晶采光電科技股份有限公司
AMPIRE CO., LTD.

SPECIFICATIONS FOR LCD MODULE

CUSTOMER	
CUSTOMER PART NO.	
AMPIRE PART NO.	AM-1024768Q1TMQW-T00H
APPROVED BY	
DATE	

☐Approved For Specifications
☐**Approved For Specifications & Sample**

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RECORD OF REVISION

Revision Date	Page	Contents	Editor
2013/02/25	--	New Release	Bob

1.0 General Descriptions

1.1 Introduction

The LCM is a color active matrix thin film transistor (TFT) liquid crystal display (LCD) that uses amorphous silicon TFT as a switching device. It is composed of a TFT LCD panel, a timing controller, voltage reference, common voltage, column driver, and row driver circuit. This TFT LCD has a 15-inch diagonally measured active display area with XGA resolution (1024horizontal by 768 vertical pixel arrays).

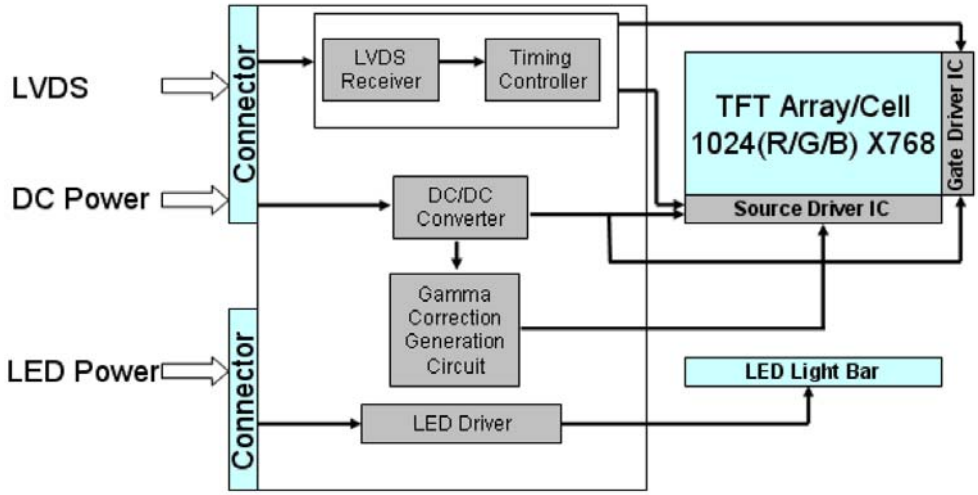
1.2 Features

- 15.0" TFT LCD Panel
- LED Backlight System
- Supported XGA (1024x768 pixels) resolution
- Aspect ratio: 4:3
- Compatible with RoHS Standard
- Resistive Touch Panel

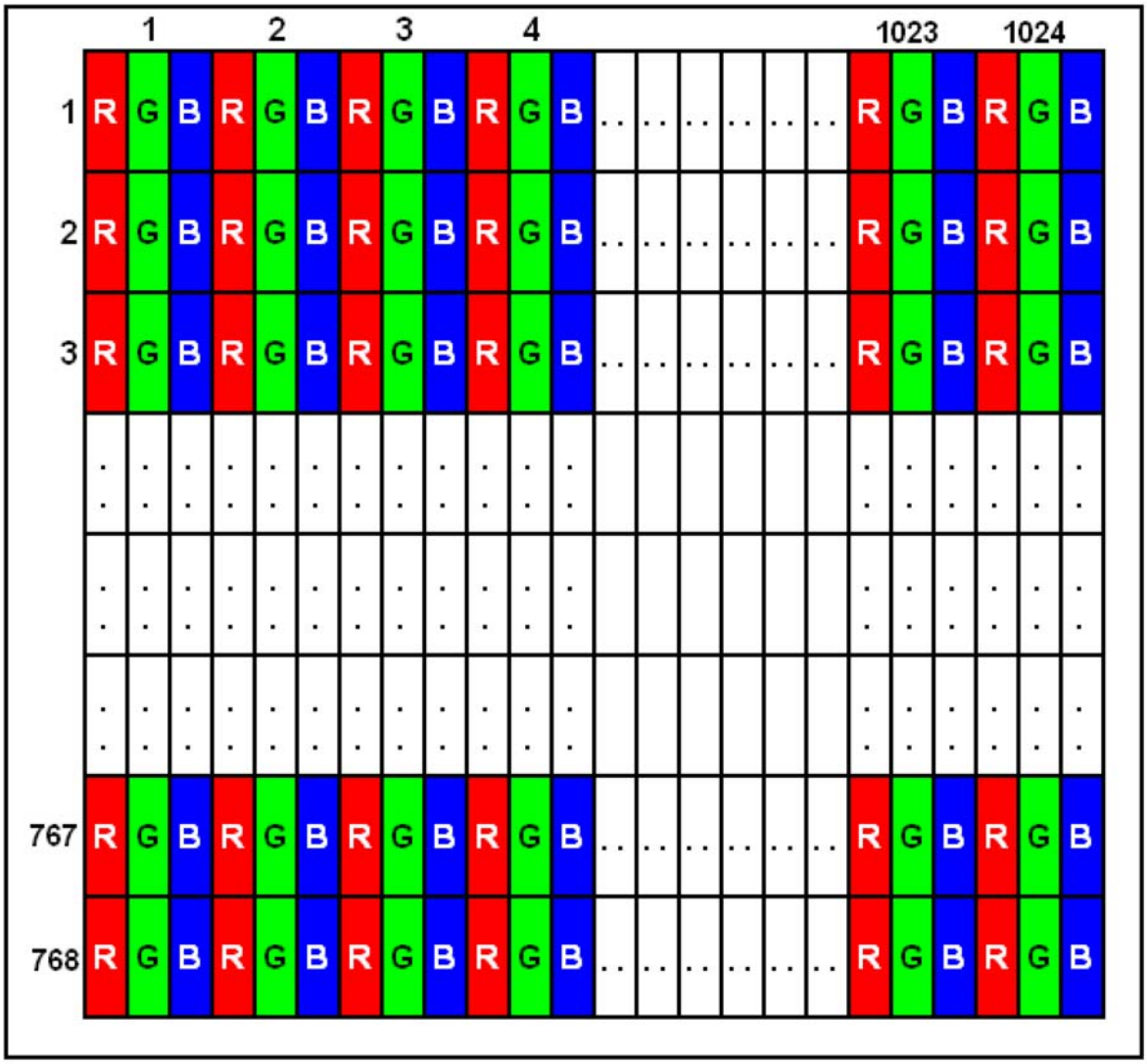
1.3 Product Summary

Items	Specifications	Unit
Screen Diagonal	38(15 inch)Diagonal	cm
Active Area	304.1(H) x 228.1(V)	mm
Pixel Format	1024(H) x768(V) (1 pixel=R+G+B dot)	pixel
Pixel Pitch	0.297(H) x 0.297(V)	mm
Pixel Arrangement	R.G.B. Vertical Stripe	-
Display Mode	Normally White	-
White Luminance	320(Typ) 256(Min)	cd /m2
Contrast Ratio	800 : 1 (Typ) 450 : 1 (Min)	-
Response Time	30typ	msec
Input Voltage	3.3V(Logic),12V(LED)	V
Weight	995(Typ)	g
Outline Dimensions	326.5(H)x253.5(V)x11.96(D) Typ.	mm
Electrical Interface (Logic)	LVDS	-
Support Color	16.7M Colors	-
Surface Treatment	Anti-glare, Hard-Coating (3H)	-

