



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-800480AZTMQW-50H
APPROVED BY	
DATE	

Approved For Specifications

Approved For Specifications & Sample

AMPIRE CO., LTD.

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RECORD OF REVISION

Revision Date	Page	Contents	Editor
2016/5/13	---	New Release	Kokai
2016/6/20	8	Mention the value of current consumption.	Emil
2016/8/16	8-9	Corrected the LED driving condition.	Emil

1. FEATURES

5 inch Amorphous-TFT-LCD (Thin Film Transistor Liquid Crystal Display) module.
This module is composed of a 5" TFT-LCD panel and backlight unit.

- (1) Construction : a-Si TFT-LCD with driving system, White LED Backlight
- (2) LCD type : Transmissive , Normally White
- (3) Number of the Colors : 16.7M colors (R,G,B 8bit digital each)
- (4) Interface : 24 Bit TTL 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
Active area	108.0 (W) x64.8 (H)	mm
Pixel pitch	0.135 (W) x 0.135 (H)	mm
Overall dimension	119.7(W) x 136.8(H) x5.8(D)	mm
Color configuration	R.G.B Vertical stripe	
Surface treatment	Antiglare	
View Direction (Gray Inversion)	6 o'clock	

3. ABSOLUTE MAXIMUM RATINGS

3.1. Electrical Absolute max. ratings

Item	Symbol	Condition	Min.	Max.	Unit	Remark
Power voltage	V _{CC}	GND=0	-0.3	5.0	V	
Input voltage	V _{in}		-0.3	V _{CC} +0.3	V	Note 1

Note1:HD, VD, DENA, DCLK, R0~R7, G0~G7, B0~B7

3.2 Environmental Absolute max. ratings

Item	OPERATING		STORAGE		Remark
	MIN	MAX	MIN	MAX	
Temperature	-20	70	-30	80	Note2,3,4,5,6,7
Humidity	Note1		Note1		
Corrosive Gas	Not Acceptable		Not Acceptable		

Note1 : Ambient temperature Ta ≤ 40°C : 85% RH max

Ta > 40°C: Absolute humidity must be lower than the humidity of 85%RH at 40°C

Note2 : For storage condition Ta at -30°C < 48h , at 85°C < 100h

For operating condition Ta at -20°C < 100h

Note3 : Background color changes slightly depending on ambient temperature.

This phenomenon is reversible.

Note4 : The response time will be slower at low temperature.

Note5 : Only operation is guaranteed at operating temperature. Contrast, response time, another display quality are evaluated at +25°C

Note6 : When LCM panel is operated over 60°C (center of the panel surface temperature), the IF of the LED back-light should be adjusted to 180mA

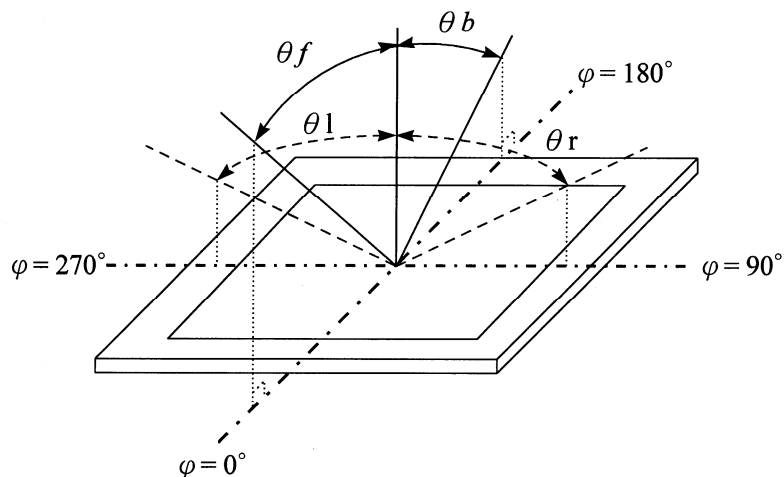
Note7 : This is center of the panel surface temperature, not ambient temperature.

