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-800600TTMQW-00H
APPROVED BY	
DATE	

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

AMPIRE CO., LTD.
4F., No.116, Sec. 1, Xintai 5th Rd., Xizhi Dist., New Taipei City221, Taiwan (R.O.C.)
新北市汐止區新台五路一段 **116** 號 **4** 樓**(**東方科學園區 **A** 棟**)**
TEL:886-2-26967269 , FAX:886-2-26967196 or 26967270

APPROVED BY	CHECKED BY	ORGANIZED BY

RECORD OF REVISION

Revision Date	Page	Contents	Editor
2013/02/01	--	New Release	Bob
2014/1/23	19	Updated the **Reliability Test Items**	Rober

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 12.1-inch diagonally measured active display area with SVGA resolution (800 horizontal by 600 vertical pixels array).

1.2 Features

- 12.1" TFT LCD Panel
- LED Backlight System
- Supported SVGA Resolution
- Aspect Ratio: 4:3
- Compatible with RoHS Standard

1.3 Product Summary

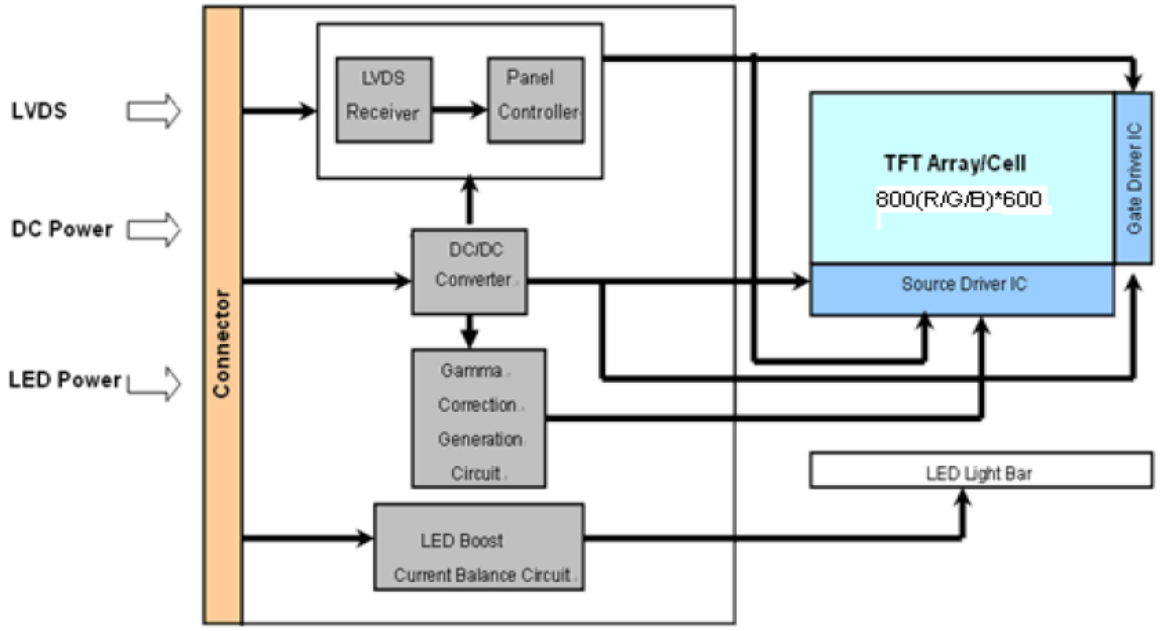
Items	Specifications	Unit
Screen Diagonal	31(12.1inch)	cm
Active Area	246.0 (H) x184.5 (V)	mm
Pixel Format	800(H) x600(V) (1 Pixel=R+G+B Dot)	pixel
Pixel Pitch	0.3075(H)×0.3075(V)	mm
Pixel Arrangement	R.G.B. Vertical Stripe	-
Display Mode	Normally White	-
White Luminance	250(Min)300(Typ)	cd /m_2
Contrast Ratio	500(Min),800(Typ)	-
Response Time	30(Typ)	msec
Input Voltage	3.3V(Logic),12V(LED)	V
Weight	700(Max)	g
Unit Outline Dimensions(*1)	276.0(W)×209.0(H)×9.1(D)	mm
Electrical Interface (Logic)	LVDS	-
Support Color	262K Colors(RGB 6 Bit)	-
Surface Treatment	Anti-Glare and Hard-coating 3H	-

(*1) Excluding the area of the connector cover.

1.4 Functional Block Diagram

The functional block diagram of the LCD module.

Figure 1 Block Diagram



2.0 Absolute Maximum Ratings

Table 1 Absolute Ratings of Environment

Item	Symbol	Condition	Pin	Ratings	Unit	Remark
Supply Voltage	V cc	Ta=25℃	VCC	-0.3~+4.0	V	Note1,2
	Vdd	Ta=25℃	VDD	-0.3~+15.0	V	Note1,2
Input Voltage	VI1	Ta=25℃	RxINi-/+ CK IN-/+	-0.3~Vcc+0.3	V	I=0,1,2
	VI2	Ta=25℃	RL/UD	-0.3~ V cc+0.3	V	-
	VI4	Ta=25℃	XSTABY,VBR	-0.3~ V DD	V	-
Storage Temperature	TSTG	-	-	-30~+80	℃	Note1
Operating Temperature	TOPA	-	-	-20~+70	℃	Note1,3,4

Note1: Humidity: 95%RH Max. (Ta<=40℃) Note static electricity.
Maximum wet-bulb temperature at 39℃ or less.(Ta>40℃) No condensation.

Note2: The Vcc power supply capacity must use the one of 2A or more.
The Vcc power supply capacity must use the one of 3A or more.