1.4 Functional Block Diagram



1.5 Pixel Format Image



2.0 Absolute Maximum Ratings

Item	Symbol	Conditon	Pin	Ratings	Unit	Note
Supply Voltage	V_{CC}	Ta=25℃	VCC	-0.3~+4.0	V	(1),(2)
	V_{DD}	Ta=25℃	VDD	-0.3~+15.0	V	(1),(2)
Input Voltage	V_{I1}	Ta=25℃	RxINi-/+ CK IN-/+	-0.3~Vcc+0.3	V	I=0,1,2,3
	V_{I2}	Ta=25℃	RL/UD,SELLVDS	-0.3~Vcc+0.3	V	-
	V_{I4}	Ta=25℃	XSTABY,VBR	-0.3~ VDD	V	-
Storage Temperature	T_{STG}	-	-	-30~+80	℃	(1)
Operating Temperature	T_{OPA}	-	-	-20~+70	℃	(1),(3),(4)

Note (1): Humidity: 95%RH Max. (Ta<=40℃) Note static electricity.
Maximum wet bulb temperature at 39℃ or less. (Ta>40℃) No condensation.

Note (2): The Vcc power supply capacity must use the one of 2A or more.
The V_{DD} power supply capacity must use the one of 3A or more.

Note (3): There is a possibility of causing deterioration in the irregularity and others of the screen and the display fineness though the liquid crystal module doesn't arrive at destruction when using it at 65~70℃ or -10~0℃. There is a possibility of causing the fineness deterioration by the prolonged use in the (high temperature) humidity environment (60% or more).

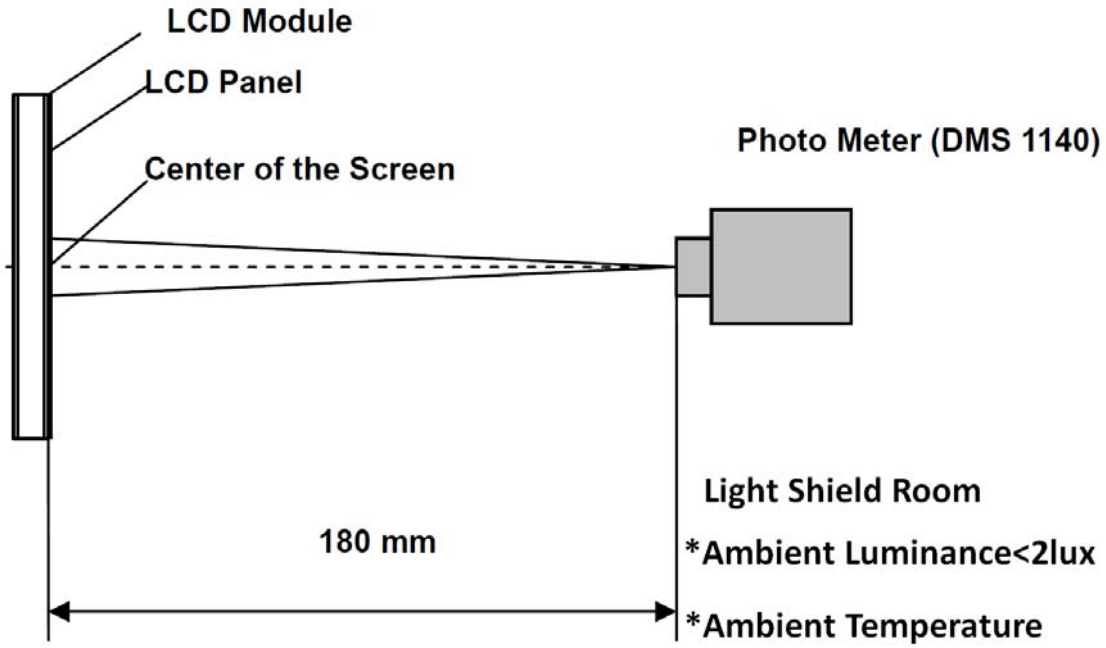
Note (4): In the operating temperature item, the low temperature side is the ambient temperature regulations. The high temperature side is the panel surface temperature regulations.

3.0 Optical Characteristics

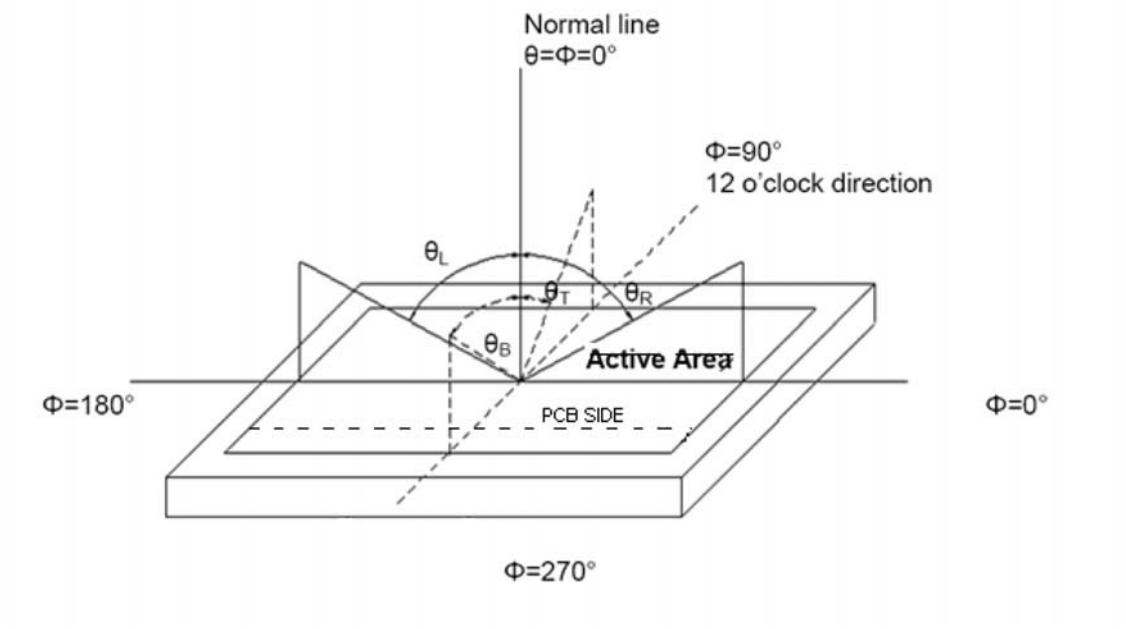
Item	Conditions		Min.	Typ.	Max.	Unit	Note
Viewing Angle [degrees] K=Contrast Ratio>10	Horizontal	θ L	70	80	-	degree	(1),(2),(4)
		θ R	70	80	-		
	Vertical	θT	60	80	-		
		θB	70	80	-		
Contrast Ratio	Center		450	800	-	-	(2),(4)
Response Time	Rising		-	5.5	-		
	Falling		-	20.1	-		
	Rising + Falling		-	30	-		(3),(4)
Color Chromaticity (CIE1931)	Red	x	0.594	0.624	0.654	-	(4)
	Red	y	0.321	0.351	0.381	-	
	Green	x	0.281	0.311	0.341	-	
	Green	y	0.601	0.631	0.661	-	
	Blue	x	0.121	0.151	0.181	-	
	Blue	y	0.045	0.075	0.105	-	
	White	x	0.255	0.305	-0.355	-	
	White	y	0.275	0.325	-0.375	-	
White Luminance [cd/m^2]	Center		256	320	-	-	(4)
Luminance Uniformity[%]	5Points		-	-	1.33		(5)

