



晶采光電科技股份有限公司  
**AMPIRE CO., LTD.**

## **SPECIFICATIONS FOR LCD MODULE**

<b>CUSTOMER</b>	
<b>CUSTOMER PART NO.</b>	
<b>AMPIRE PART NO.</b>	AM-800600K7TMQW-TA0H
<b>APPROVED BY</b>	
<b>DATE</b>	

☐Approved For Specifications

☐Approved For Specifications & Sample

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## RECORD OF REVISION

Revision Date	Page	Contents	Editor
2011/12/27	-	New Release	Rober
2013/2/20		Update operating and storage temperature	Rober
2013/03/28	8	Correct Interface	Tony
2015/9/10	4	Update operating and storage temperature	Patrick

## 1. INSTRUCTION

Ampire 10.4" Display Module is a color active matrix TFT-LCD that uses amorphous silicon TFT as a switching device . This model is composed of a TFT-LCD panel , a driving circuit with LVDS interface and touch panel. This TFT-LCD has a high resolution (800(R.G.B) X 600) and can display up to 262,144 colors.

### 1.1 Features

- (1) Construction : a-Si TFT-LCD with driving system, White LED Backlight.
- (2) LCD type : Transmissive , Normally White
- (3) Number of the Colors : 262K colors (R,G,B 6 bit digital each)
- (4) LVDS Interface.
- (5) LCD Power Supply Voltage: 3.3V single power input, built-in power supply circuit.

## 2. PHYSICAL SPECIFICATIONS

Item	Specifications	unit
Display resolution	800RGB (W) x 600(H)	dots
Display size	10.4" (diagonal)	inch
Viewing Angle	6 o'clock (Gray Inversion)	-
Active area	211.2 (W) x 158.4(H)	mm
Pixel pitch	0.264 (W) x 0.264 (H)	um
Color configuration	R.G.B -stripe	-
Overall dimension	236.0(W) x 176.9(H) x 5.6(D)	mm
Backlight unit	LED	-
Brightness	400	cd/m2
Display color	262,144	colors
Contrast ratio	500	-
Power consumption	2.79	watt

### 3. ABSOLUTE MAXIMUM RATINGS

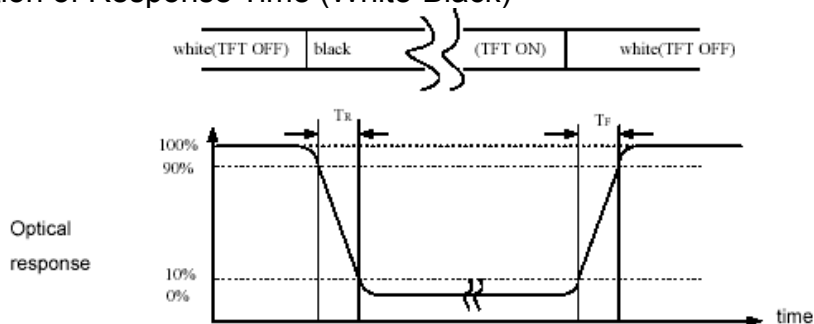
Item	Symbol	Min.	Max.	Unit	Note
Power voltage	$V_{DD}$	-0.3	4.0	V	GND=0V
Voltage range at any terminal	$V_{IN}$	-0.3	$V_{DD}+0.3$	V	Note(1)
Operating Temperature	$T_{op}$	-20	70	°C	
Storage Temperature	$T_{stg}$	-30	80	°C	

