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-800480LTMQW-T00H
APPROVED BY	
DATE	

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

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RECORD OF REVISION

Revision Date	Page	Contents	Editor
2008/10/08	-	New Release	Tony
2009/01/05	24-25	Modify the mechanical drawing.	Emil
2009/3/6	8	Modify the LED BL diagram	Eric
2009/3/30	-	Change part No. to AM-800480LTMQW-T00H	Eric
2009/5/7	3	Modify ABSOLUTE MAXIMUM RATINGS VCC	Kokai
	4	Color chromaticity	
		Modify VDD to VCC	
2009/6/18	4	Remodify Luminance	JOHN
2009/7/2	3 &18	Correct Operating & Storage Temperature	JOHN

1. FEATURES

(1) Construction : a-Si TFT-LCD with driving system, White LED Backlight, Touch Panel.

(2) LCD type : Transmissive , Normally White

(3) Number of the Colors : 16.7M colors (R,G,B 6 8bit digital each)

(4) RGB Interface 45 pin.

(5) LCD Power Supply Voltage : 3.3V single power input, built-in power supply circuit.

(6) ROHS compliant.

2. PHYSICAL SPECIFICATIONS

Item	Specifications	unit
Display size (diagonal)	5.0	inch
Resolution	800 (W) x RGB x 480 (H)	dot
Display area	110.6 (W) x67.4 (H)	mm
Pixel pitch	0.135 (W) x 0.135 (H)	mm
Overall dimension	118.5(W) x 135.0(H) x4.417(D)	mm
Color configuration	R.G.B Vertical stripe	
Surface treatment	Antiglare	
View Direction (Gray Inversion)	6 o'clock	

3. ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Min.	Max.	Unit	Note
Power Supply for logic	VCC	-0.5	6	V	
Input Signal Voltage	VI	-0.5	VCC + 0.5	V	(1)
Operating Temperature	Top	-20	70	℃	(2)
Storage Temperature	Tstg	-30	80	℃	

Note 1: Hsync, Vsync, DEN, DCLK, R0~R7, G0~G7, B0~B7

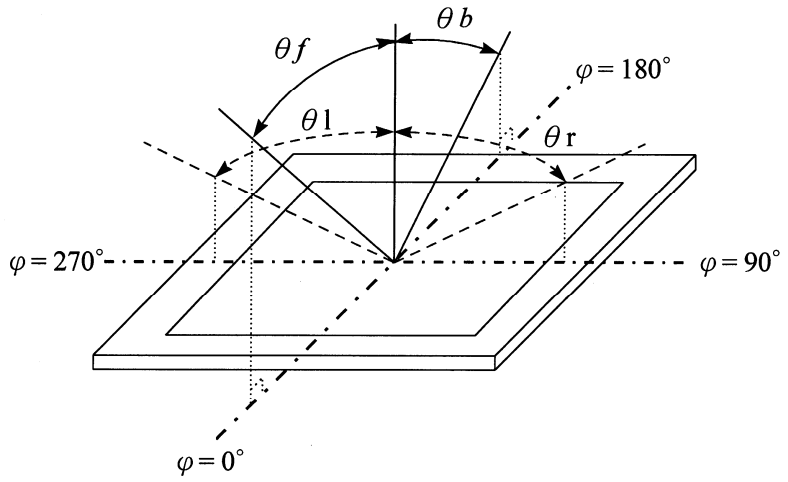
Note 2: Background color changes slightly depending on ambient temperature. This phenomenon is reversible.

4. OPTICAL CHARACTERISTICS

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Viewing Angle	Front	θ f	CR≧10	--	70	--	deg.	(1)(2)(3)
	Back	θ b		--	50	--		
	Left	θ l		--	70	--		
	Right	θ r		--	70	--		
Contrast ratio		CR	Θ=Φ=0°	150	250	--	--	(1)(3)
Response Time		T_r	Θ=Φ=0°	--	15	30	ms	(1)(4)
		T_f		--	35	50	ms	(1)(4)
Color chromaticity	Red	Rx	Θ=Φ=0°	0.585	0.615	0.645	--	(1)
		Ry		0.314	0.344	0.374		
	Green	Gx		0.277	0.307	0.337		
		Gy		0.532	0.562	0.592		
	Blue	Bx		0.103	0.133	0.163		
		By		0.120	0.150	0.180		
	White	Wx		0.279	0.309	0.339		
		Wy		0.320	0.350	0.380		
Luminance (I_{LED}=120mA)		L	Θ=Φ=0°	--	360	--	cd/m^2	(1)(5)
Luminance Uniformity		ΔL	Θ=Φ=0°	70	--	-	%	(1)(5)(6)

Note 1: Ta=25°C. To be measured on the center area of panel after 10 minutes operation.

Note 2: Definition of Viewing Angle



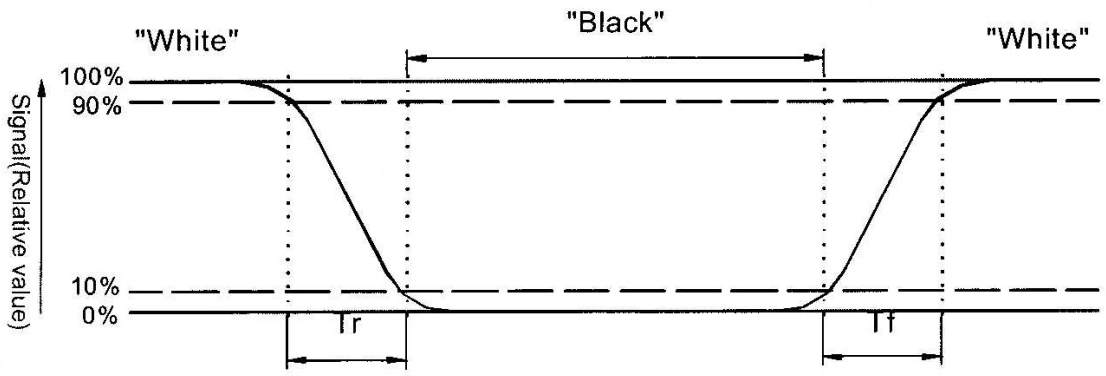
Note 3: Definition of contrast ratio:

Contrast ratio is calculated with the following formula.