The measurement shall be executed 30 minutes after lighting at rating.

The optical characteristics shall be measured in a dark room or equivalent state with the method shown in below.



Note (1): Definitions of viewing angle range



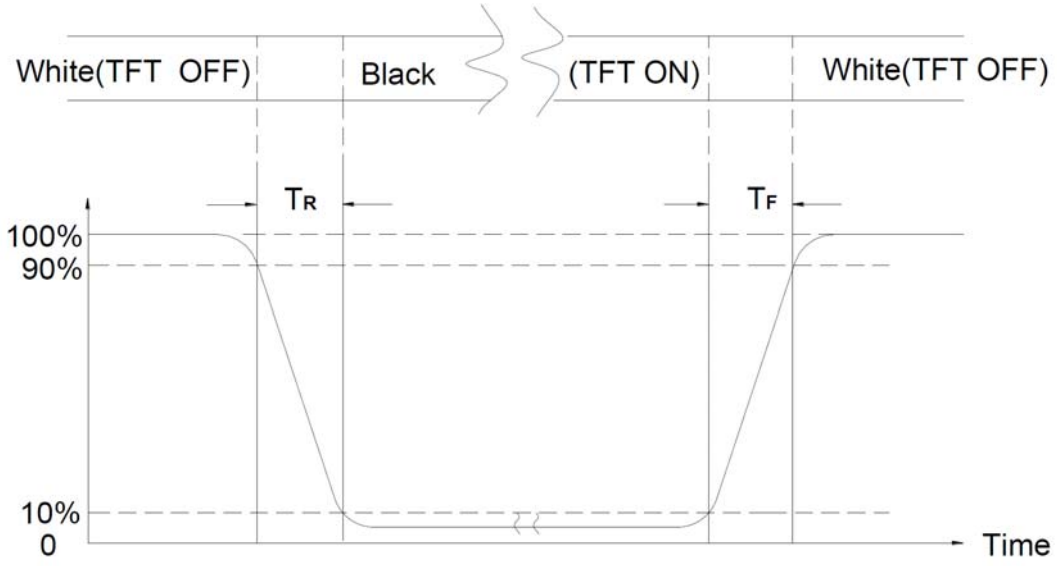
Note (2) Definition of Contrast Ratio (CR)

The contrast ratio is defined as the following

Contrast Ratio (CR) = Luminance with all pixels white / Luminance with all pixels black

Note (5) Definition Of Response Time (TR, TF)

The response time is defined as the following figure and shall be measured by switching the input signal for “black” and “white”

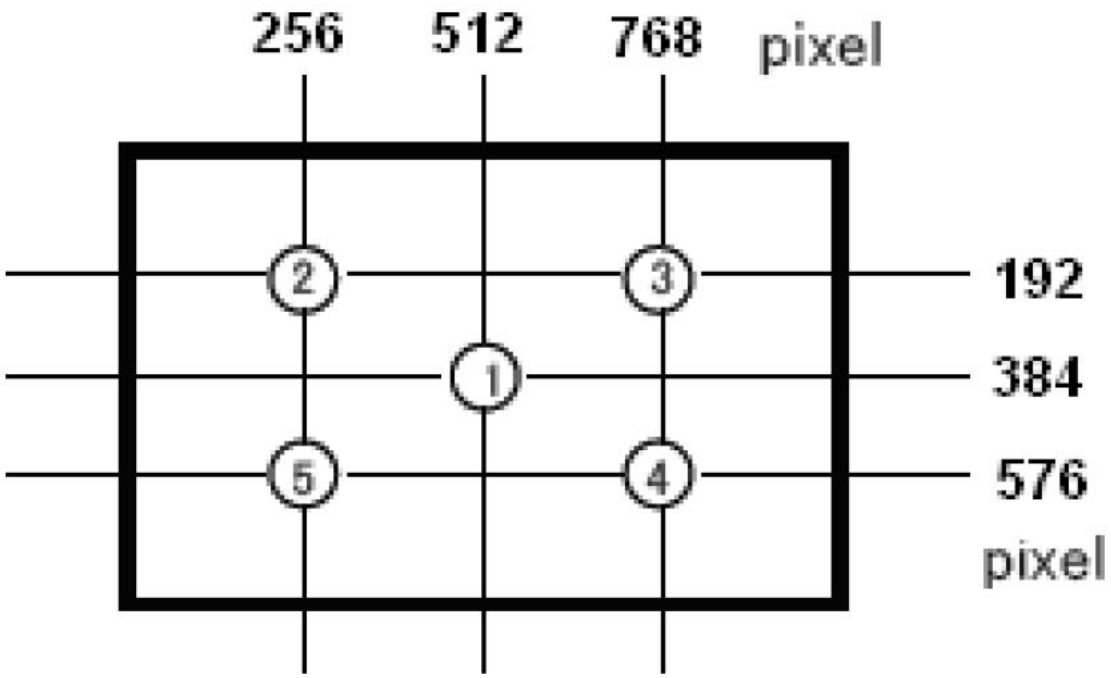


Note (4): This shall be measured at center of the screen.

Note (5): Definition Of white uniformity

White uniformity is defined as the following with five measurements

$$\text{Luminance uniformity} = \frac{\text{(Min Luminance of 5 points)}}{\text{(Max Luminance of 5 points)}} \times 100\%$$



4.0 Input Terminals

4.1 TFT LCD panel driving

CN1 (Interface signals and +3.3V power supply)

Using connectors:

CN1: MSB240420HD (SIN SHENG TERMINAL & MACHINE INC.) or Similar type.

Corresponding connectors: P240420 (SIN SHENG TERMINAL & MACHINE INC.)