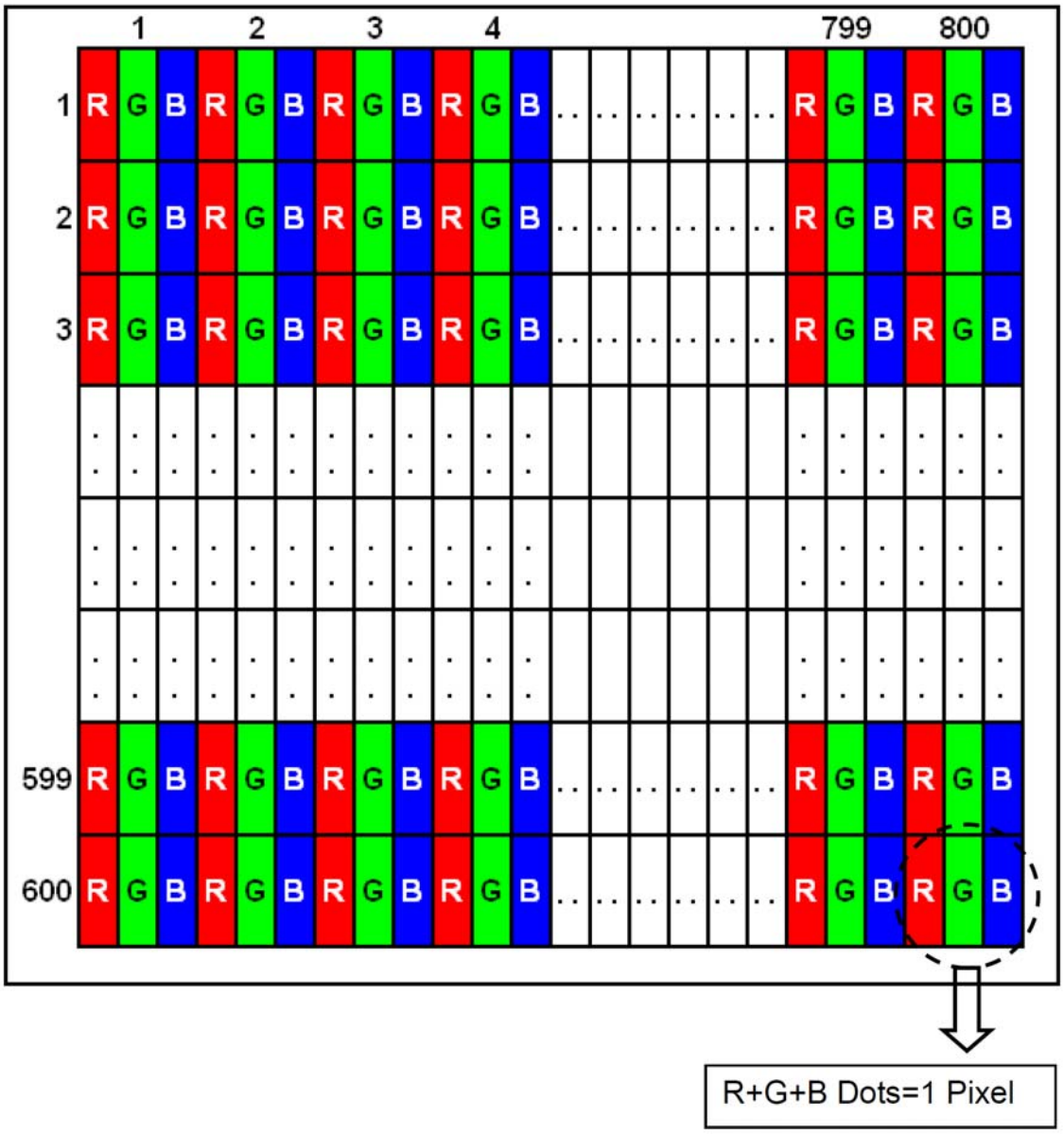
Note3: There is a possibility of causing deterioration in the irregularity and others of the screen and the display fineness though the liquid crystal module doesn't arrive at destruction when using it at 65~70℃. There is a possibility of causing the fineness deterioration by the prolonged use in the(high temperature) humidity environment(60% or more).

Note4: 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 Pixel Format Image

Figure 2 shows the relationship of the input signals and LCD pixel format image.

Figure 2 Pixel Format



4.0 Optical Characteristics

The optical characteristics are measured under stable conditions as following notes