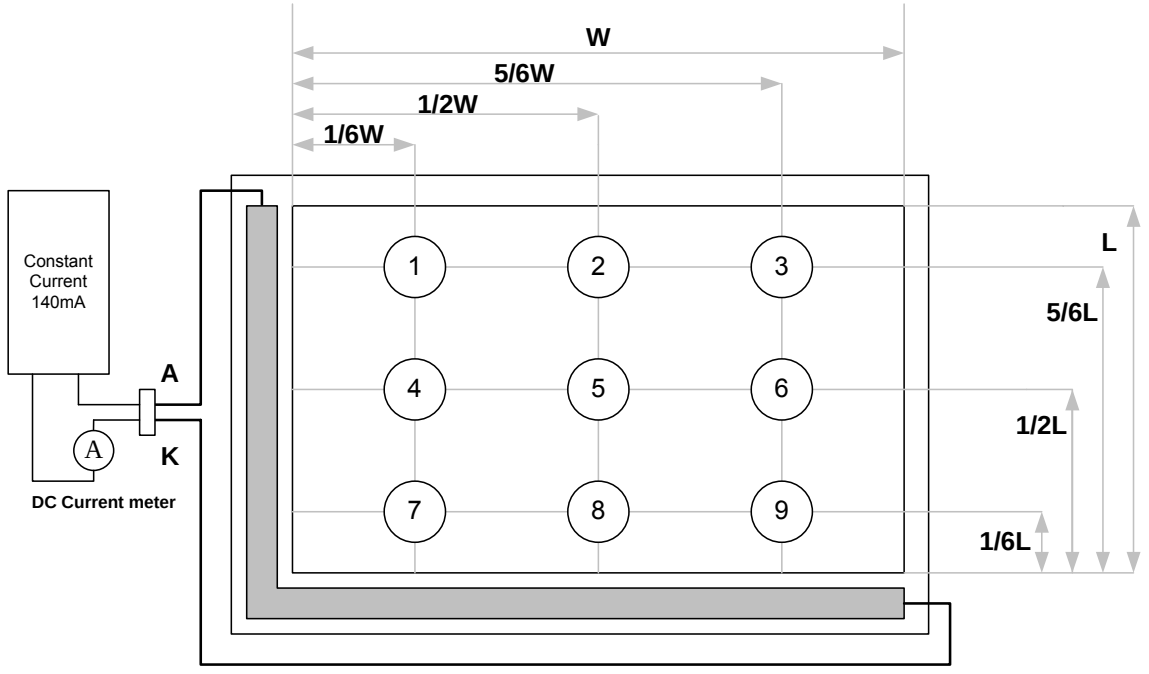
$$\text{Contrast ratio(CR)} = \frac{\text{Photo detector output when LCD is at "White" state}}{\text{Photo detector Output when LCD is at "Black" state}}$$

Note 4: Definition of response time:

The output signals of photo detector are measured when the input signals are changed from "black" to "white"(falling time) and from "white" to "black" (rising time) respectively. The response time is defined as the time interval between the 10% and 90% of amplitudes. Refer to figure as below.



Note 5 : Luminance is measured at point 5 of the display.



Note 6 : Definition of Luminance Uniformity

ΔL = [L(min.) of 9 points / L(max.) of 9 points] X 100%

5. ELECTRICAL CHARACTERISTICS

5.1 LCD driving

Item		Symbol	Min.	Typ.	Max.	Unit	Note
Power supply voltage		VCC	3.0	3.3	3.6	V	
Input voltage for logic	H Level	V_{IH}	0.7 VCC	--	VCC	V	(1)
	L Level	V_{IL}	0	--	0.3 VCC	V	
Power Supply current		IDD	--	(120)*	--	mA	(2)

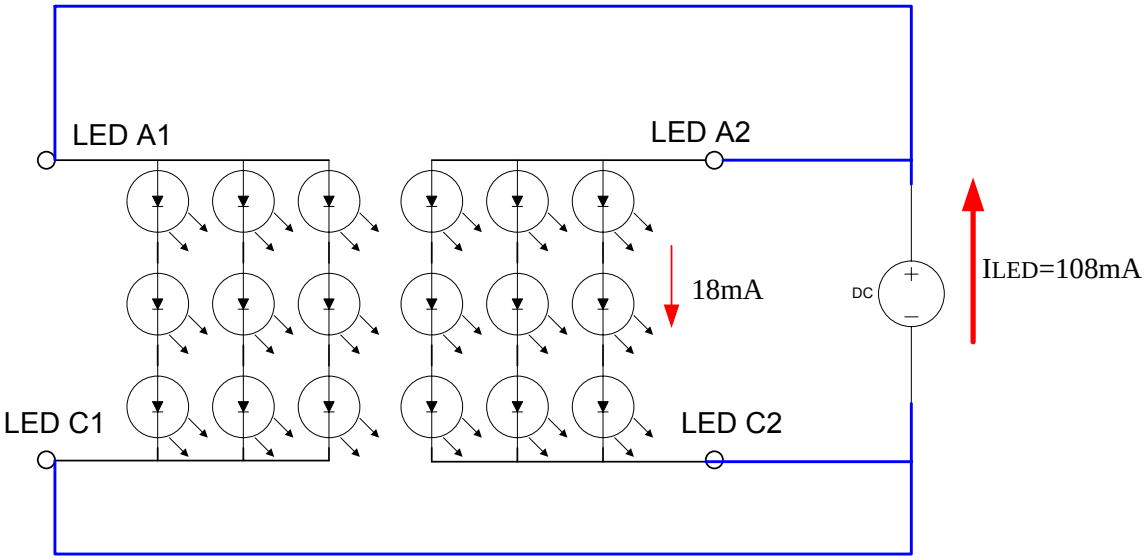
Note 1: Hsync, Vsync, DEN, DCLK, R0~R7, G0~G7, B0~B7