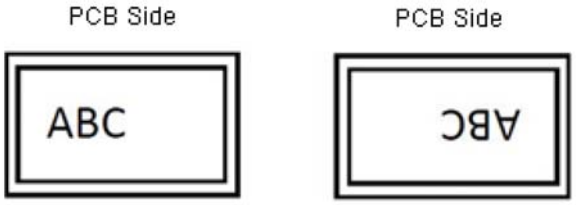
Using LVDS receiver:

Building into control IC (THC63LVDF84B (Thine electronics) or Compatible product)

Corresponding LVDS transmitter: THC63LVDM83D (Thine electronics) or Compatible product.

Pin #	Singnal Name	Description	Remarks
1	VCC	Power Supply, 3.3V (typical)	-
2	VCC	Power Supply, 3.3V (typical)	-
3	GND	GND	-
4	GND	GND	-
5	RxIN0-	LVDS receiver signal CH0(-)	LVDS
6	RxIN0+	LVDS receiver signal CH0(+)	LVDS
7	GND	GND	-
8	RxIN1-	LVDS receiver signal CH1(-)	LVDS
9	RxIN1+	LVDS receiver signal CH1(+)	LVDS
10	GND	GND	-
11	RxIN2-	LVDS receiver signal CH2(-)	LVDS
12	RxIN2+	LVDS receiver signal CH2(+)	LVDS
13	VSS	GND	-
14	CK IN-	LVDS receiver signal CK(-)	LVDS
15	CK IN+	LVDS receiver signal CK(+)	LVDS
16	GND	GND	-
17	RxIN3-	LVDS receiver signal CH3(-)	-
18	RxIN3+	LVDS receiver signal CH3(+)	-
19	RL/UD	Horizontal/Vertical display mode select singal	*1
20	SELLVDS	LVDS SET	*2

*1 RL/UD=LOW RL/UD=HIGH



*2 SELLVDS is shown in 4.2.

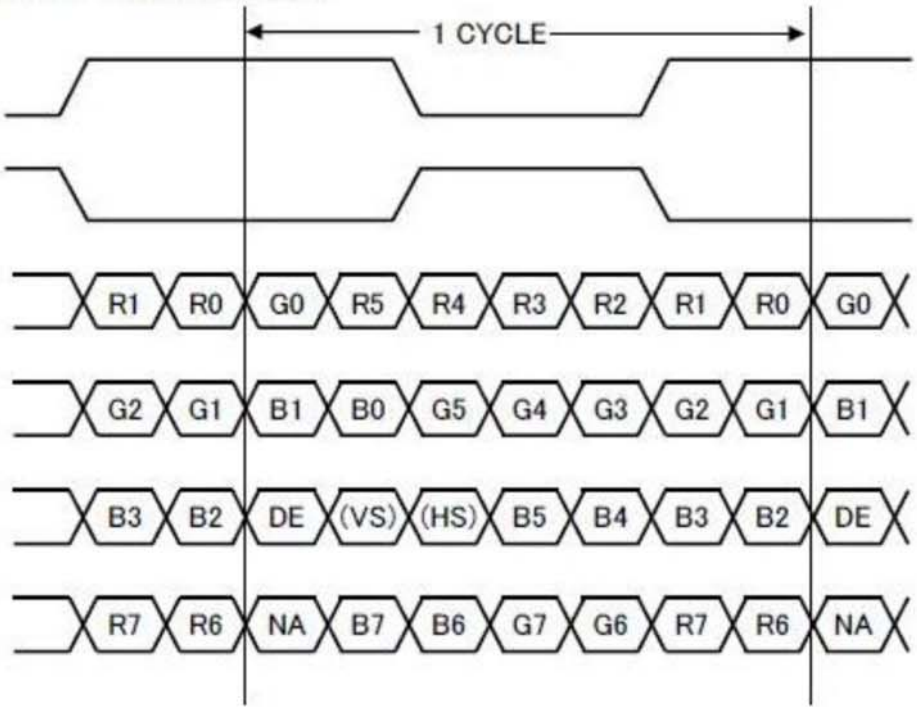
4.2 Data Mapping

1) 8 bit input

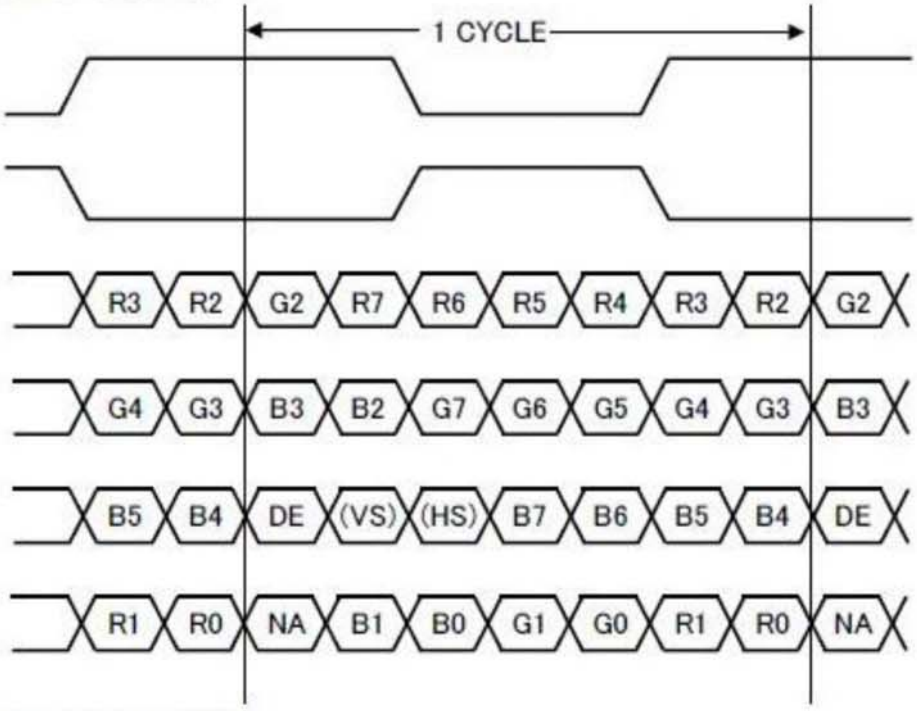
Pin assignment with SELLVDS pin (THC63LVDM83D (Thine electronics) or Compatible product)

Transmitter		20Pin SELLVDS	
Pin No	Data	=L(GND) or Open	=H(3.3V)
51	TA0	R0(LSB)	R2
52	TA1	R1	R3
54	TA2	R2	R4
55	TA3	R3	R5
56	TA4	R4	R6
3	TA5	R5	R7(MSB)
4	TA6	G0(LSB)	G2
6	TB0	G1	G3
7	TB1	G2	G4
11	TB2	G3	G5
12	TB3	G4	G6
14	TB4	G5	G7(MSB)
15	TB5	B0(LSB)	B2
19	TB6	B1	B3
20	TC0	B2	B4
22	TC1	B3	B5
23	TC2	B4	B6
24	TC3	B5	B7(MSB)
27	TC4	(HS)	(HS)
28	TC5	(VS)	(VS)
30	TC6	DE	DE
50	TD0	R6	R0(LSB)
2	TD1	R7(MSB)	R1
8	TD2	G6	G0(LSB)
10	TD3	G7(MSB)	G1
16	TD4	B6	B0(LSB)
18	TD5	B7(MSB)	B1
25	TD6	(NA)	(NA)