Note (1) :  $V_{IN}$  represents  $IN0\pm$ ,  $IN1\pm$ ,  $IN2\pm$ ,  $CLK\pm$

### 4. OPTICAL CHARACTERISTICS

Item		Symbol	Conditions	Min	Typ	Max	Unit	Note
Contrast Ration		CR	Viewing normal angle $\Theta x = \Theta y = 0$	-	500	-	-	(2)
Response Time		TR		-	5	10	ms	(1)
		TF		-	15	20	ms	
Viewing Angle	Hor.	$\Theta x+$	Center CR>10	-	70	-	deg	(5)
		$\Theta x-$		-	70	-	deg	
	Ver.	$\Theta y+$		-	50	-	deg	
		$\Theta y-$		-	60	-	deg	
Module Chromaticity	Red	XR	Viewing normal angle $\Theta x = \Theta y = 0$	0.550	0.600	0.650		
		YR		0.294	0.344	0.394		
	Green	XG		0.304	0.354	0.404		
		YG		0.529	0.579	0.629		
	Blue	XB		0.105	0.155	0.205		
		YB		0.076	0.126	0.176		
	White	XW		0.240	0.290	0.340		
		YW		0.268	0.318	0.368		
Brightness		-	If=120mA	300	400	-	cd/m <sup>2</sup>	(4)

(1) Definition of Response Time (White-Black)



(2) Definition of Contrast Ratio

Measure contrast ratio on the below 5 points(refer to figure1,#1~#5point) and take the average value

Contrast ratio is calculated with the following formula :

$$\text{Contrast Ratio(CR)} = (\text{White})\text{Luminance of ON} \div (\text{Black})\text{Luminance of OFF}$$

(3) Definition of Luminance :

Measure the luminance of white state at **center point**.