Note 2: fV =60Hz , Ta=25℃ , Display pattern : All Black

*:Will be reference only

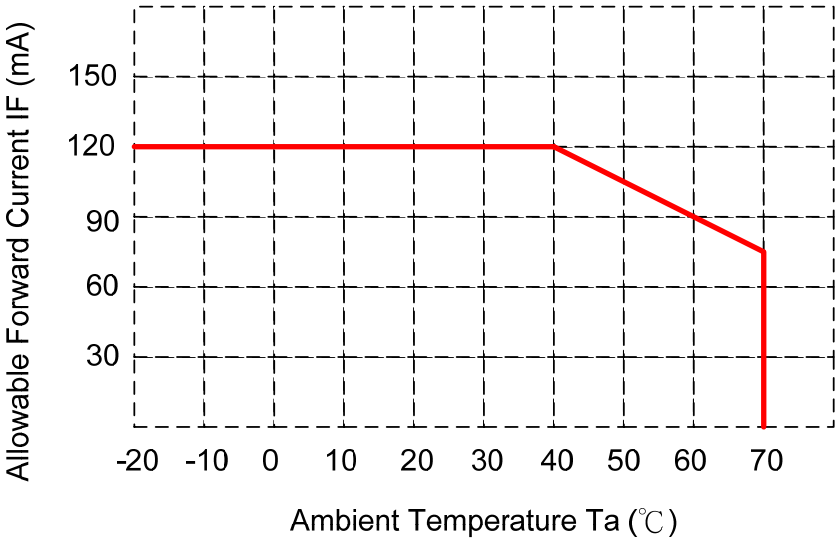
5.2 Electrical characteristic of LED Back-light

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
LED voltage	V_{AK}	--	9.9	10.8	V	I_{LED} =108mA,Ta=25℃
LED forward current	I_{LED}	--	108	120	mA	Ta=25℃



■ The constant current source is needed for white LED back-light driving.

When LCM is operated over 60℃ ambient temperature, the I_{LED} of the LED back-light should be adjusted to 75mA max



5.2 Touch Panel Specification

Parameter	Condition	Standard Value
Terminal Resistance	X Axis	300 ~ 1100 Ω
	Y Axis	100 ~ 700 Ω
Insulating Resistance	DC 25 V	More than 10MΩ
Linearity	--	Under ±1.5 % *
Notes life by Pen	Note a	1,00,000 times(min)
Input life by finger	Note a	1,000,000 times (min)

* after environmental & life test Linearity ≤ 3.0%

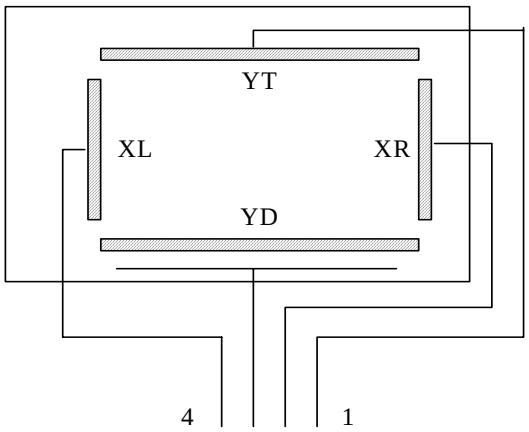
Note a

Measurement condition of minimum input force

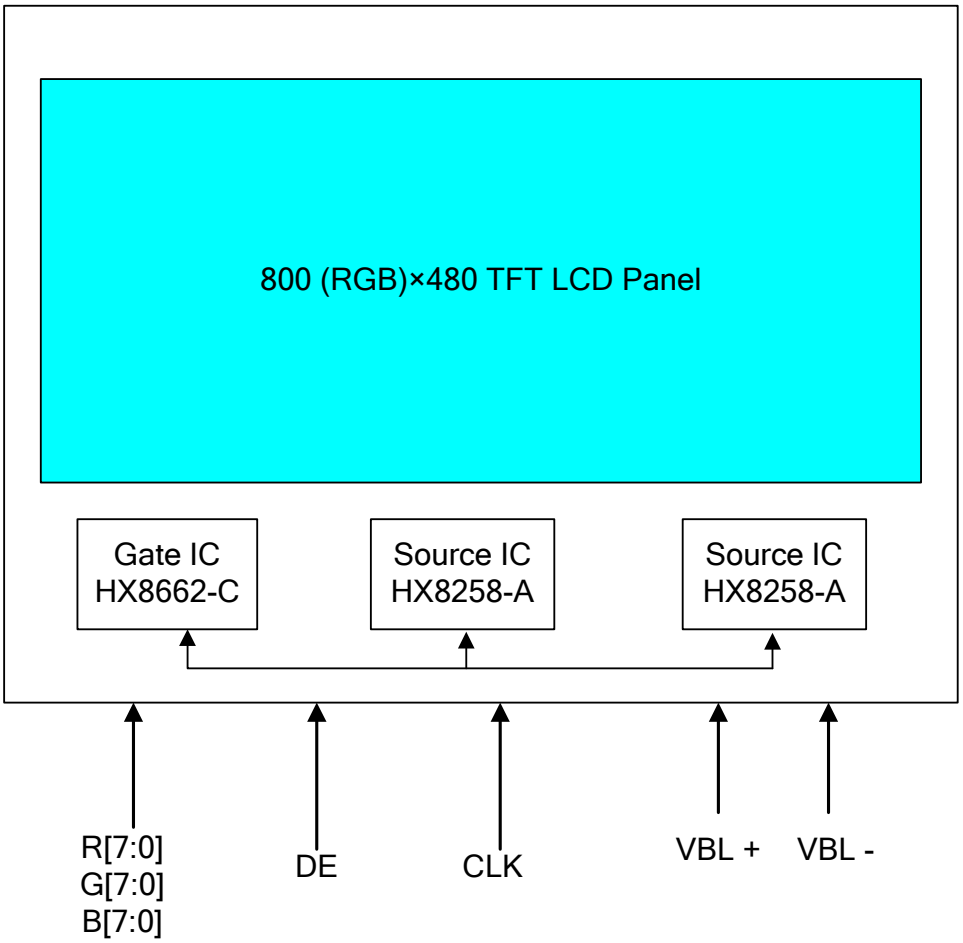
Resistance between X & Y axis must be equal or lower than 2kΩ (R_{on} ≤ 2kΩ)。