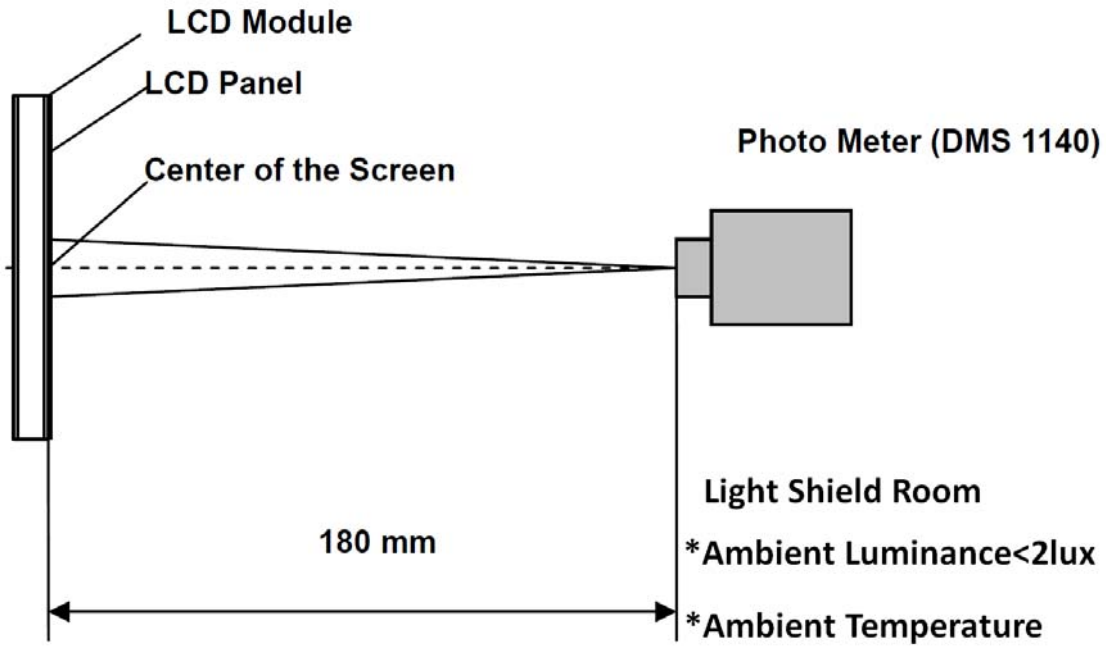
Table 2 Optical Characteristics

Item	Condition		Specification			
			Min.	Typ.	Max.	Note
Viewing Angle [degrees] K=Contrast Ratio>10	Horizontal	θ_L	70	80	-	A, B,D
		θ_R	70	80	-	
	Vertical	θ_T	50	60	-	
		θ_B	70	80	-	
Contrast Ratio	Center		500	800	-	B,D
Response time	Tr		-	7	-	-
	Tf		-	23	-	-
	Tr + Tf		-	30	-	C,D
Color Chromaticity (CIE 1,931)	Red	x	-0.05	0.640	+0.05	D
	Red	y		0.327		
	Green	x		0.303		
	Green	y		0.640		
	Blue	x		0.151		
	Blue	y		0.060		
	White	x		0.280		
	White	y		0.301		
White Luminance [cd/m^2]	Center		250	300	-	D
White Uniformity [%]	5Points		75	-	-	E

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

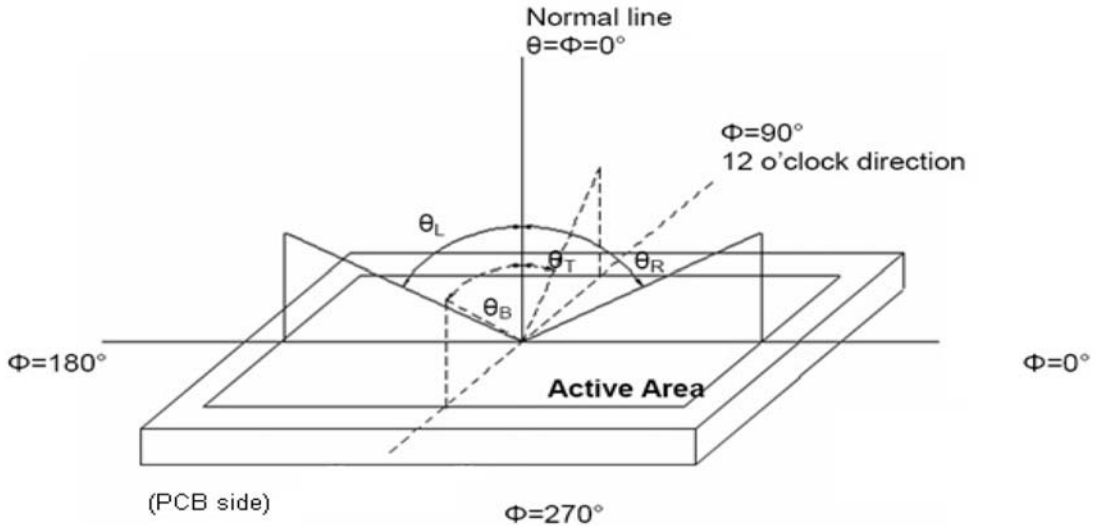
The optical characteristics shall be measured in a dark room or equivalent state with the method shown in below.

Figure 3 Measurement Setup



Note A: Definitions of viewing angle range:

Figure 4 Definition of Viewing Angle



Note B: Definition Of Contrast Ratio (CR)

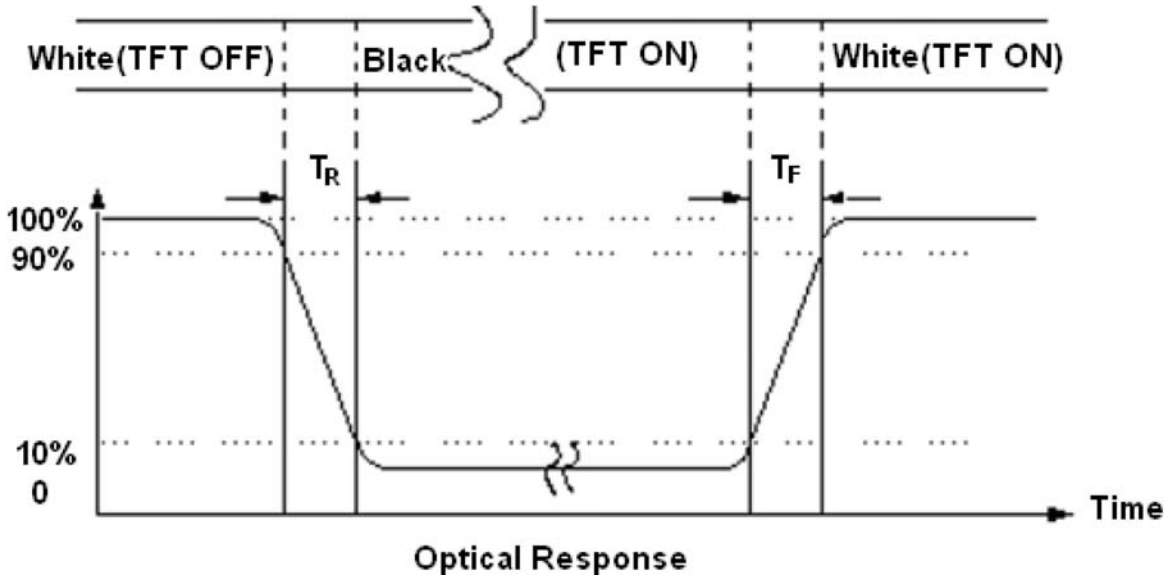
The contrast ratio is defined as the following

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

Note C: 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”

Figure 5 Definition of Response Time



Note D: This shall be measured at center of the screen.

