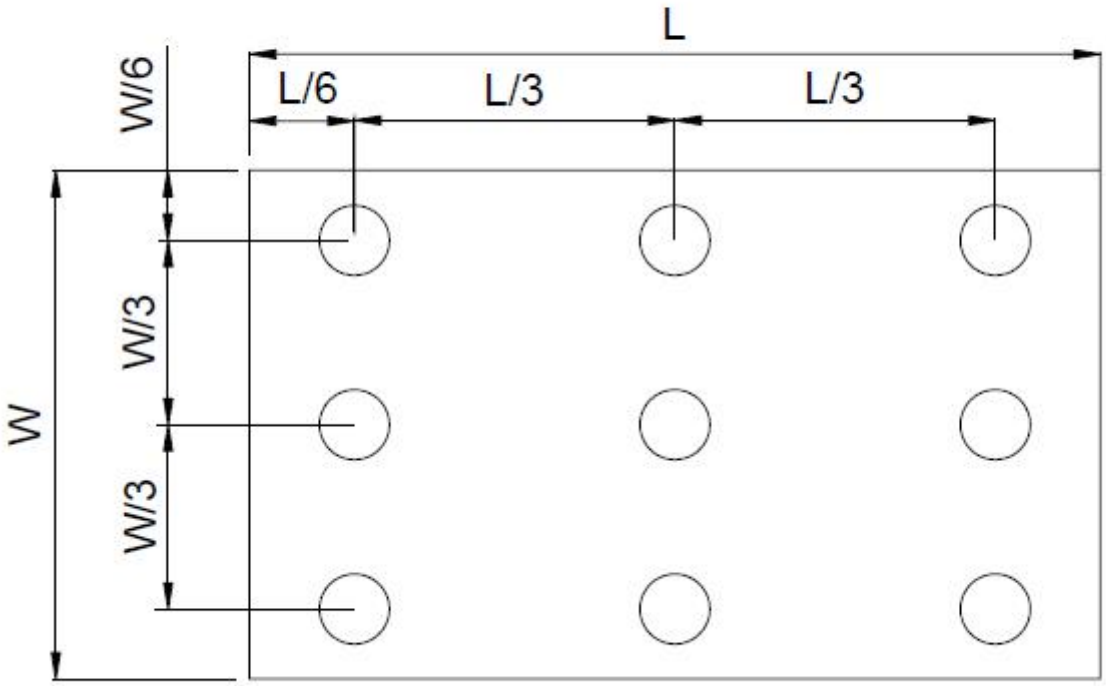


Fig. 4-4 Definition of measuring points

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

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

5. Reliability Test

Item	Test Conditions	Criterion
High Temperature Storage	Ta = 80℃ 240hrs	Note 1，Note3，Note 4 ,Note5
Low Temperature Storage	Ta = -30℃ 240hrs	Note 1，Note3，Note 4
High Temperature Operation	Ts = 70℃ 240hrs	Note 2，Note3，Note 4 , Note5
Low Temperature Operation	Ta =-20℃ 240hrs	Note 1，Note3，Note 4
Operate at High Temperature and Humidity	+60℃, 90%RH 240hrs	Note3，Note 4 Note5
Thermal Shock(non operation)	-30℃/30 min ~ +80℃/30 min for a total 100 cycles, Start with cold temperature and end with high temperature.	Note3，Note 4 Note5
Vibration Test	Sweep:10Hz~55Hz~10Hz 2G 2 hours for each direction of X. Y. Z. (6 hours for total)	
Package Vibration Test	Random Vibration : 0.015G*G/Hz from 5-200HZ, -6dB/Octave from 200-500HZ 2 hours for each direction of X. Y. Z. (6 hours for total)	
Package Drop Test	Height:60 cm 1 corner, 3 edges, 6 surfaces	
Electro Static Discharge	Contact=+/-4KV, Air=+/-8KV,(R=330R,C=150pF), 1 sec,9point,10times/point;	

※Criterion:

Note 1: Ta is the ambient temperature of samples.