4. OPTICAL CHARACTERISTICS

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Viewing Angle	Front	θf	$CR \geq 10$	60	70	--	deg.	(1)(2)(3)
	Back	θb		50	60	--		
	Left	θl		56	75	--		
	Right	θr		65	75	--		
Contrast ratio		CR	$\Theta = \Phi = 0^\circ$	480	600	--	--	(1)(3)
Response Time		T_r	$\Theta = \Phi = 0^\circ$	--	2	4	ms	(1)(4)
		T_f		--	6	12	ms	(1)(4)
Color chromaticity	Red	R_x	$\Theta = \Phi = 0^\circ$	0.626+/-0.15			--	(1)
		R_y		0.346+/-0.15				
	Green	G_x		0.322+/-0.15				
		G_y		0.552+/-0.15				
	Blue	B_x		0.149+/-0.15				
		B_y		0.183+/-0.15				
	White	W_x		0.310+/-0.15				
		W_y		0.349+/-0.15				
Luminance (ILED=120mA)		L	$\Theta = \Phi = 0^\circ$	800	1000	--	cd/m ²	(1)(5)
Luminance Uniformity		ΔL	$\Theta = \Phi = 0^\circ$	70	-	-	%	(1)(5)(6)

Note 1: $T_a = 25^\circ\text{C}$. To be measured on the center area of panel after 10 minutes operation. LED Back-light IF=240mA.

Note 2: Definition of Viewing Angle



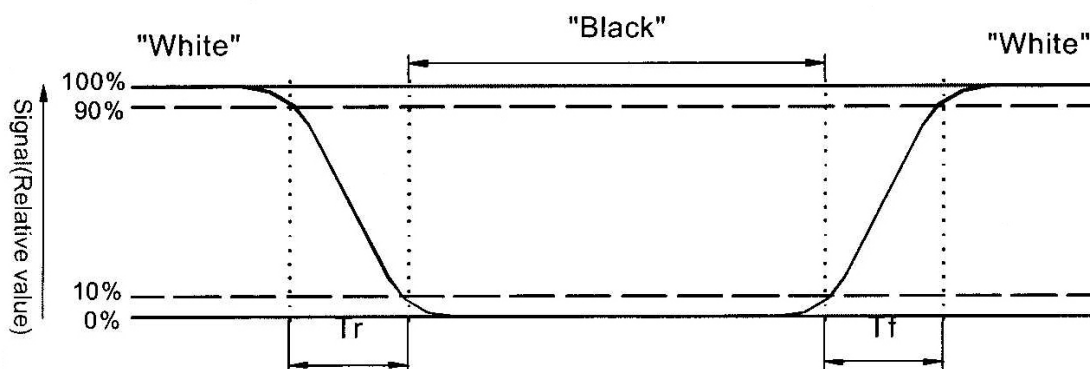
Note 3: Definition of contrast ratio:

Contrast ratio is calculated with the following formula.