Note E: Definition Of white uniformity.

White uniformity is defined as the following with five measurements

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

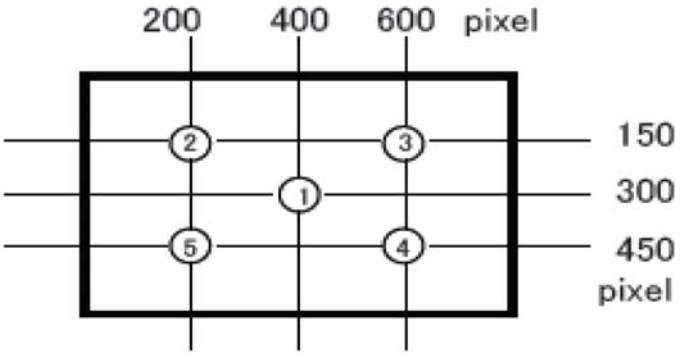


Figure 6 Measurement Locations

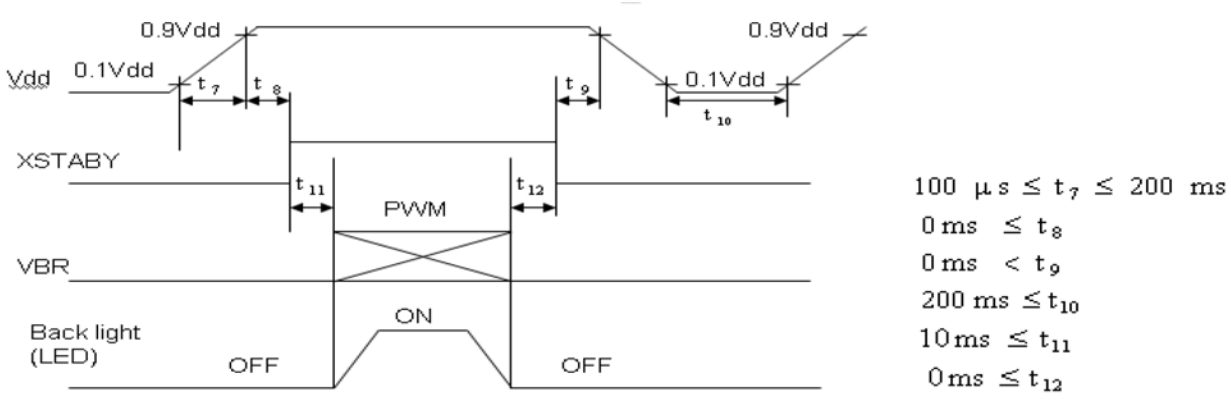
5.0 Backlight Characteristics

5.1 Parameter Guideline Of LED Backlight

Table 3 Parameter Guideline for LED Backlight

Parameter		Symbol	Min	Typ.	Max.	Units	Condition
Supply voltage		VDD	10.2	12	13.8	[V]	Note A
Current dissipation		IDD	-	570	670	mA	Note B
Permissive input ripple voltage		V_{RP_BL}	-	-	200	mVp-p	VDD=12V
XSTABY	High voltage	V_{IH_BL1}	2.4	-	VDD	V	Note C
	Low voltage	V_{IL_BL1}		-	0.2	V	
PWM frequency		f_{PWM}	200	-	1K	Hz	Note D,E
PWM duty		D_{PWM}	10	-	100	%	Note D,E
VBR	High voltage	V_{IH_BL2}	2.1	-	VDD	V	Note D
	Low voltage	V_{IL_BL2}	-	-	0.8	V	
Life Time		L	50,000	-	-	Hours	Note F

Note A: On-off conditions for supply voltage



Note B: Current dissipation

Typ. Value: VDD=+12V, Duty=100%

Max. Value: VDD=10.2V, Duty=100%

Note C: Backlight ON/OFF signal(connected by the pull-down resistor of 10 Kohm)

Note D: PWM signal(connected by the pull-down resistor of 10 Kohm)

Note E: PWM

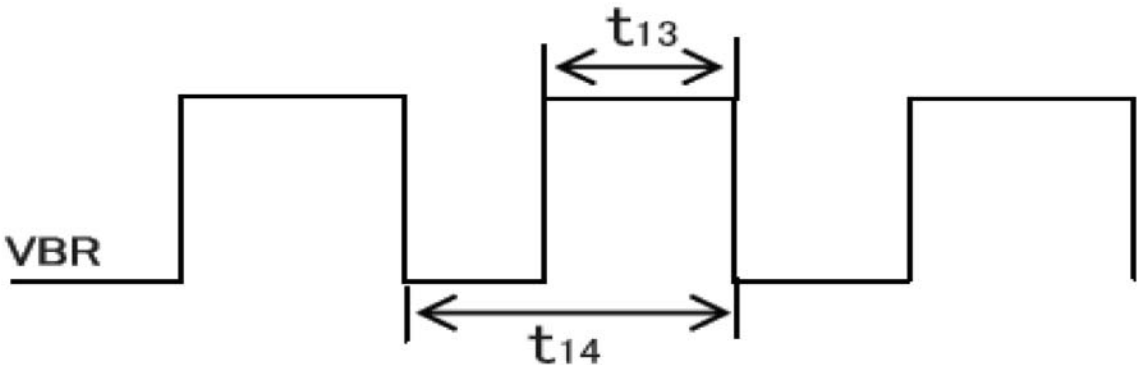
F_{PWM}=1/t14

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

6.0 Input Terminals

6.1 TFT LCD panel driving

CN1(Interface signals and +3.3V power supply)

Using connectors: 076B20-0048RA-G4 (Starconn) or similar type.