SELLVDS = L(GND) or Open >



SELLVDS = H(3.3V) >



DE: DATA ENABLE

HS: Hsync

VS: Vsync

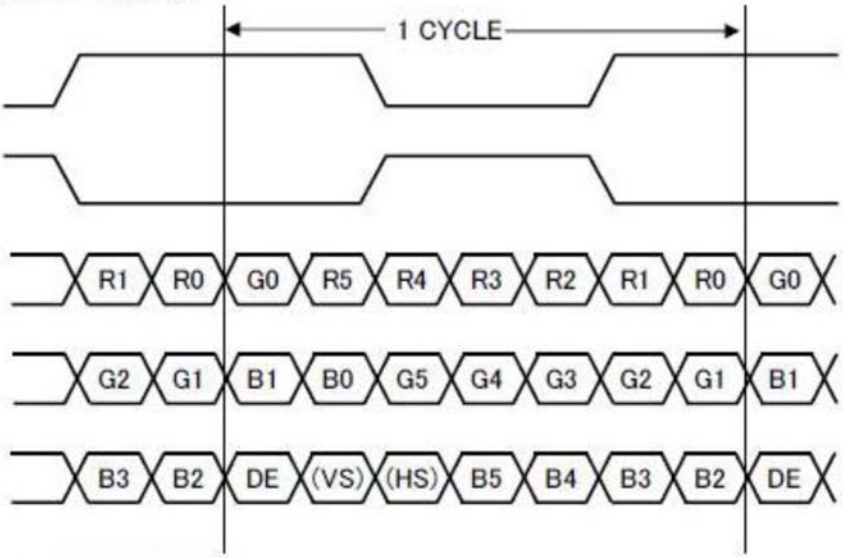
NA: Non Available

2) 6 bit input

Pin assignment with SELLVDS pin (THC63LVDM83D (Thine electronics) or Compatible product)

Transmitter		20Pin SELLVDS	
Pin No	Data	=L(GND) or Open	=H(3.3V)
51	TA0	-	R0(LSB)
52	TA1	-	R1
54	TA2	-	R2
55	TA3	-	R3
56	TA4	-	R4
3	TA5	-	R5(MSB)
4	TA6	-	G0(LSB)
6	TB0	-	G1
7	TB1	-	G2
11	TB2	-	G3
12	TB3	-	G4
14	TB4	-	G5(MSB)
15	TB5	-	B0(LSB)
19	TB6	-	B1
20	TC0	-	B2
22	TC1	-	B3
23	TC2	-	B4
24	TC3	-	B5(MSB)
27	TC4	-	(HS)
28	TC5	-	(VS)
30	TC6	-	DE
50	TD0	-	GND
2	TD1	-	GND
8	TD2	-	GND
10	TD3	-	GND
16	TD4	-	GND
18	TD5	-	GND
25	TD6	-	(NA)

< SELLVDS = H(3.3V) >



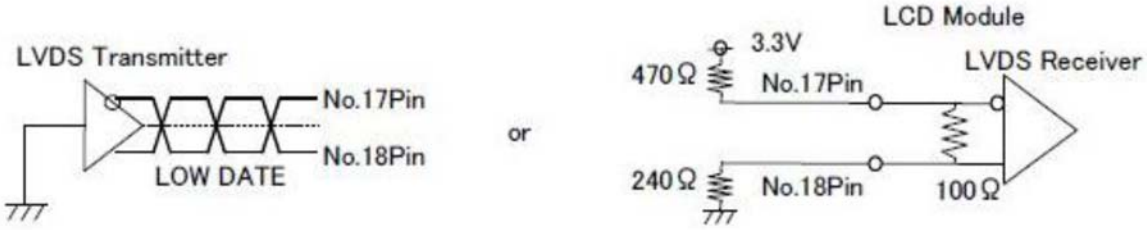
DE : DATA ENABLE

HS : Hsync

VS : Vsync

NA : Non Available

Recommended input （17pin, 18pin at 6bit ）



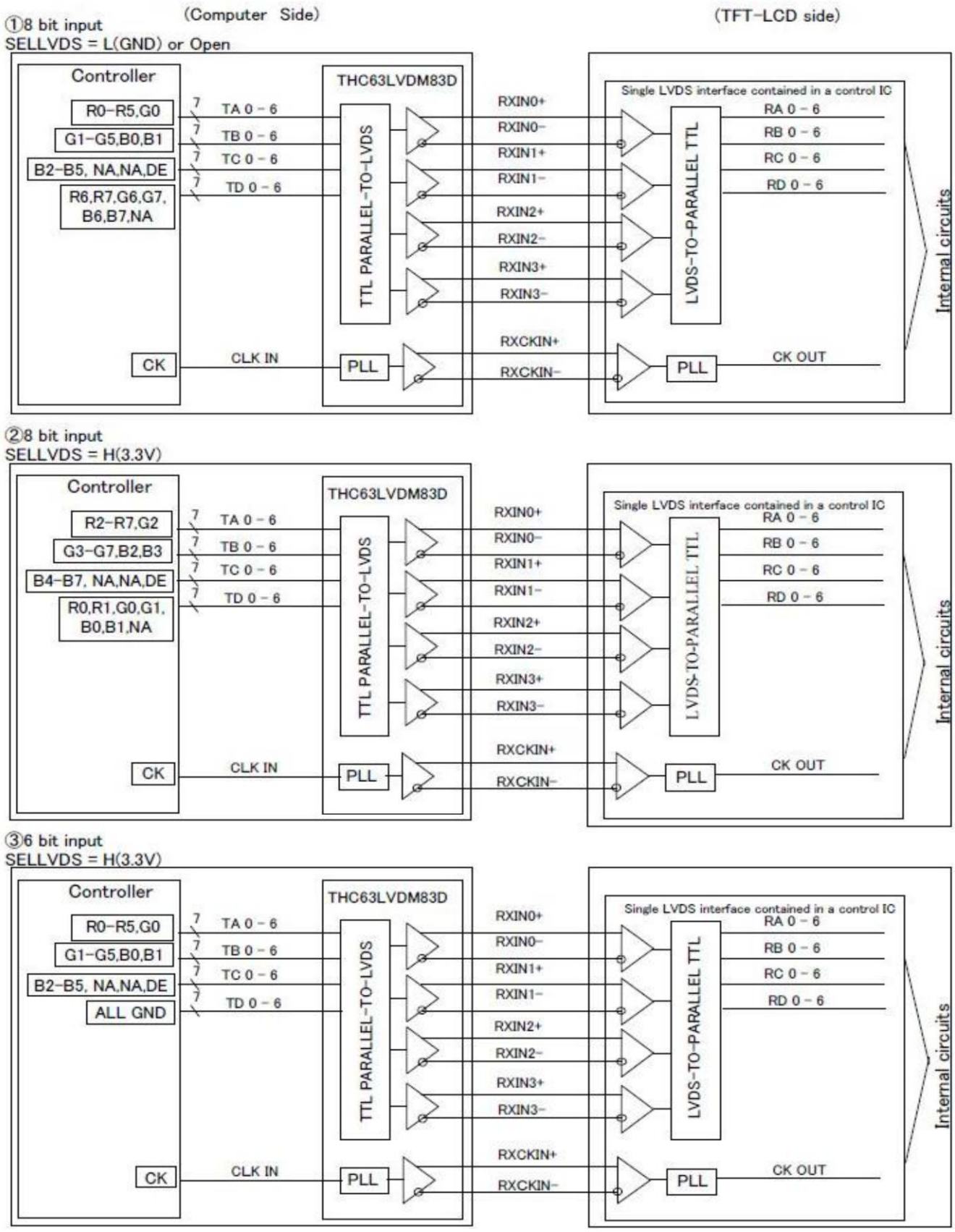
4.3 LED backlight connector

CN2 Used connector : SM06B-SHLK-G-TF（HF）(J.S.T. Mfg. Co. Ltd)