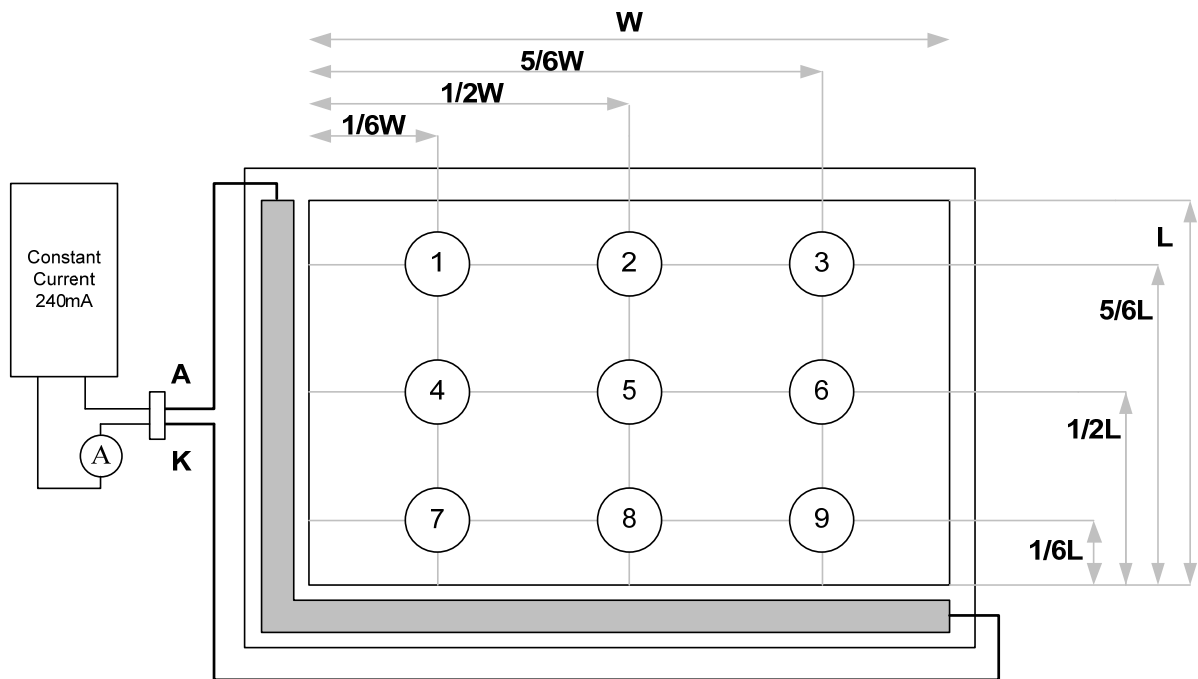
$$\text{Contrast ratio(CR)} = \frac{\text{Photo detector output when LCD is at "White" state}}{\text{Photo detector Output when LCD is at "Black" state}}$$

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

$$\Delta L = [L(\text{min.}) \text{ of } 9 \text{ points} / L(\text{max.}) \text{ of } 9 \text{ points}] \times 100\%$$

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	--	*100	*120	mA	(2)	

Note 1: HD, VD, DENA, DCLK, R0~R7, G0~G7, B0~B7, DISP

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