Corresponding connectors:FI-SE20M or FI-S20S(Japan Aviation Electronics Industry Co., Ltd)

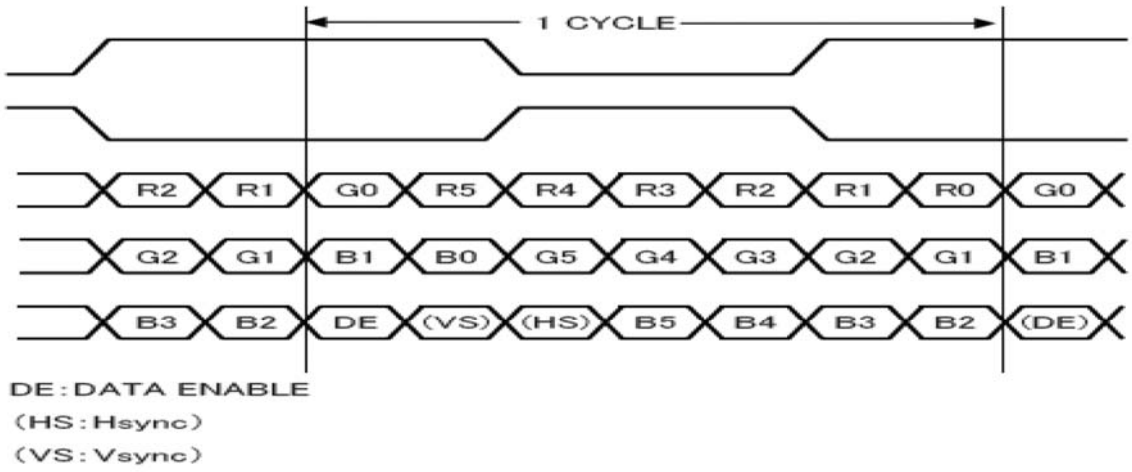
Table 4 Signal Pin Assignment

Pin #	Symbol	Function	Remarks
1	Vcc	+3.3V Power supply	-
2	Vcc	+3.3V Power supply	-
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	GND	GND	-
14	CK IN-	LVDS receiver signal CK(-)	LVDS
15	CK IN+	LVDS receiver signal CK(+)	LVDS
16	GND	GND	-
17	NC	Non Connection	-
18	RL/UD	-	6.1.1
19	GND	GND	-
20	GND	GND	-

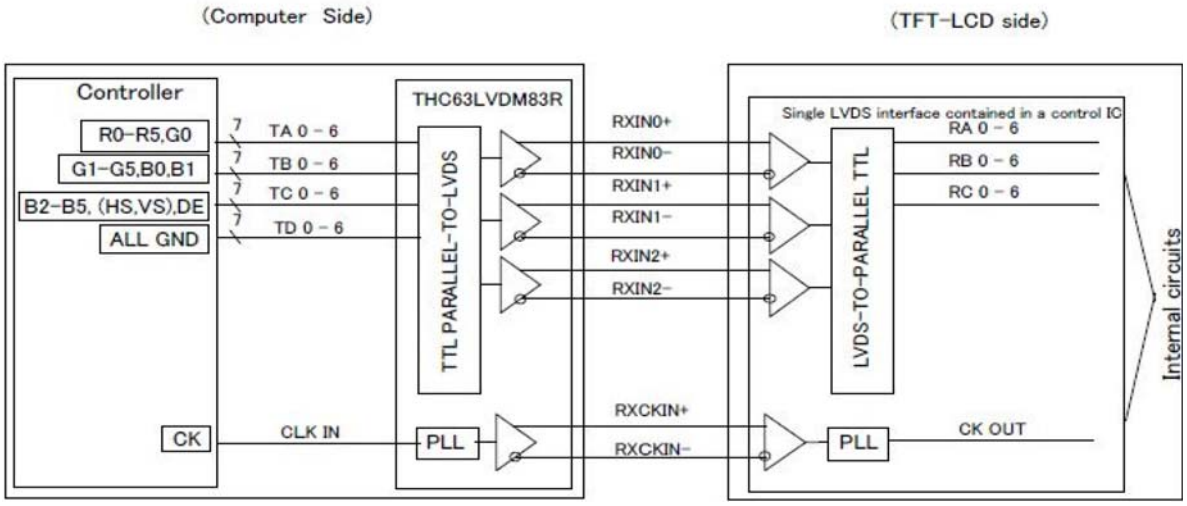
6.1.1 RL/UD drawing

RL/UD=LOW RL/UD=HIGH

6.1.2 Signal Drawing



6.1.3 Interface block diagram



6.2 LED backlight connector

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

or Similar type

Corresponding connector: SHLP-06V-S-B

Table 5 LED Power Pin Assignment

Pin #	Symbol	Function
1	VDD	+12V Power supply
2	VDD	+12V Power supply
3	GND	GND
4	GND	GND
5	XSTABY	LED ENABLE PIN(+3.3V INPUT)
6	VBR	SYSTEM PWM SIGNAL INPUT