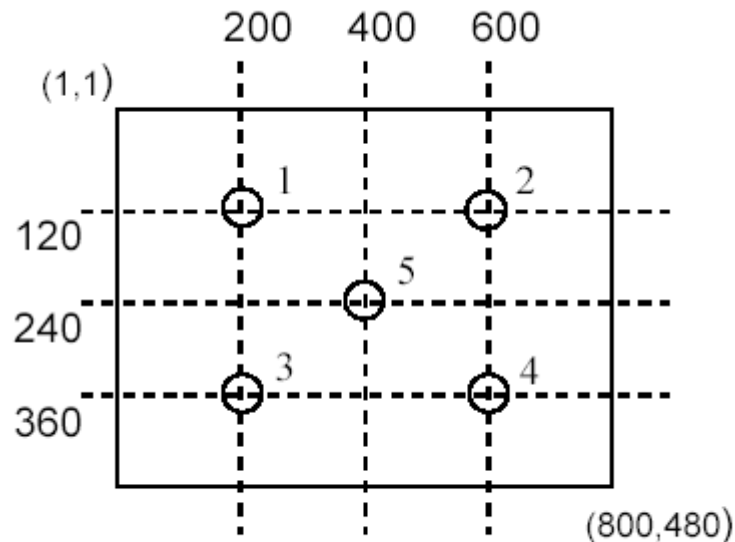


Fig.1 Measuring point

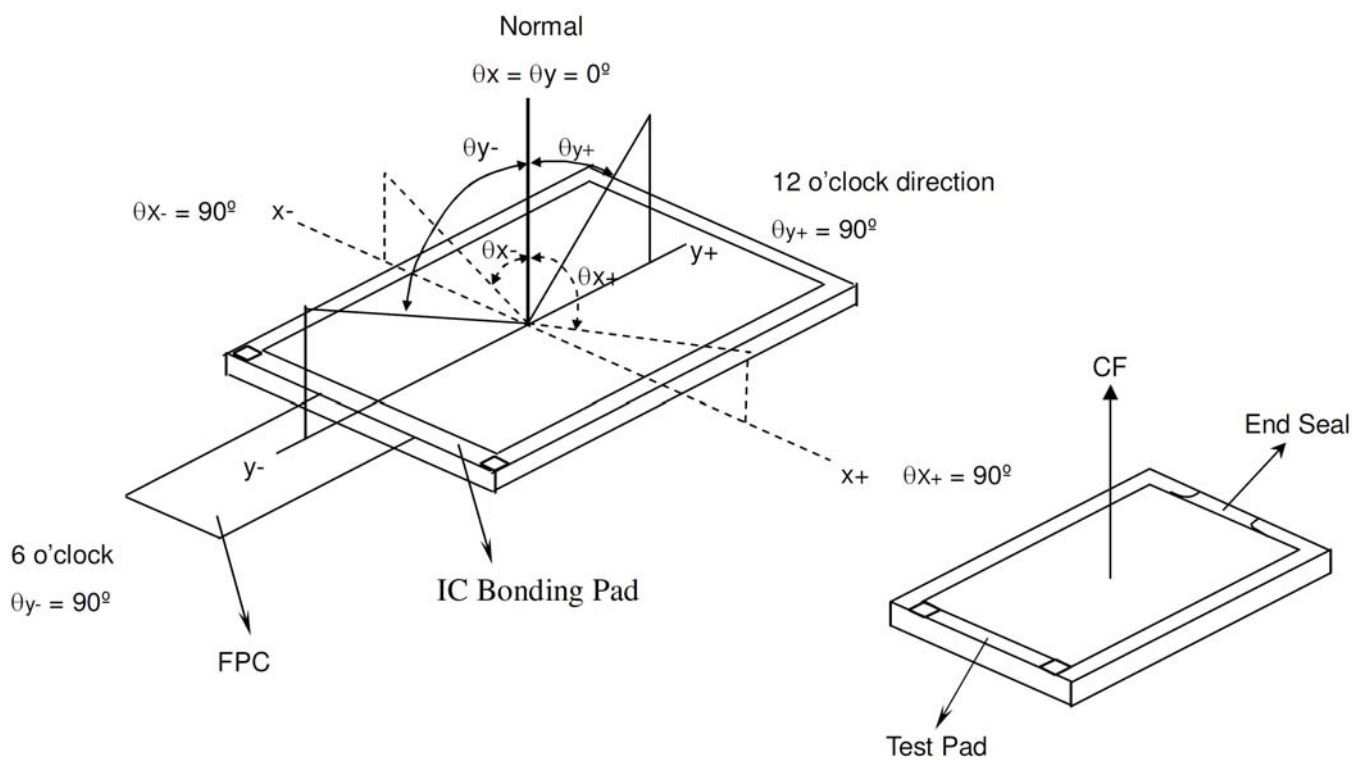
(4) Definition of Luminance Uniformity :

Measured Maximum luminance[L(MAX)] and Minimum luminance[L(MIN)] on the 5 points

Luminance Uniformity is calculated with the following formula :