Corresponding connector : SHLP-06V-S-B (J.S.T. Mfg. Co. Ltd)

Pin #	Symbol	Function
1	VDD	+12V Power supply
2	VDD	+12V Power supply
3	GND	GND
4	GND	GND
5	XSTABY	Backlight ON/OFF signal
6	VBR	PWM signal

4.4 Interface block diagram

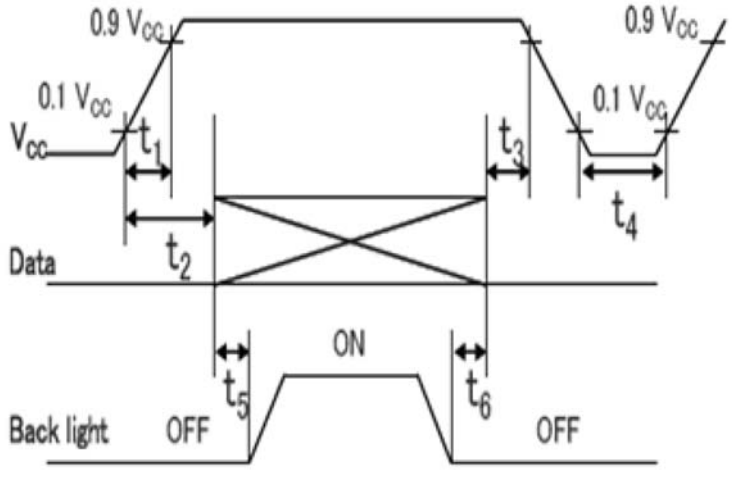


5.0 Electrical Characteristic

5.1 TFT LCD panel driving

Parameter		Symbol	Condition	Min.	Typ.	Max.	Units	Condition
Supply voltage		Vcc	-	3.0	3.3	3.6	[V]	(1)
Current dissipation		Icc	Vcc=3.3V	-	200	300	[mA]	(2)
Input voltage width for LVDS receiver		VL	-	0	-	2.4	[V]	-
Permissive input ripple voltage		-	-	-	-	200	mVp-p	Vcc=3.3V
Differential input Threshold voltage	High	VTH	-	-	-	Vcm+100	mV	Vcm=1.2V (3)
	Low	VTL	-	Vcm-100	-	-	mV	
Input voltage		VIH	-	2.1	-	-	V	(4)
		VIL	-	-	-	0.8	V	
Input reak current		IOH	-	-	-	400	uA	VI2=+3.3V, (4)
		IOL	-	-10	-	+10	uA	VI2=0V, (4)
Terminal resistor		RT	-	-	100	-	Ω	Differential input

Note (1): On-off condition for supply voltage



$100us < t_1 \leqq 10ms$

$0 < t_2 \leqq 20ms$

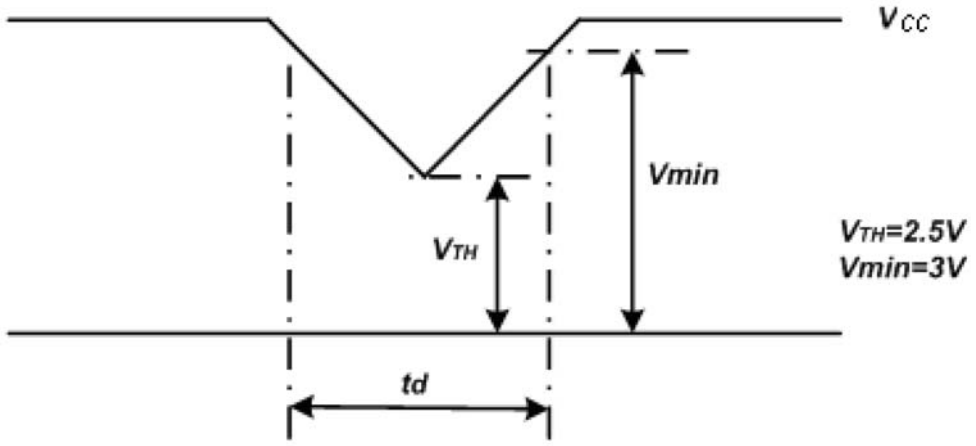
$0 < t_3 \leqq 1s$

$1s \leqq t_4$

$300ms \leqq t_5$

$200ms \leqq t_6$

Vcc-dip Condition



If VTH＜Vcc≤Vmin，then td≤10ms；When the voltage return to normal our panel must revive automatically.

If Vcc<Vth, then Vcc-dip conditions should also follow the On-off conditions for supply voltage.

* Hsync/Vsync need not be input so that this model may drive only by the ENAB signal. Even if Hsync/ Vsync is input, it doesn't become a malfunction.

* The relation between the data input and the backlight will recommend the above-mentioned input sequence. When the backlight is turned on before the panel operates, there is a possibility of abnormally displaying. The liquid crystal module is not damaged.

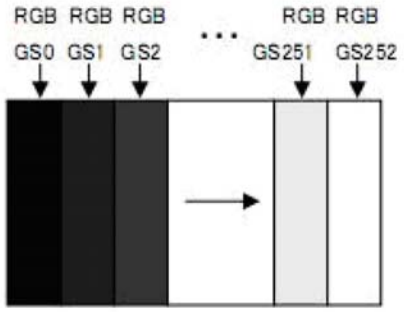
Note (2): Current dissipation

Current dissipation

Typical current situation : 253-gray-bar pattern

(Vcc=+3.3V、fck = 65MHz、Ta=25°C)