7.0 Interface Timings

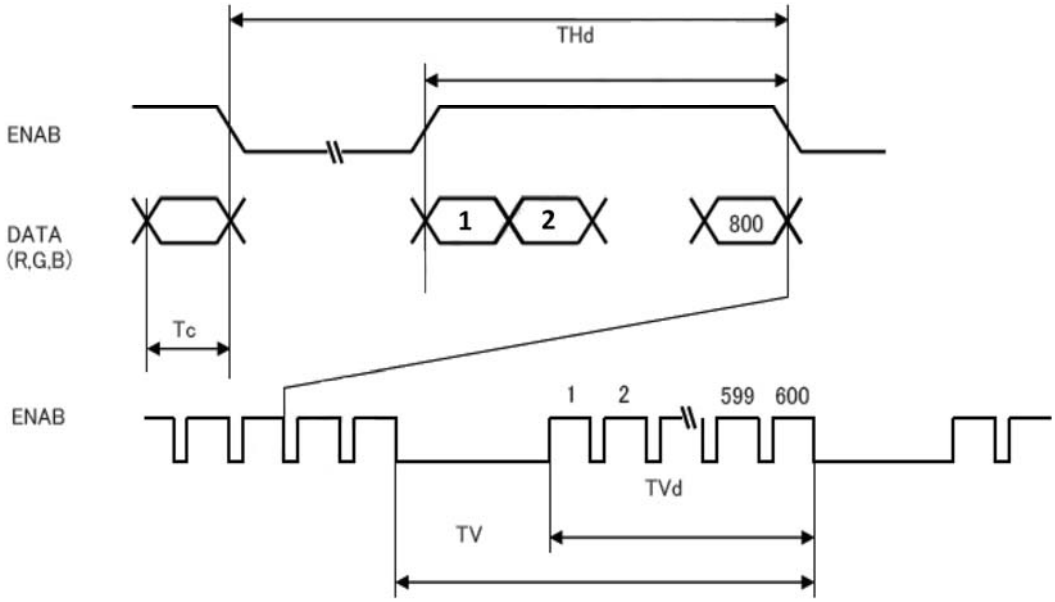
7.1Timing Characteristics

Table 6 Interface Timings

Parameter	Symbol	Min	Typ	Max	Unit
DCLK Frequency	1/Tc	35	40	42	MHz
Horizontal Display Area	thd		800		DCLK
H Total Time	th	940	1056	1395	DCLK
H Active Time		23.5	26.4	39.9	us
Vertical Display Area	tvd		600		Line
V Total Time	tv	628	666	798	line
V Active Time		-	16.7	-	ms

Note:

In case of using the long vertical period, the deterioration of display quality, flicker etc. may occur.



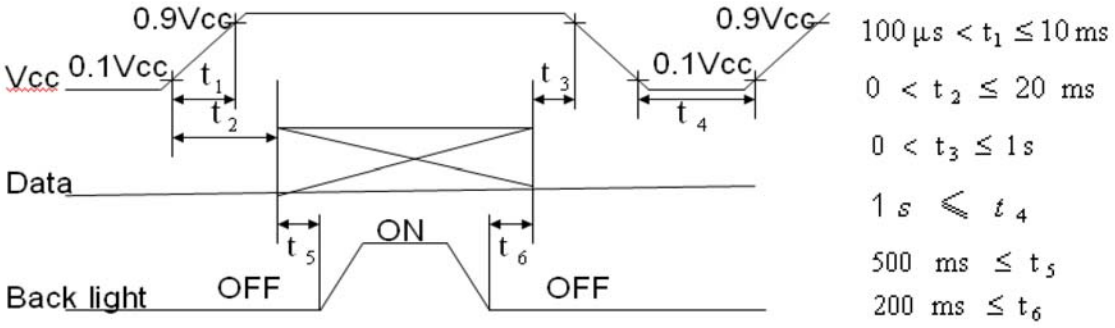
8.0 Power Consumption

Input power specifications are as follows.

Table 7 Power Consumption

Parameter		Symbol	Condition	Min.	Typ.	Max.	Units	Condition
Supply voltage		Vcc	-	3.0	3.3	3.6	[V]	Note1
Current dissipation		Icc	Vcc=3.3V	-	270	350	[mA]	Note2
Input voltage width for LVDS receiver		V_L	-	-	-	2.4	[V]	-
Permissive input ripple voltage		V_{RIP}	-	-	-	200	mVp-p	Vcc=3.3V
Differential input Threshold voltage	High	V_{TH}	-	-	-	Vcm+100	mV	Vcm=1.2V Note3
	Low	V_{TL}	-	Vcm-100	-	-	mV	
Input voltage		V_{IH}	-	2.1	-	-	V	Note4
		V_{IL}	-	-	-	0.8	V	
Input reak current		I_{OH}	-	-	-	400	uA	VI2=+3.3V, Note4
		I_{OL}	-	-10	-	+10	uA	VI2=0V,Note4
Terminal resistor		R_T	-	-	100	-	Ω	Differential input