Interface

No.	Symbol	Function
1	XR	Touch Panel Right Signal in X Axis
2	YD	Touch Panel Bottom Signal in Y Axis
3	XL	Touch Panel Left Signal in X Axis
4	YT	Touch Panel Top Signal in Y Axis



6. BLOCK DIAGRAM



7. INTERFACE PIN ASSIGNMENT

Pin No	Symbol	Function
1	GND	Power Ground
2	GND	Power Ground
3	VCC	3.3V Power Supply for LCD
4	VCC	3.3V Power Supply for LCD
5	R0	Red Data 0 (LSB)
6	R1	Red Data 1
7	R2	Red Data 2
8	R3	Red Data 3
9	R4	Red Data 4
10	R5	Red Data 5
11	R6	Red Data 6
12	R7	Red Data 7 (MSB)
13	G0	Green Data 0 (LSB)
14	G1	Green Data 1
15	G2	Green Data 2
16	G3	Green Data 3
17	G4	Green Data 4
18	G5	Green Data 5
19	G6	Green Data 6
20	G7	Green Data 7 (MSB)
21	B0	Blue Data 0 (LSB)
22	B1	Blue Data 1
23	B2	Blue Data 2
24	B3	Blue Data 3
25	B4	Blue Data 4
26	B5	Blue Data 5
27	B6	Blue Data 6
28	B7	Blue Data 7(MSB)
29	GND	Power Ground
30	DCLK	Clock Signals
31	DISP	Display on/off (High: on, Low:off)
32	HSYNC	Horizontal SYNC signal.
33	VSYNC	Vertical SYNC signal
34	DENA	Data Enable signal (to settle the viewing area)
35	XR	Touch Panel Right Signal in X Axis
36	YD	Touch Panel Bottom Signal in Y Axis
37	XL	Touch Panel Left Signal in X Axis
38	YT	Touch Panel Top Signal in Y Axis
39	SC	Scan direction control (Low= Reverse, High= Normal)
40	GND	Power Ground

41	GND	Power Ground
42	LED C1	LED cathode 1
43	LED A1	LED anode 1
44	LED C2	LED cathode 2
45	LED A2	LED anode 2

Remark:

1. GND Pin must ground contact, can not be floating.

2. SC are controlled function

(L/R)	(U/D)	Function
1	0	Normally display
0	1	Left and Right opposite , Up and Down opposite