$$\Delta L = [ L(\text{MIN}) / L(\text{MAX}) ] \times 100\%$$

## (5) Definition of Viewing Angle



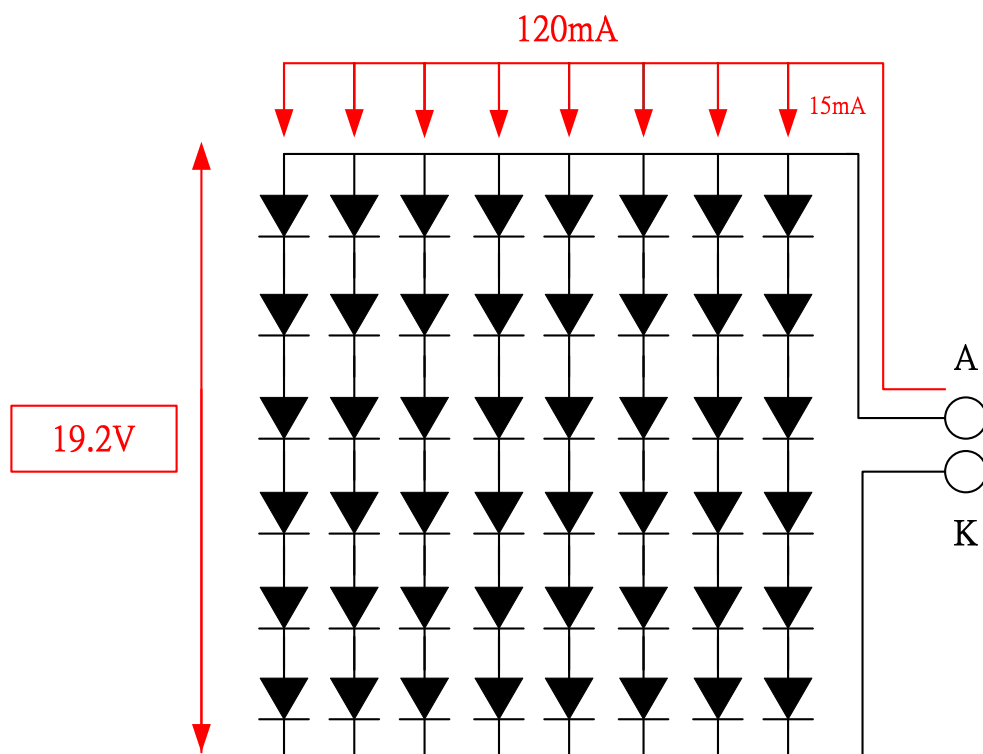
## 5. ELECTRICAL CHARACTERISTICS

Item	Symbol	Min	Typ	Max	Unit	Note
Power Voltage	$V_{DD}$	-	3.3	-	V	
Power Current	$I_{DD}$	-	110	-	mA	
High-level Input Voltage	$V_{IH}$	$0.8V_{DD}$	-	$V_{DD}$	V	
Low-level Input Voltage	$V_{IL}$	GND	-	$0.2V_{DD}$	V	

## 6. Backlight Driving Circuit

Item	Symbol	Min	Typ	Max	Unit	Note
Forward Current	$I_F$	-	120.0	-	mA	$T = 25^{\circ}\text{C}$
Forward Voltage	$V_F$	-	19.2	-	V	$I_F = 120\text{ mA}$
Backlight Power Consumption	$W_{BL}$	-	2304	-	mW	Note(1)
Life Time	-	-	20K	-	hrs	$I_F = 120\text{ mA}$ Note(2)

Note 1: LED connection of backlight shown as below:



Note2: The brightness reduces to half of minimum value.

## 7. INTERFACE

### CN1:

Pin no	Symbol	Function
1	VDD	Power supply for digital circuit (3.3V)
2	VDD	Power supply for digital circuit (3.3V)
3	GND	Power Ground
4	GND	Power Ground
5	IN0-	Transmission Data of Pixels 0
6	IN0+	Transmission Data of Pixels 0
7	GND	Power Ground
8	IN1-	Transmission Data of Pixels 1
9	IN1+	Transmission Data of Pixels 1
10	GND	Power Ground
11	IN2-	Transmission Data of Pixels 2
12	IN2+	Transmission Data of Pixels 2
13	GND	Power Ground
14	CLK-	Sampling Clock
15	CLK+	Sampling Clock
16	GND	Power Ground
17	NC	No Connection
18	NC	No Connection
19	GND	Power Ground
20	GND	Power Ground