*:Will be reference only

5.2 Electrical characteristic of LED Back-light

Item	Symbol	Min.	Typ.	Max.	Unit	Note
LED Forward Current	IF	--	240	--	mA	Ta=25°C , A1+A2 total current
LED Forward Voltage	VF	7.8	9.0	10.5	V	IF=240mA, Ta=25°C
LED life time			50,000	-	Hr	IF=240mA, Ta=25°C

Note 1: Ta means ambient temperature of TFT-LCD module.

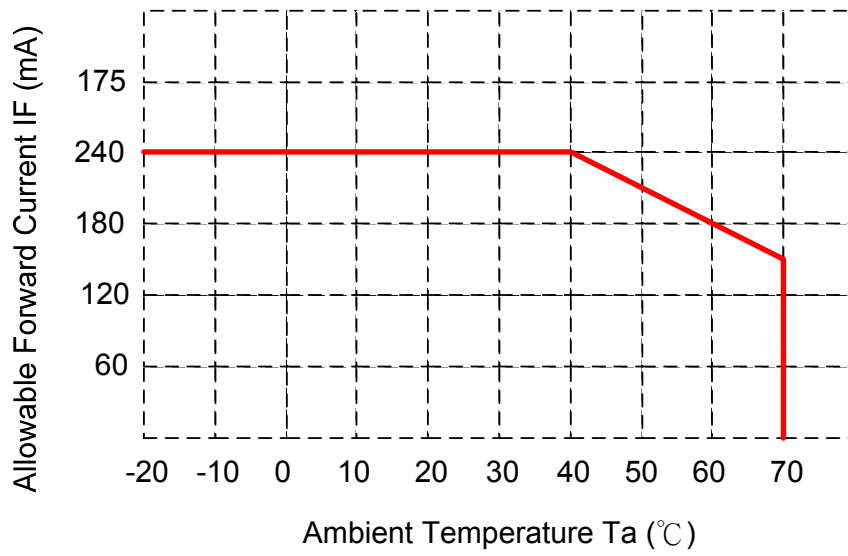
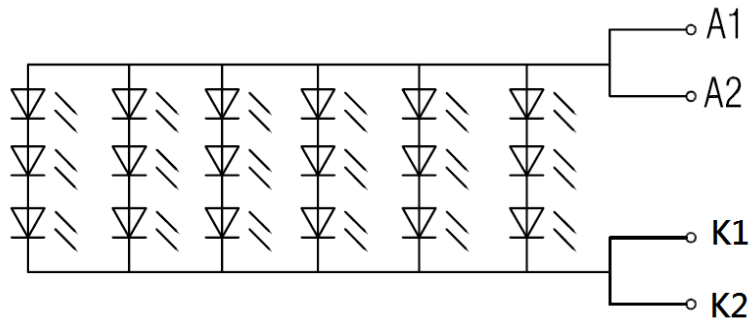
Note 2: If the module is driven by high current or at high ambient temperature & humidity condition. The operating life will be reduced.