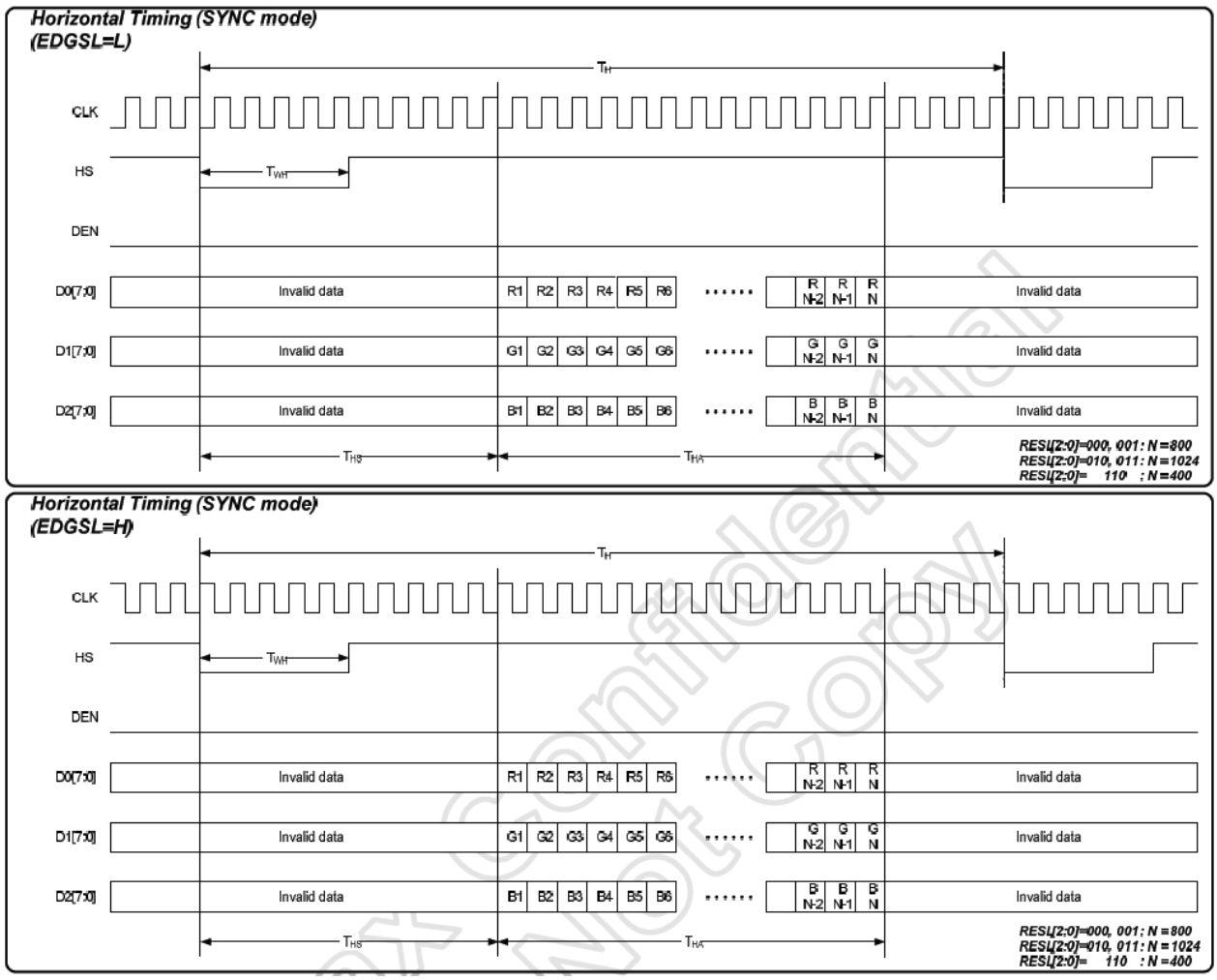
8. INTERFACE TIMING

Signal	Parameter	Symbol	Min.	Typ.	Max.	Unit.
DCLK	Frequency	**FCPH**	27.32	30.06	33.41	MHz
	DCLK period	**TCPH**	29.93	33.26	36.59	ns
	Pulse duty	**T**CWH	40	50	60	%
RGB DATA	Data setup time	**TDSU**	6	-	-	ns
	Data hold time	**TDHD**	6	-	-	ns
HSYNC	HSYNC period	**TH**	950	1056	1600	**TCPH**
	HSYNC pulse width	**TWH**	1	128	THS-2	**TCPH**
	HSYNC Active time	**THA**	-	800	-	**TCPH**
VSYNC	VSYNC period	**TV**	490	525	625	**TH**
	VSYNC pulse width	**TWV**	1	2	**T**VS	**TH**
	VSYNC Actuve time	**TVA**		480		**TH**

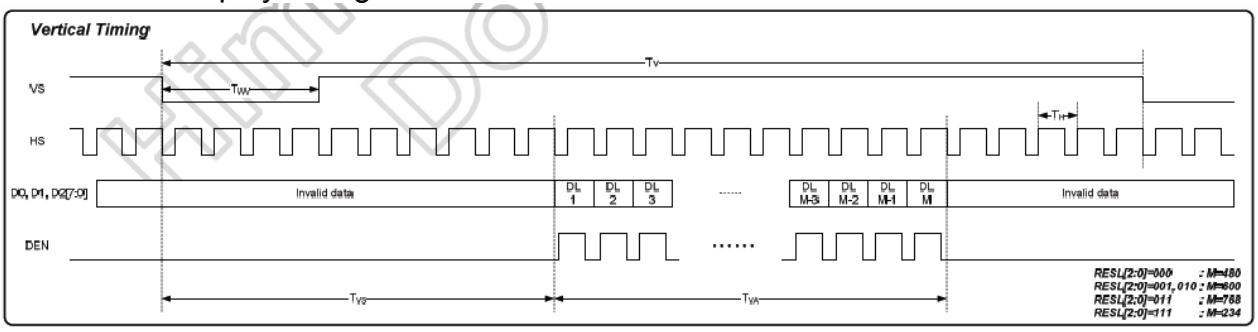
Remark : If DEN is fixed to low, the SYNC mode is used. Otherwise DE mode is used.

When SYNC mode is used, 1st data start from 68th CLK after Hsync falling

- Horizontal display timing



- Vertical display timing



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9. DISPLAYED COLOR AND INPUT DATA

DATA SIGNAL

COLOR		INPUT DATA																							
		R DATA								G DATA								B DATA							
		R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0
		MSB							LSB	MSB							LSB	MSB							LSB
BASIC COLOR	BLACK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(255)	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GREEN(255)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	BLUE(255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	CYAN	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	MAGENTA	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	YELLOW	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	WHITE	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
RED	RED(1)	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(2)	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(255)	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GREEN	GREEN(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	GREEN(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
	GREEN(255)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
BLUE	BLUE(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	BLUE(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	BLUE(255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1

10. QUALITY AND RELIABILITY

10.1. Test Conditions

Tests should be conducted under the following conditions :

Ambient temperature : 25 ± 5°C

Humidity : 60 ± 25% RH.

10.2. Sampling Plan

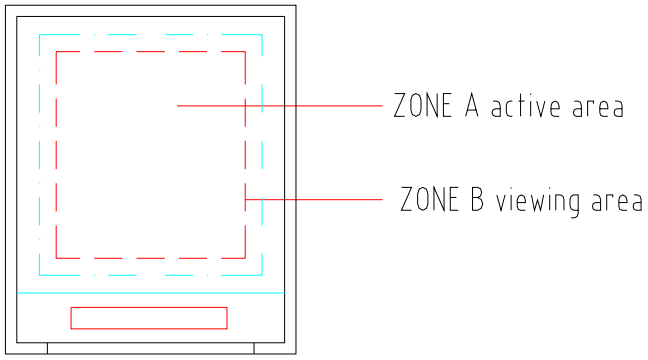
Sampling method shall be in accordance with MIL-STD-105E , level II, normal single sampling plan .