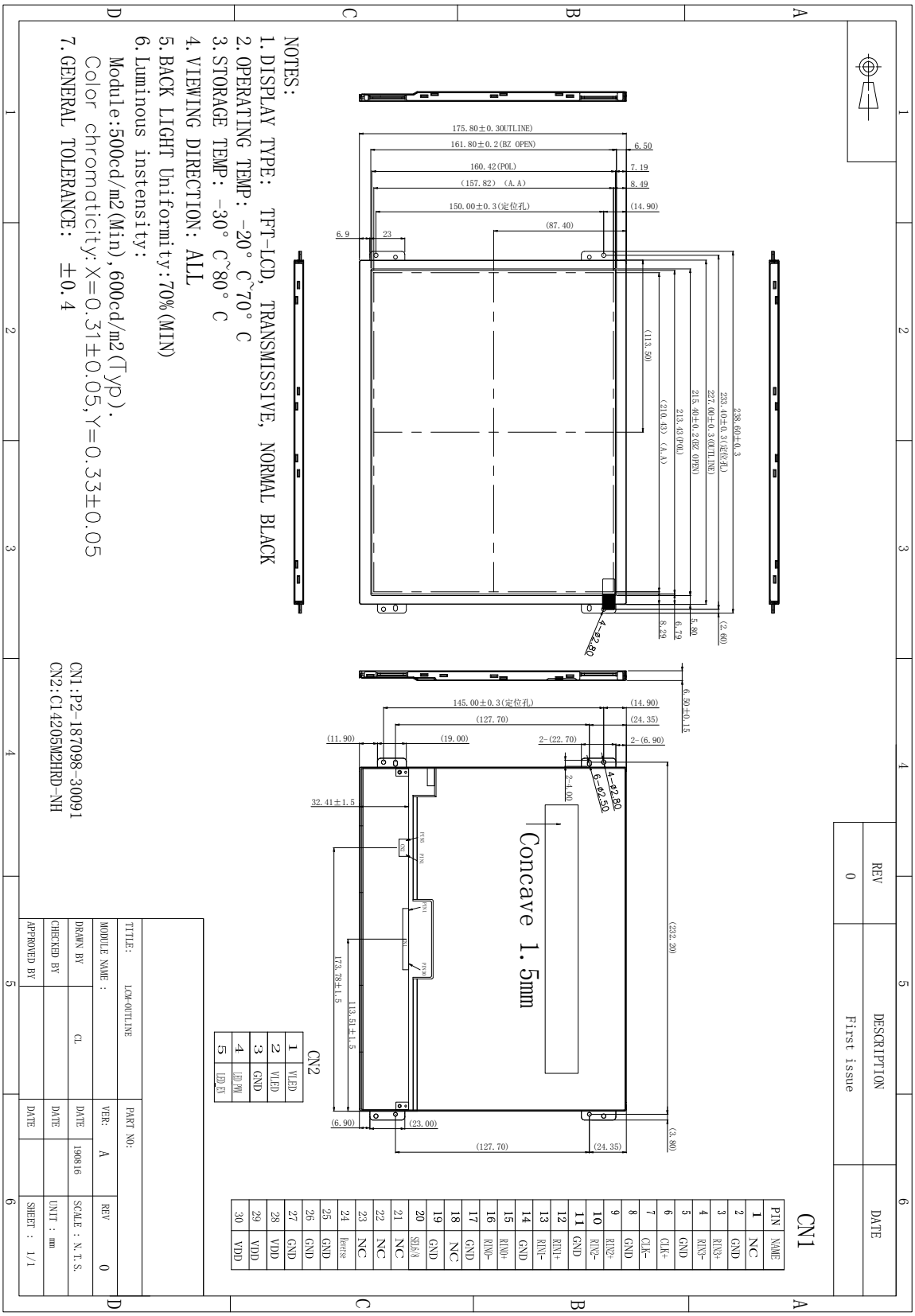
Note 2: Ts is the temperature of panel’s surface.

Note 3: In the standard condition, there shall be no practical problem that may affect the display function. After the reliability test, the product only guarantees operation, but don’t guarantee all of the cosmetic specification.

Note 4: Before cosmetic and function test, the product must have enough recovery time,

at least 2 hours at room temperature.
Note 5: A certain level of Mura (non-uniformity) of dark / black image will happen several days after high temperature testing (H.T.T.). There is a slowly part recovery over a long time (several months). Such a long exposure time like in H.T.T. will normally not happen in a real application. Therefore the test H.T.T. was introduced to simulate cycles with normal conditions in-between but with the same total exposure time what show a significant reduced Mura.
The root cause is related to tension generated due to different amount of shrinking in the stack of layers in the polarizer sheet. The effect is more significant on larger displays like this size. An investigation into alternative polarizer material showed that there is no better alternative currently available.

6. Mechanical Drawing



7. Package Drawing

TBD

8. General Precautions

8.1. Safety

Liquid crystal is poisonous. Do not put it in your mouth. If liquid crystal touches your skin or clothes, wash it off immediately by using soap and water.

8.2. Handling

1. The LCD panel is plate glass. Do not subject the panel to mechanical shock or to excessive force on its surface.
2. The polarizer attached to the display is easily damaged. Please handle it carefully to avoid scratch or other damages.
3. To avoid contamination on the display surface, do not touch the module surface with bare hands.
4. Keep a space so that the LCD panels do not touch other components.
5. Put cover board such as acrylic board on the surface of LCD panel to protect panel from damages.
6. Transparent electrodes may be disconnected if you use the LCD panel under environmental conditions where the condensation of dew occurs.
7. Do not leave module in direct sunlight to avoid malfunction of the ICs.