Note 3: The constant current source is needed for LED back-light driving.

Note 4: Operating life means brightness goes down to 50% minimum brightness.

LED life time is estimated data. Ta=25°C

Note 5: the structure of LED B/L shows as below.

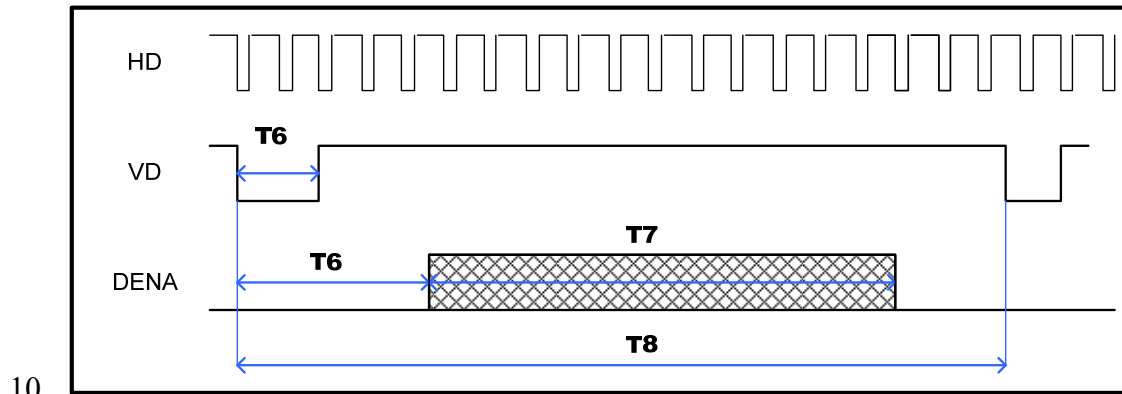
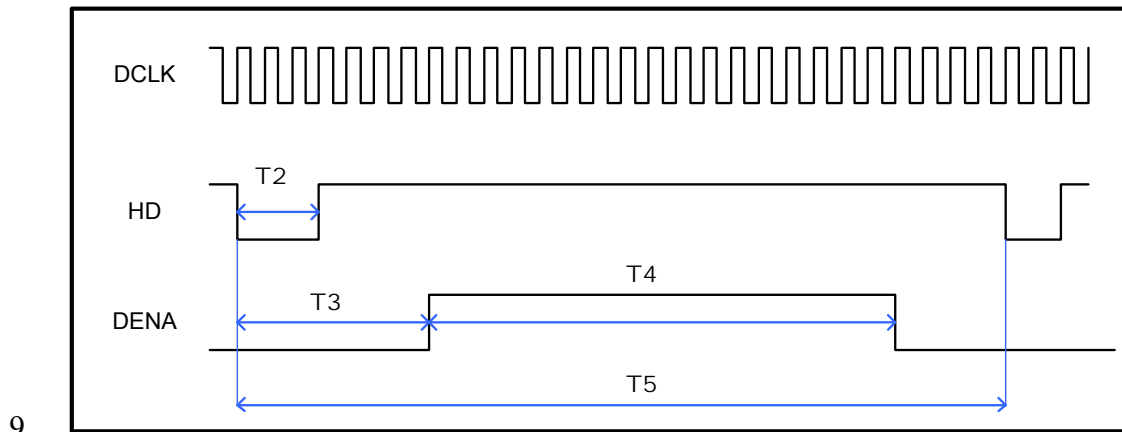
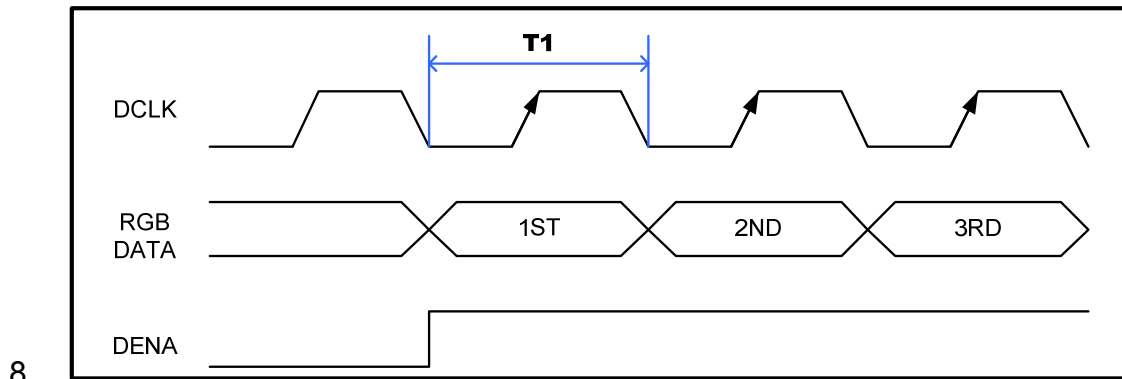