10.3. Acceptable Quality Level

A major defect is defined as one that could cause failure to or materially reduce the usability of the unit for its intended purpose. A minor defect is one that does not materially reduce the usability of the unit for its intended purpose or is an infringement from established standards and has no significant bearing on its effective use or operation.

10.4. Appearance

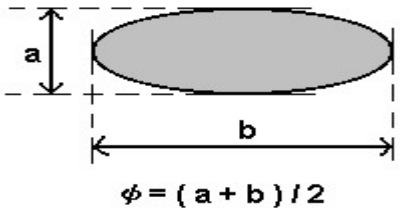
An appearance test should be conducted by human sight at approximately 30 cm distance from the LCD module under florescent light. The inspection area of LCD panel shall be within the range of following limits.



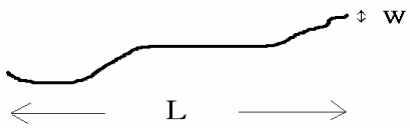
10.5. Incoming Inspection Standard

Defect Type			Limit						Note
Visual Defect	Internal	Spot	φ＜0.15mm			Ignore			(1)
			0.15mm≦φ≦0.5mm			N≦4			
			0.5mm＜φ			N=0			
		Fiber	0.03mm<W≦0.1mm, L≦5mm			N≦3			(1)
			1.0mm＜W, 1.5mm＜L			N=0			
		Polarizer Bubble	φ＜0.15mm			Ignore			(1)
			0.15mm≦φ≦0.5mm			N≦2			
			0.5mm＜φ			N=0			
		Mura	It' OK if mura is slight visible through 6%ND filter						
Electrical Defect	Bright Dot		A Grade			B Grade			
			C Area	O Area	Total	C Area	O Area	Total	(3)
			N≦0	N≦2	N≦2	N≦2	N≦3	N≦5	(2)
	Dark Dot		N≦2	N≦3	N≦3	N≦3	N≦5	N≦8	
	Total Dot		N≦4			N≦5	N≦6	N≦8	(2)
	Two Adjacent Dot		N≦0	N≦1 pair	N≦1 pair	N≦1 pair	N≦1 pair	N≦1 pair	(4)
	Three or More Adjacent Dot		Not Allowed						
	Line Defect		Not Allowed						

[Note1] W : Width[mm], L : Length[mm], N : Number, φ : Average Diameter

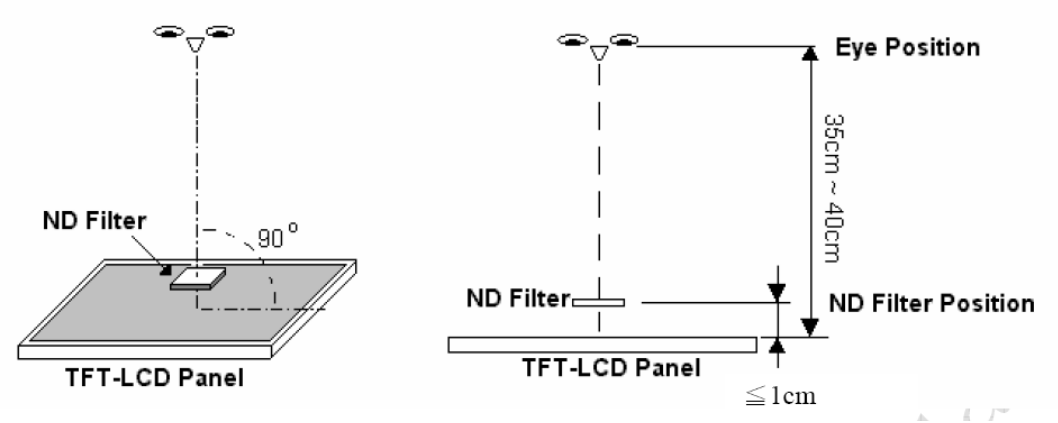


1. (White, black) Spot
2. Polarizer Bubble

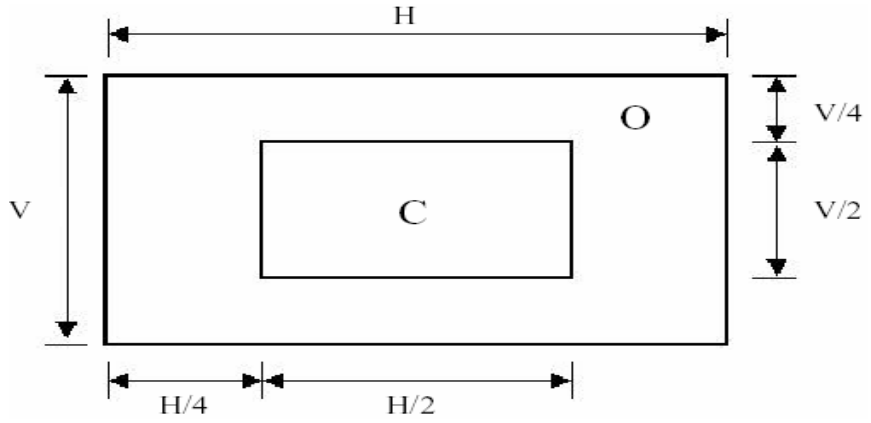


1. fiber

[Note2] Bright dot is defined through 6% transmission ND Filter as following.