8.3. Static Electricity

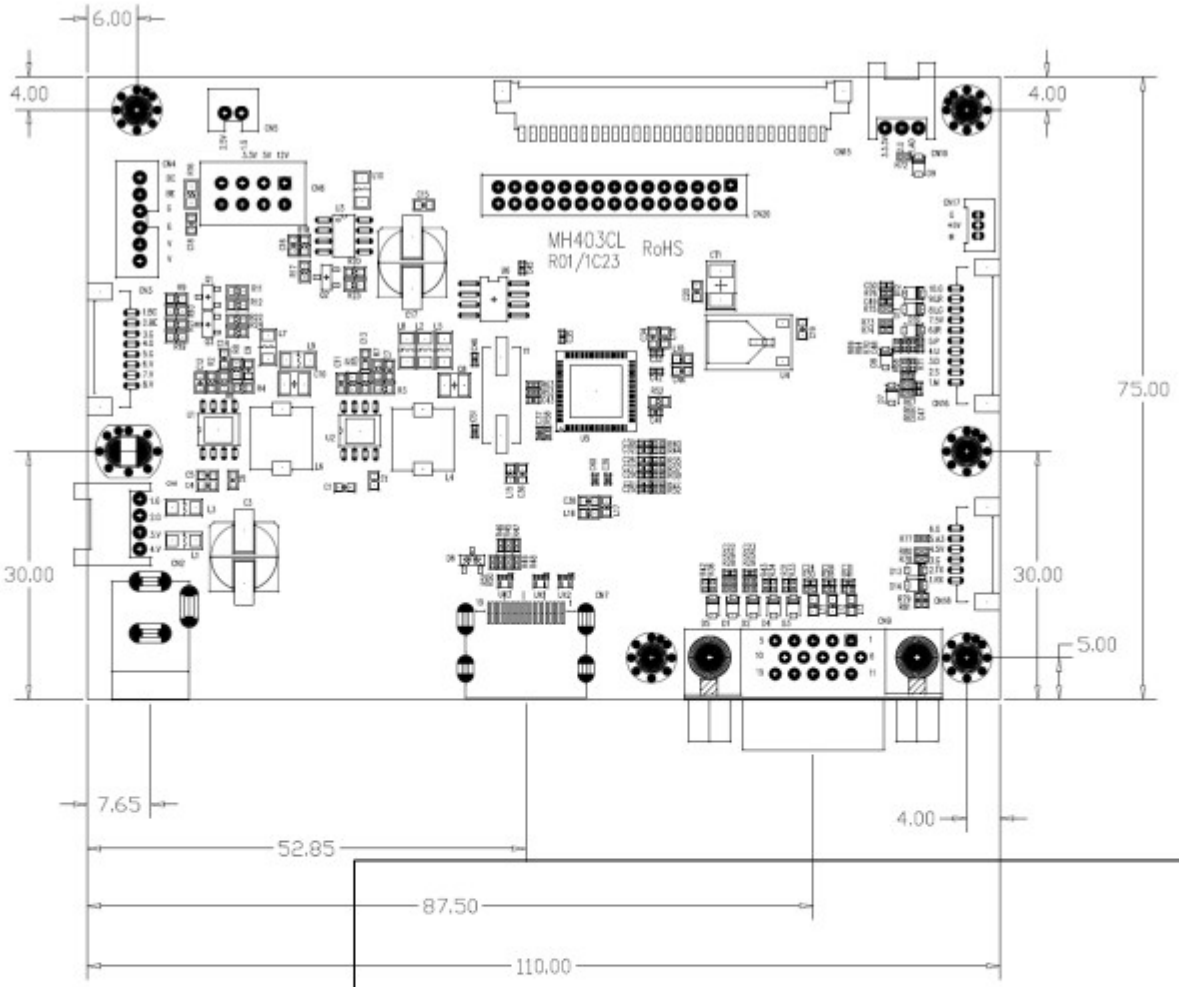
1. Be sure to ground module before turning on power or operating module.
2. Do not apply voltage which exceeds the absolute maximum rating value.

8.4. Storage

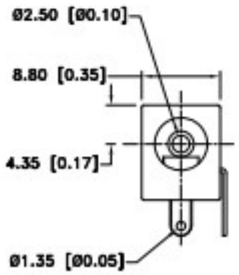
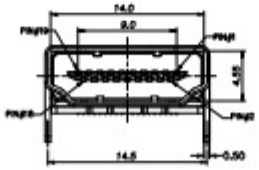
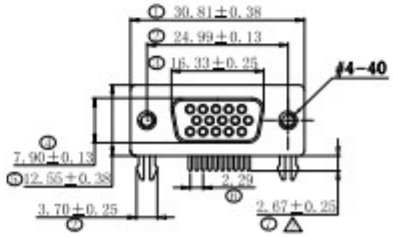
1. Store the module in a dark room where must keep at 25±10℃ and 65%RH or less.
2. Do not store the module in surroundings containing organic solvent or corrosive gas.
3. Store the module in an anti-electrostatic container or bag.

8.5. Cleaning

1. Do not wipe the polarizer with dry cloth. It might cause scratch.
2. Only use a soft sloth with IPA to wipe the polarizer, other chemicals might permanent damage to the polarizer.



Note: Any of the holes shown above can be used for mounting the PCB, they are 3.5mm in diameter.

		
CN2, Power Connector	CN7, HDMI	CN9, RGB Connector