6. INTERFACE PIN ASSIGNMENT

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	HD	Horizontal SYNC signal.
33	VD	Vertical SYNC signal
34	DENA	Data Enable signal (to settle the viewing area)
35	NC	No Connect
36	NC	No Connect
37	NC	No Connect
38	NC	No Connect
39	SC	No function. Scan direction selectable by jumper.

40	GND	Power Ground
41	GND	Power Ground
42	LED_K	LED cathode
43	LED_A	LED anode
44	LED_K	LED cathode
45	LED_A	LED anode

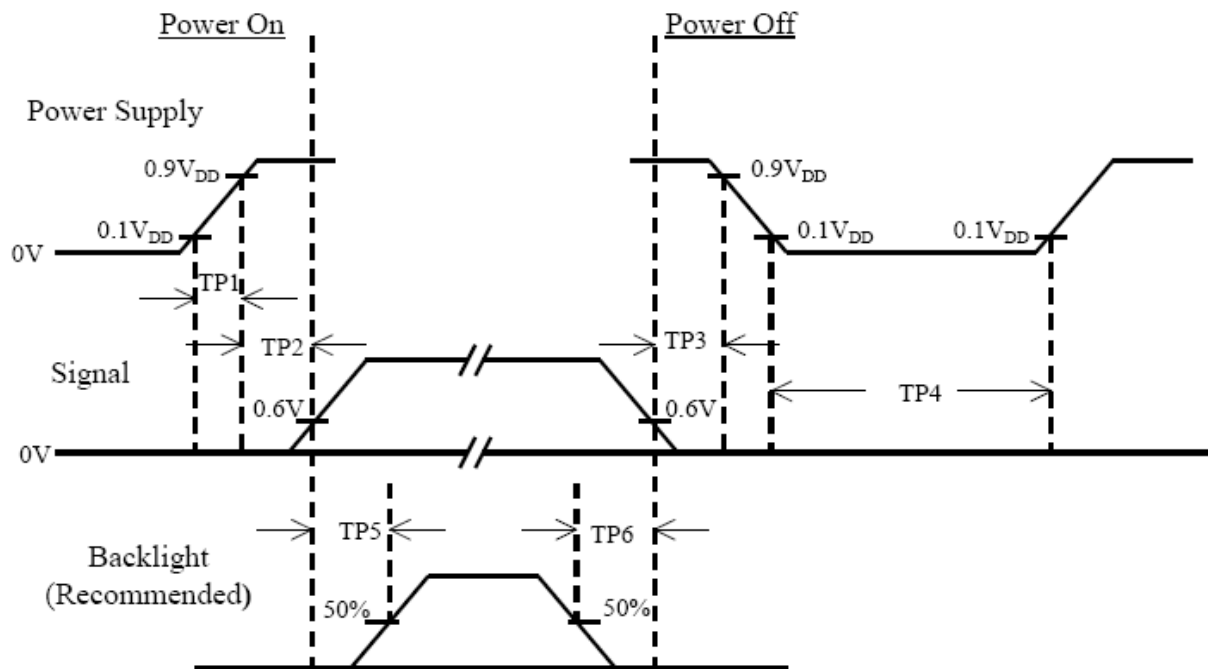
7. INTERFACE TIMING



11.

ITEM	SYMBOL	MIN	TYP	MAX	UNIT
Clock Frequency	$1/T1$	--	33.3	50	MHz
HSYNC Plus Wide	$T2$	4	48	64	clocks
HSYNC to DE	$T3$	88	88	88	Clocks
Horizontal Display Period	$T4$	--	800	--	Clocks
Horizontal total Period	$T5$	908	928	1010	Clocks
VSYNC Plus Wide	$T2$	1	3	31	Lines
VSYNC to DE	$T6$	32	32	32	Lines
Vertical Display Period	$T7$	--	480	--	Lines
Vertical total Period	$T8$	515	525	--	Lines

Power On/Off Sequence



Item	Min.	Typ.	Max.	Unit	Remark
TP1	0.5	--	10	msec	
TP2	0	--	50	msec	
TP3	0	--	50	msec	
TP4	500	--	--	msec	
TP5	200	--	--	msec	
TP6	200	--	--	msec	

Note :

- (1) The supply voltage of the external system for the module input should be the same as the definition of VCC.
- (2) Apply the lamp voltage within the LCD operation range. When the back-light turns on before the LCD operation or the LCD turns off before the back-light turns off, the display may momentarily become white.
- (3) In case of VCC = off level, please keep the level of input signal on the low or keep a high impedance.
- (4) TP4 should be measured after the module has been fully discharged between power off and on period.
- (5) Interface signal shall not be kept at high impedance when the power is on.

12. 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	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	RED(2)	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	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	1	0	0	0	0	0	0	0	0	0	
	GREEN(2)	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	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	1		
	BLUE(2)	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	1	1	1	1	1	1	1	1		

10. RELIABILITY TEST CONDITIONS

Test Item	Test Conditions	Note
High Temperature Operation	70±3°C , t=240 hrs	
Low Temperature Operation	-20±3°C , t=240 hrs	
High Temperature Storage	80±3°C , t=240 hrs	1,2
Low Temperature Storage	-30±3°C , t=240 hrs	1,2
Thermal Shock Test	-10°C ~ 60°C 30 m in. ~ 30 min. (1 cycle) Total 100cycle	1,2
Storage Humidity Test	60 °C, Humidity 90%, 240 hrs	1,2
Vibration Test (Packing)	Sweep frequency : 10 ~ 50 ~ 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).

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 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.

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. $1M\Omega$ 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.