Note 1: On-off condition for supply voltage



Vcc-dip Condition

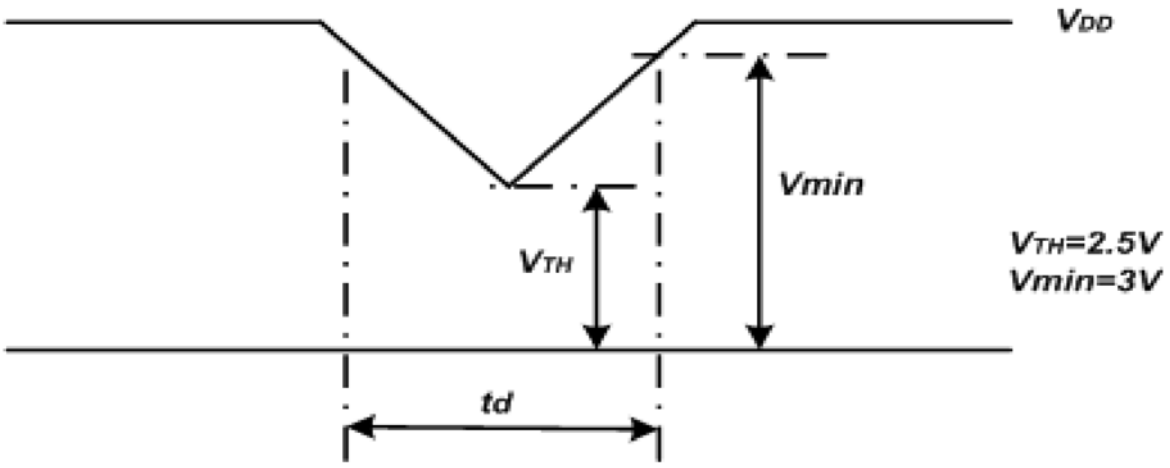


Figure 7 VDD Power Dip

If $V_{TH} < V_{DD} \leq Vmin$, then $t_d \leq 10ms$; 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

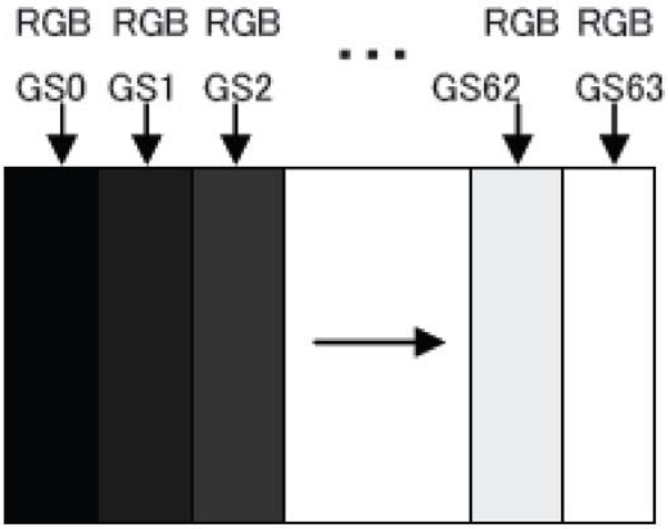
Hsync/ Vsync is input, it doesn't become a malfunction.The relation between the data input and

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.

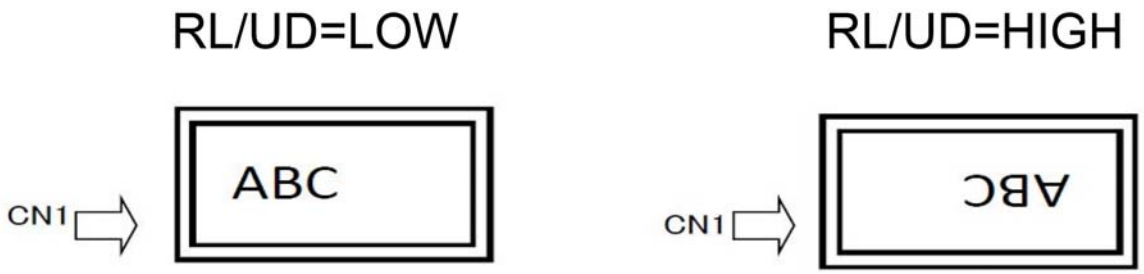
Note2: Current dissipation

Typical current situation: 64-gray-bar pattern (Vcc=3.3V, fck=40MHz,Ta=25℃)



Note3: Vcm: LVDS Common mode voltage

Note4: RL/UD



9. Reliability Test Items

Test Item	Test Conditions	Note
High Temperature Operation	70±3°C , t=500 hrs	1
Low Temperature Operation	-20±3°C , t=500 hrs	1
High Temperature Storage	80±3°C , t=500 hrs	1
Low Temperature Storage	-30±3°C , t=500 hrs	1
Storage at High Temperature and Humidity	50°C, 95% RH , 500 hrs	1
Thermal Shock Test	-30°C ~ 80°C 1hr/200 cycles	1
Vibration Test	1.5G , 10 ~ 500 Hz x.y.z each axis/1h	1
Shock Test	Half Sine Wave 70G 11ms ,±X,±Y,±Z 1 times each axis	1
Drop Test (Packing)	65cm,1 corner,3 arris,6side	1
Vibration Test (Packing)	1.5 G, 10 ~ 500Hz, X, y, x each axis/1h	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)

10 USE PRECAUTIONS

10.1 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.

10.2 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.

10.3 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.

10.4 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.