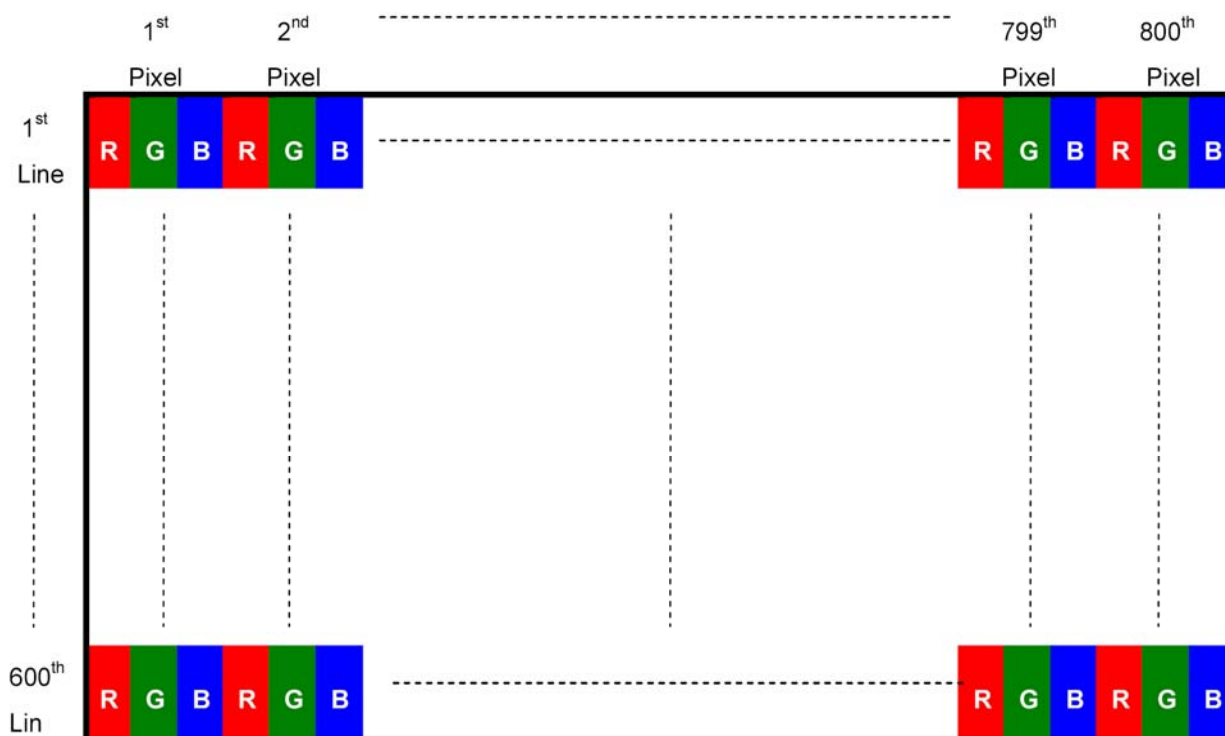
### CN5:

Pin no	Symbol	Function	Wire Color
1	VL1	LED driving anode (high voltage)	Red
2	VL2	LED driving cathode (low voltage)	White



## 8. AC Timing characteristic of the LVDS

Following figure shows the relationship between input signal and LCD pixel format.