[Note3]

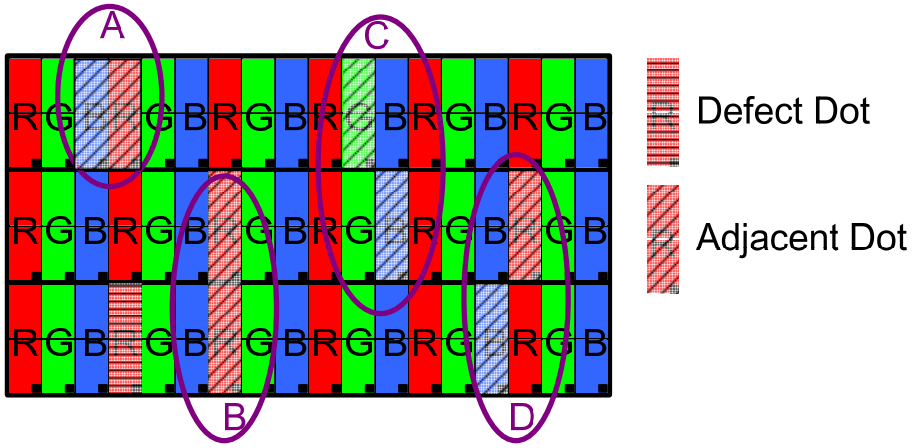


C Area: Center of display area

C Area: Outer of display area

[Note4]

Judge defect dot and adjacent dot as following. Allow below (as A, B, C and D status) adjacent defect dots, including bright and dart adjacent dot. And they will be counted 2 defect dots in total quantity.



(1) The defects that are not defined above and considered to be problem shall be reviewed and discussed by both parties.

(2) Defects on the Black Matrix, out of Display area, are not considered as a defect or counted.

10.6. Reliability Test

Test Item	Test Conditions	Note
High Temperature Operation	70±3°C , t=96 hrs*	
Low Temperature Operation	-20±3°C , t=96 hrs*	
High Temperature Storage	80±3°C , t=96 hrs*	1,2
Low Temperature Storage	-30±3°C , t=96 hrs*	1,2
Thermal Shock Test	-20°C ~ 25°C ~ 70°C* 30 m in. 5 min. 30 min. (1 cycle) Total 5 cycle	1,2
Humidity Test	40 °C, Humidity 90%, 96 hrs*	1,2
Vibration Test (Packing)	Sweep frequency : 10 ~ 55 ~ 10 Hz/1min Amplitude : 0.75mm Test direction : X.Y.Z/3 axis Duration : 30min/each axis	2

Note 1 : Condensation of water is not permitted on the module.

Note 2 : The module should be inspected after 1 hour storage in normal conditions (15-35°C , 45-65%RH).

Note* : After 24 hr room temp. and test

Definitions of life end point :

- Current drain should be smaller than the specific value.
- Function of the module should be maintained.
- Appearance and display quality should not have degraded noticeably.
- Contrast ratio should be greater than 50% of the initial value.

11. USE PRECAUTIONS

11.1. 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 benzene 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.

11.2. 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.

11.3. 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.