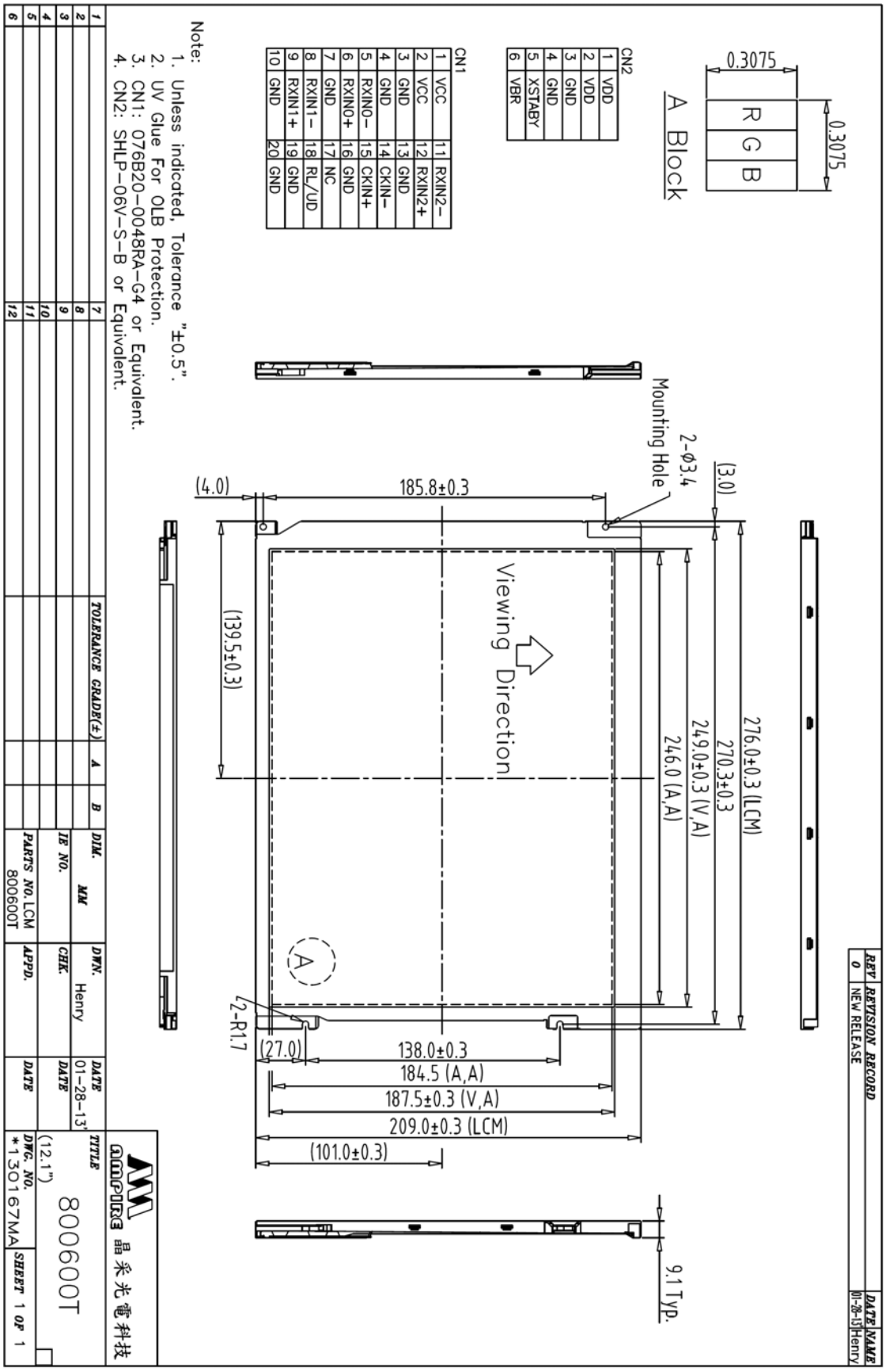
7) The characteristic of the semiconductor element changes when it is exposed to light emissions, therefore ICs on the LCD may malfunction if they receive light emissions. To prevent these malfunctions, design and assemble ICs so that they are shielded from light emissions.

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.

10. Other

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.

11. MECHANIC DRAWING



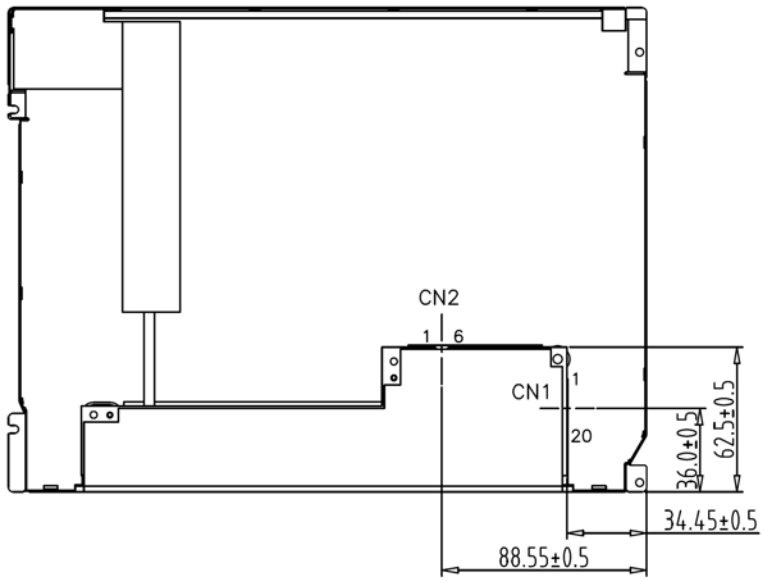
REV	REVISION RECORD	DATE	NAME
0	NEW RELEASE	01-28-13	Henry

CN2

1	VDD
2	VDD
3	GND
4	GND
5	XSTABY
6	VBR

CN1

1	VCC	11	RXIN2−
2	VCC	12	RXIN2+
3	GND	13	GND
4	GND	14	CKIN−
5	RXIN0−	15	CKIN+
6	RXIN0+	16	GND
7	GND	17	NC
8	RXIN1−	18	RL/UD
9	RXIN1+	19	GND
10	GND	20	GND



Back view

Note:
1. Unless indicated, Tolerance "±0.5".
2. UV Glue For OLB Protection.
3. CN1: 076B20-0048RA-G4 or Equivalent.
4. CN2: SHLP-06V-S-B or Equivalent.

1		7		TOLERANCE GRADE(±)	A	B	DIM. MM	DWN. Henry	DATE 01-28-13	TITLE 800600T (12.1")	
2		8					IE NO.	CHK.	DATE		
3		9									
4		10									
5		11					PARTS NO. LCM-1 800600T	APPD.	DATE	DWG. NO. *130168MA	SHEET 1 OF 1
6		12									

晶采光電科技

AMPIRE CO., LTD.

Date : 2014/1/23