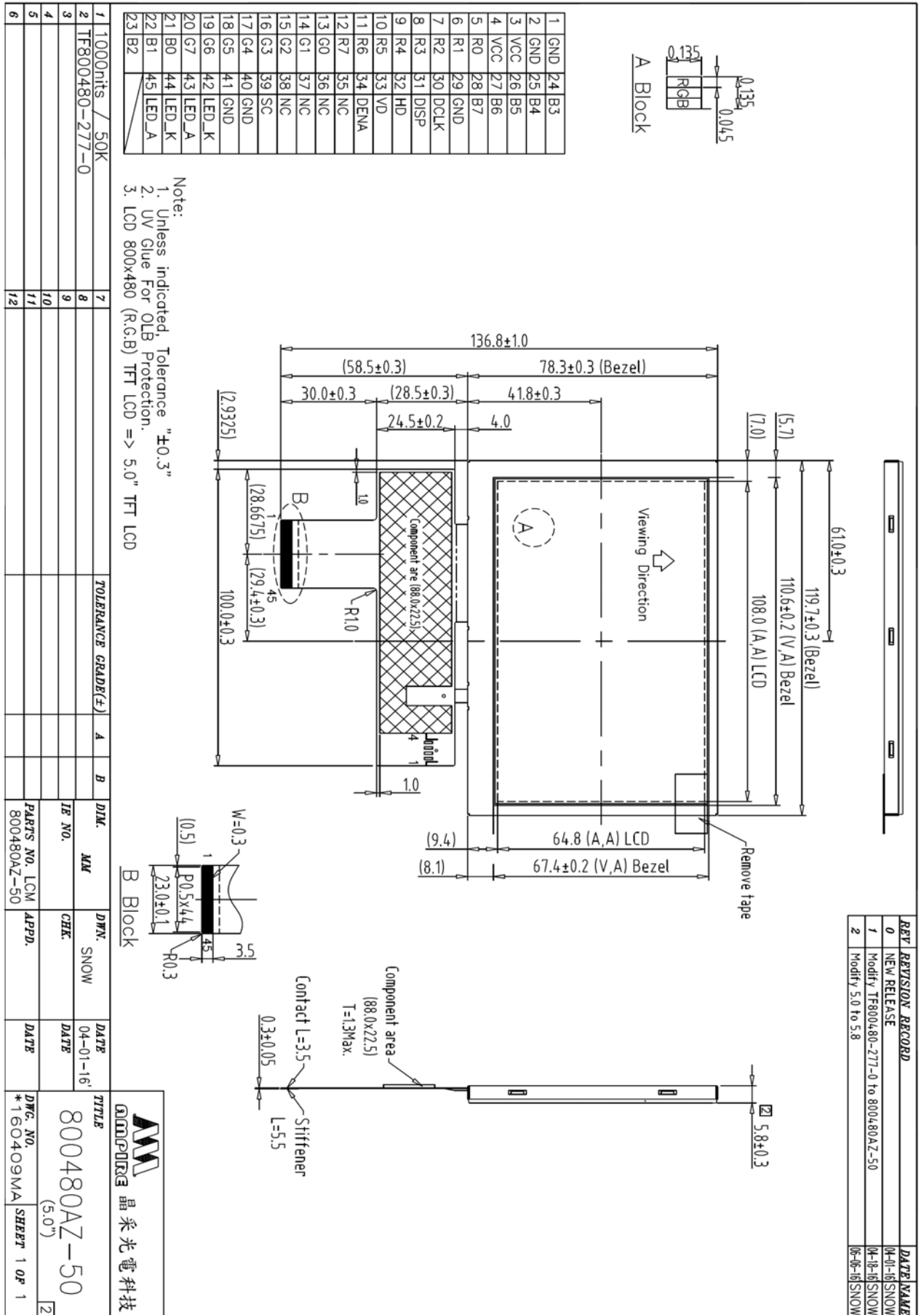
11.4 Operating precautions

- 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 drive 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: 0.2V_{dd} or less and H level: 0.8V_{dd} 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 warrantee for all products and three months warrantee for all repairing products.