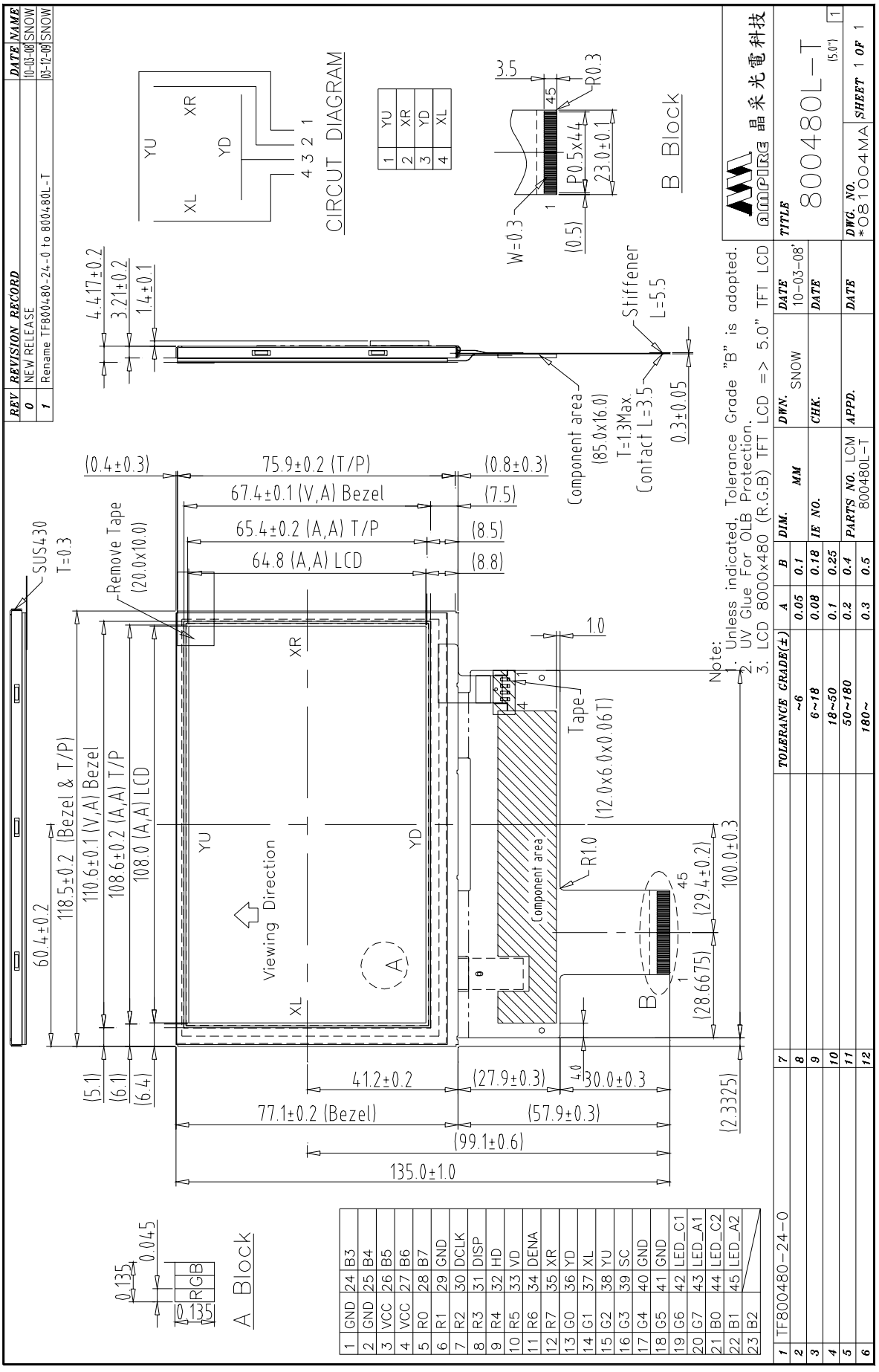
11.4. Operating precautions

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: 0.2VCC or less and H level: 0.8VCC 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.

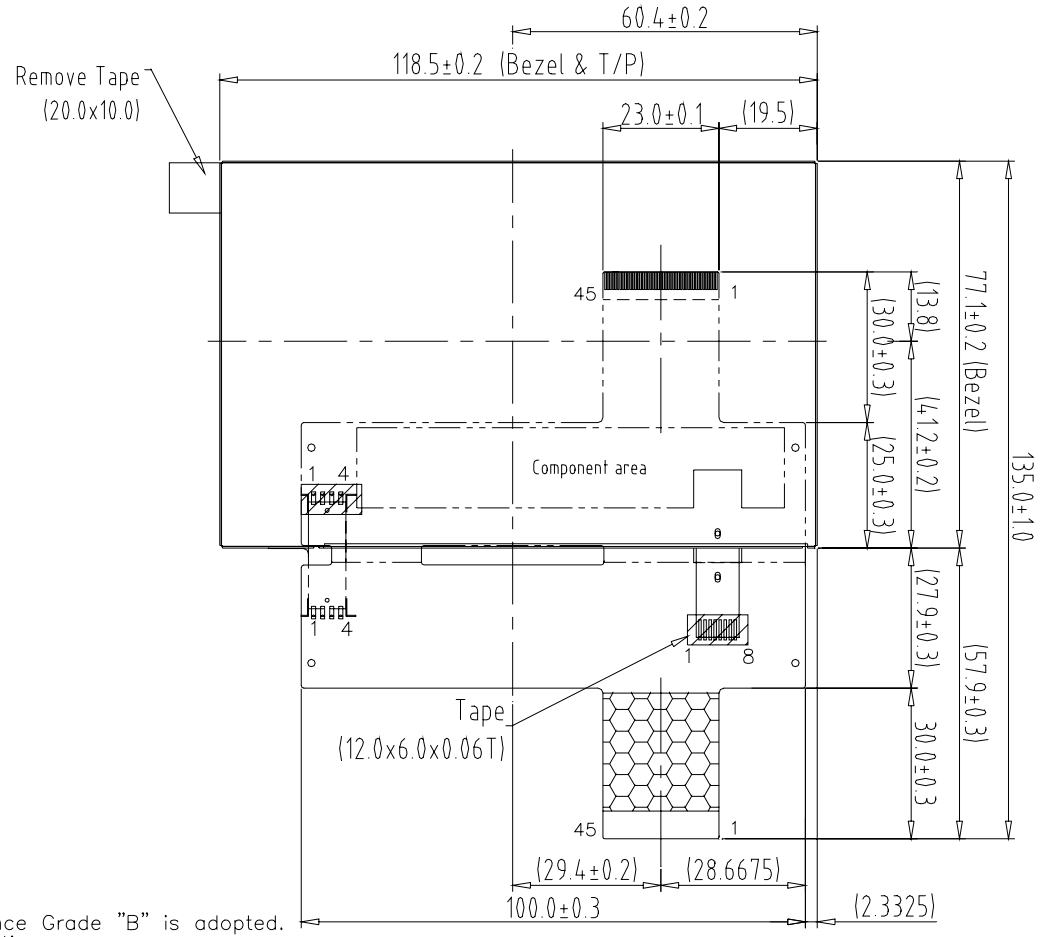
11.5. Other

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 warranty for all products and three months warrantee for all repairing products.

11. OUTLINE DIMENSION



REV	REVISION RECORD	DATE	NAME
0	NEW RELEASE	10-03-08	SNOW
1	Rename TF800480-24-0 to 800480L-T	03-12-09	SNOW



Back view

Note:
1. Unless indicated, Tolerance Grade "B" is adopted.
2. UV Glue For OLB Protection.
3. LCD 8000x480 (R.G.B) TFT LCD => 5.0" TFT LCD

1	TF800480-24-0	7		TOLERANCE GRADE(±)	A	B	DIM. MM	DWN. SNOW	DATE 10-03-08'	TITLE 800480L-T (5.0") 1
2		8		~6	0.05	0.1				
3		9		6~18	0.08	0.18	IE NO.	CHK.	DATE	
4		10		18~50	0.1	0.25				
5		11		50~180	0.2	0.4	PARTS NO. LCM-1 800480L-T	APPD.	DATE	DWG. NO. *081005MA SHEET 1 OF 1
6		12		180~	0.3	0.5				

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