V_{CM} : LVDS common mode voltage



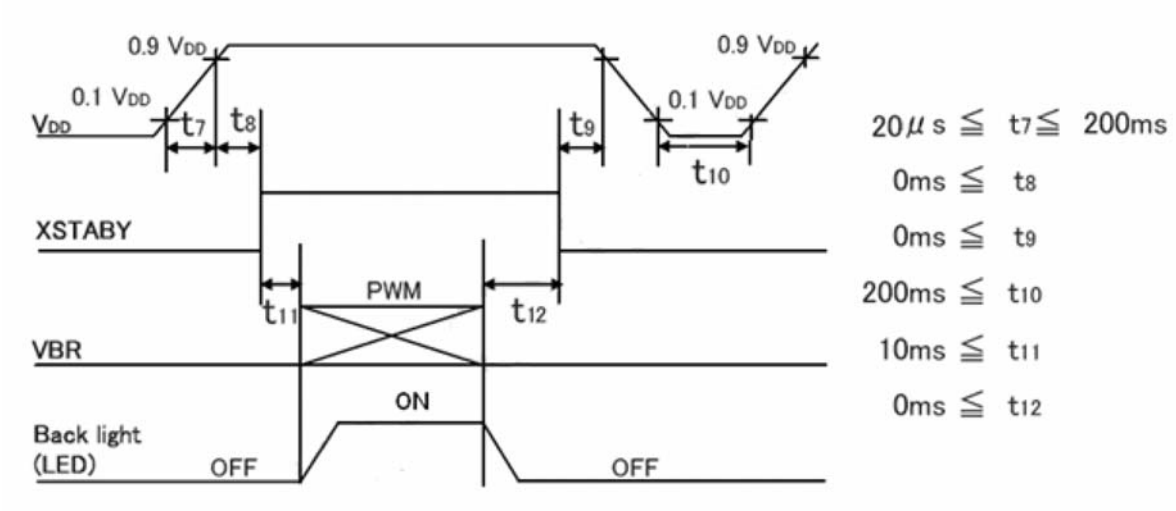
Note (3): Vcm: LVDS Common mode voltage

Note (4): RL/UD, SELLVDS

5.2 LED Backlight

Parameter		Symbol	Min	Typ.	Max.	Units	Note
Supply voltage		VDD	10.2	12	13.8	[V]	(1)
Current dissipation		IDD1	-	580	740	mA	(2)
Permissive input ripple voltage		VRP_BL	-	-	200	mVp-p	VDD=12V
XSTABY	High voltage	VIH_BL1	2.4	-	VDD	V	(3)
	Low voltage	VIL_BL1		-	0.4	V	
PWM frequency		fPWM	200	-	1K	Hz	(4),(5)
PWM duty		DPWM	10	-	100	%	(4),(5)
VBR	High voltage	VIH_BL2	2.1	-	VDD	V	(4)
	Low voltage	VIL_BL2	-	-	0.4	V	
Life Time		L	(50,000)	-	-	Hours	(6)

Note (1): On-off conditions for supply voltage



Note (2): Current dissipation

Typ. Value: V_{DD} =+12.0V, Duty=100%

Max. Value: V_{DD} =+10.2V, Duty=100%

Note (3): PWM

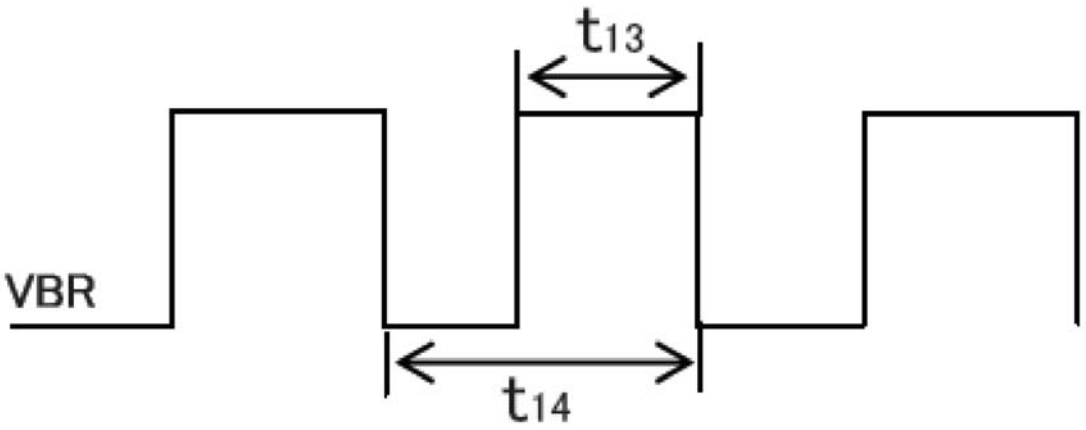
f_{PWM} =1/t14

Duty 10%: Min. Luminance (0%: LED OFF)

Duty 100%: Max. Luminance

Luminance changes in proportion to the duty ratio. (t13>=10us)

When the frequency slows, the display fineness might decrease.

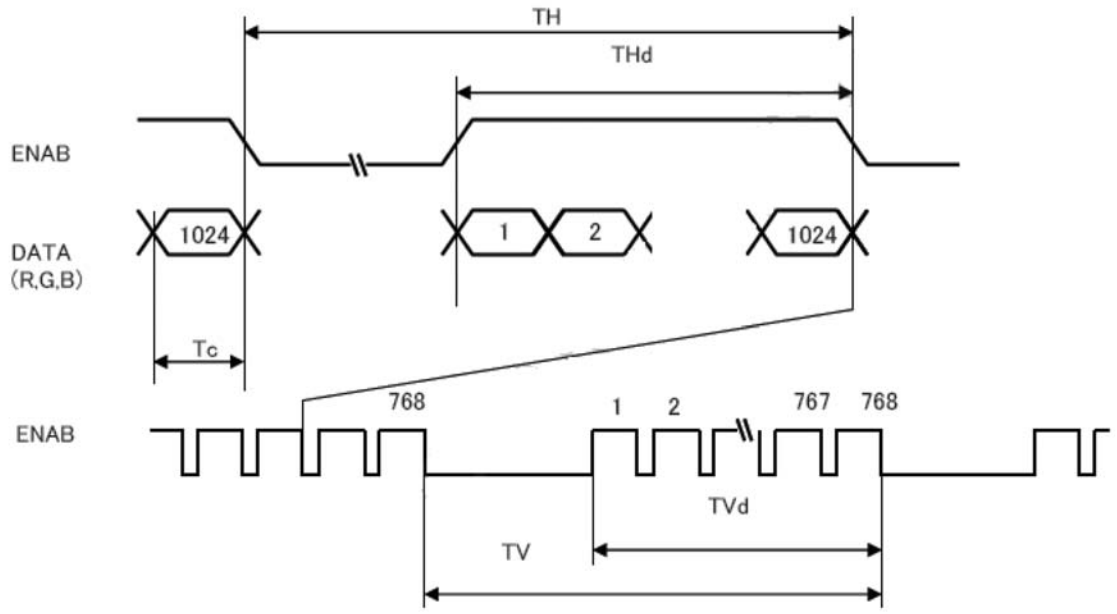


Note (6): Luminance becomes 50% of an initial value. (Ta=25℃, PWM=100%)

6.0 Timing characteristics of the input signal

Parameter	Symbol	Min	Typ	Max	Unit	Note
DCLK Frequency	1/Tc	50	65	80	MHz	(1)
Horizontal Display Area	THd		1024		DCLK	
H Total Time	TH	1056	1344	1720	DCLK	
		16.0	20.7	23.4	us	
Vertical Display Area	TVd		768		Line	
V Total Time	TV	772	806	990	line	
		13.3	16.7	18	ms	

Note (1): In case of using the long vertical period, the deterioration of display quality, flicker etc. may occur.