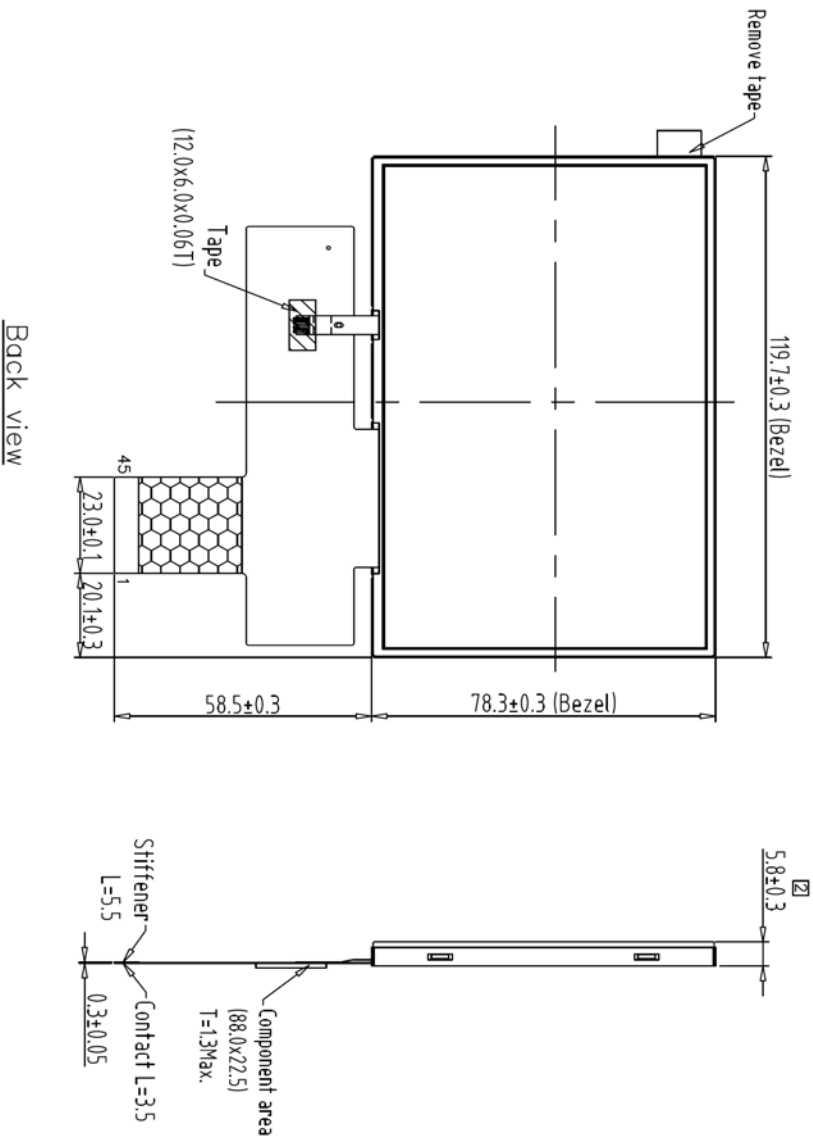
12. OUTLINE DIMENSION



REV	REVISION RECORD	DATE	NAME
0	NEW RELEASE	14-01-18	SNOW
1	Modify TF800480-277-0 to 800480AZ-50	14-18-18	SNOW
2	Modify 5.0 to 5.8	16-06-18	SNOW

1	GND	24	B3
2	GND	25	B4
3	VCC	26	B5
4	VCC	27	B6
5	R0	28	B7
6	R1	29	GND
7	R2	30	DC1K
8	R3	31	DISP
9	R4	32	HD
10	R5	33	VD
11	R6	34	DENA
12	R7	35	NC
13	G0	36	NC
14	G1	37	NC
15	G2	38	NC
16	G3	39	SC
17	G4	40	GND
18	G5	41	GND
19	G6	42	LED_K
20	G7	43	LED_A
21	B0	44	LED_K
22	B1	45	LED_A
23	B2		

Note:
 1. Unless indicated, Tolerance "±0.3"
 2. UV Glue For OLB Protection.
 3. LCD 800x480 (R.G.B) TFT LCD => 5.0" TFT LCD



REV	REVISION RECORD	DATE	NAME
0	NEW RELEASE	14-01-18	SNOW
1	Modify TF800480-277-0 to 800480AZ-50	14-18-18	SNOW
2	Modify 5.0 to 5.8	16-06-18	SNOW

REV	TOLERANCE GRADE(±)	A	B	DIM.	MM	DWN.	SNOW	DATE	TITLE
1								04-01-16	800480AZ-50
2									(5.0")
3									
4									
5									
6									

PARTS NO.	LOM-1	APPD.	DATE	DWG. NO.	SHEET
800480AZ-50				*160410MA	1 OF 1