7. **Resistive Touch Panel**

Electrical Charateristics

Item	Specifications
(1) Supply Voltage	DC 5V
(2) Circuit Resistance	X:200~900 ohm, Y200~900 ohm (See Figure 1)
(3) Linearity	X≤1.5%, Y≤1.5%
(4) Response	≤10ms
(5) Insulation	≥ 20Mohm/25V(DC)
(6) Endurance	No acting damage at DC50V/60sec.

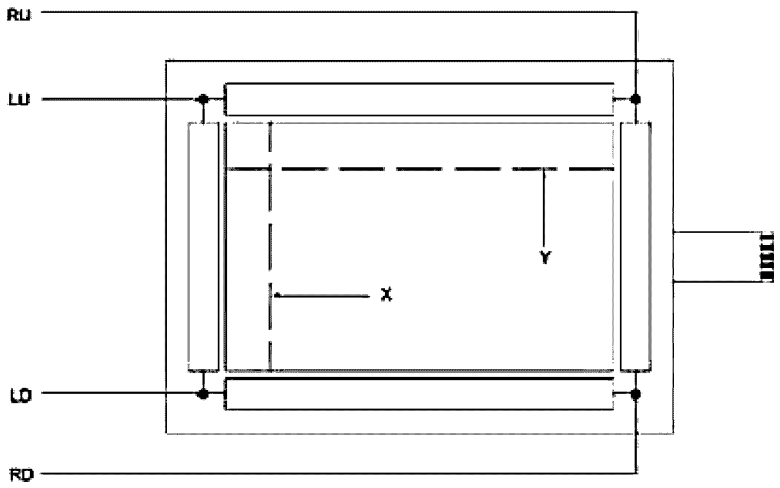


Figure 1

Note : Circuit Resistance X = short RU and RD, short LU and LD , measure the resistance between RU and LU.
Circuit Resistance Y = short RU and LU , short RD and LD, measure the resistance between RU and RD

Pin#	Assginment
1	Y up
2	X right
3	X left
4	Y down

8. Reliability Test Items

Test Item	Test Conditions	Note
High Temperature Operation	70±3°C , t=240hrs	1
Low Temperature Operation	-20±3°C , t=240hrs	1
High Temperature Storage	80±3°C , t=240 hrs	1
Low Temperature Storage	-30±3°C , t=240 hrs	1
Storage at High Temperature and Humidity	35°C, 90% RH ,240 hrs	1
Thermal Shock Test	-30°C ~ 80°C 1hr/10 cycles	1

Note 1 :

Under the display quality test conditions with normal operation state, these shall be no change which may affect practical display function.(normal operation state:Temperature:15~35°C, Humidity:45~75%, Atmospheric pressure:86~106kpa)

9 USE PRECAUTIONS

9.1 Handling precautions

1) The polarizing plate may break easily so be careful when handling it. Do not touch, press or rub it with a hard-material tool like tweezers.
2) Do not touch the polarizing plate surface with bare hands so as not to make it dirty. If the surface or other related part of the polarizing plate is dirty, soak a soft cotton cloth or chamois leather in benzine and wipe off with it. Do not use chemical liquids such as acetone, toluene and isopropyl alcohol. Failure to do so may bring chemical reaction phenomena and deteriorations.
3) Remove any spit or water immediately. If it is left for hours, the suffered part may deform or decolorize.
4) If the LCD element breaks and any LC stuff leaks, do not suck or lick it. Also if LC stuff is stuck on your skin or clothing, wash thoroughly with soap and water immediately.

9.2 Installing precautions

1) The PCB has many ICs that may be damaged easily by static electricity. To prevent breaking by static electricity from the human body and clothing, earth the human body properly using the high resistance and discharge static electricity during the operation. In this case, however, the resistance value should be approx. 1MΩ and the resistance should be placed near the human body rather than the ground surface. When the indoor space is dry, static electricity may occur easily so be careful. We recommend the indoor space should be kept with humidity of 60% or more. When a soldering iron or other similar tool is used for assembly, be sure to earth it.
2) When installing the module and ICs, do not bend or twist them. Failure to do so may crack LC element and cause circuit failure.
3) To protect LC element, especially polarizing plate, use a transparent protective plate (e.g., acrylic plate, glass etc) for the product case.
4) Do not use an adhesive like a both-side adhesive tape to make LCD surface (polarizing plate) and product case stick together. Failure to do so may cause the polarizing plate to peel off.

9.3 Storage precautions

1) Avoid a high temperature and humidity area. Keep the temperature between 0°C and 35°C and also the humidity under 60%.
2) Choose the dark spaces where the product is not exposed to direct sunlight or fluorescent light.
3) Store the products as they are put in the boxes provided from us or in the same conditions as we recommend.

9.4 Operating precautions

1) Do not boost the applied drive voltage abnormally. Failure to do so may break ICs. When applying power voltage, check the electrical features beforehand and be careful. Always turn off the power to the LC module controller before removing or inserting the LC module input connector. If the input connector is removed or inserted while the power is turned on, the LC module internal circuit may break.
2) The display response may be late if the operating temperature is under the normal standard, and the display may be out of order if it is above the normal standard. But this is not a failure; this will be restored if it is within the normal standard.
3) The LCD contrast varies depending on the visual angle, ambient temperature, power voltage etc. Obtain the optimum contrast by adjusting the LC dive voltage.
4) When carrying out the test, do not take the module out of the low-temperature space suddenly. Failure to do so will cause the module condensing, leading to malfunctions.
5) Make certain that each signal noise level is within the standard (L level: 0.2Vdd or less and H level: 0.8Vdd or more) even if the module has functioned properly. If it is beyond the standard, the module may often malfunction. In addition, always connect the module when making noise level measurements.
6) The CMOS ICs are incorporated in the module and the pull-up and pull-down function is not adopted for the input so avoid putting the input signal open while the power is ON.

7) The characteristic of the semiconductor element changes when it is exposed to light emissions, therefore ICs on the LCD may malfunction if they receive light emissions. To prevent these malfunctions, design and assemble ICs so that they are shielded from light emissions.

8) Crosstalk occurs because of characteristics of the LCD. In general, crosstalk occurs when the regularized display is maintained. Also, crosstalk is affected by the LC drive voltage. Design the contents of the display, considering crosstalk.

9.5Other

1) Do not disassemble or take the LC module into pieces. The LC modules once disassembled or taken into pieces are not the guarantee articles.
2) The residual image may exist if the same display pattern is shown for hours. This residual image, however, disappears when another display pattern is shown or the drive is interrupted and left for a while. But this is not a problem on reliability.
3) AMIPRE will provide one year warrantee for all products and three months warrantee for all repairing products.

10. MECHANIC DRAWING