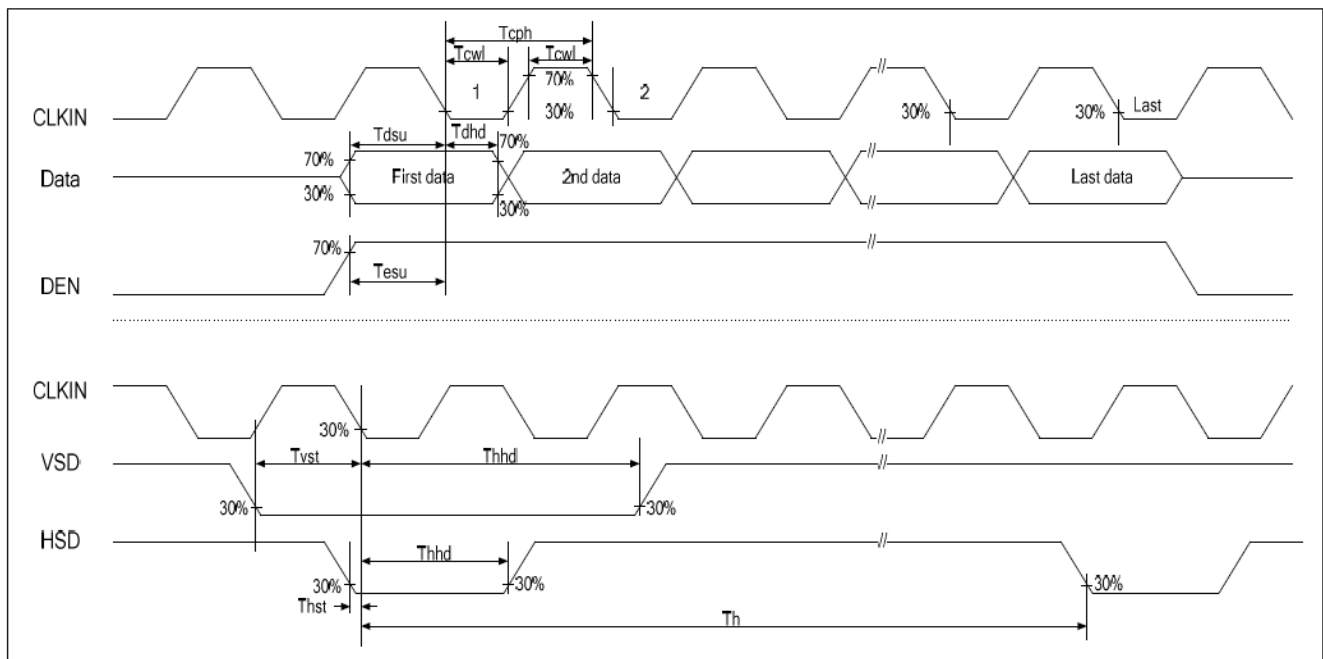
Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
HS setup time	$T_{hst}$	8	-	-	ns
HS hold time	$T_{hhd}$	8	-	-	ns
VS setup time	$T_{vst}$	8	-	-	ns
VS hold time	$T_{vhd}$	8	-	-	ns
Data setup time	$T_{dsu}$	8	-	-	ns
Data hold time	$T_{dhd}$	8	-	-	ns
DE setup time	$T_{esu}$	8	-	-	ns
DE hold time	$T_{ehd}$	8	-	-	ns
VDD Power On Slew rate	$T_{POR}$	-	-	20	ms
RSTB pulse width	$T_{Rst}$	10	-	-	$\mu s$
CLKIN cycle time	$T_{cph}$	20	-	-	ns
CLKIN pulse duty	$T_{cwh}$	40	50	60	%
Output stable time	$T_{sst}$	-	-	6	$\mu s$

- **Horizontal Timing**

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
Horizontal Display Area	thd		800		DCLK
DCLK frequency	fclk	-	40	50	MHz
One Horizontal Line	th	862	1056	1200-	DCLK
HS pulse width (Min.)	thpw		1		DCLK
HS pulse width (Typical.)	thpw		-		DCLK
HS pulse width (Max.)	thpw		40		DCLK
HS Back Porch (Blanking)	thb	46	46	46	DCLK
HS Front Porch	thfp	16	210	354	DCLK

- **Vertical Timing**

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
Vertical Display Area	tvd		600		$T_H$
VS period time	tv	624	635	700	$T_H$
VS pulse width	tvpw	1	-	20	$T_H$
VS Back Porch (Blanking)	tvb	23	23	23	$T_H$
VS Front Porch	tvfp	1	12	77	$T_H$



## 9. TOUCH PANEL ELECTRICAL SPECIFICATION

Part no.: T010-1201-T110R

Parameter	Condition	Standard Value
Terminal Resistance	X Axis	200 ~ 1000 $\Omega$
	Y Axis	100 ~ 800 $\Omega$
Insulating Resistance	DC 25 V	More than 10M $\Omega$
Linearity	--	$\pm 2.0$ %
Notes life by Pen	Note a	100,000 times(min)
Input life by finger	Note b	1,000,000 times (min)

### Note A .

Notes area for pen notes life test is 10 x 9 mm.

Size of word is 7.5 x 6.75

Shape of pen end : R0.8

Load : 250 g

### Note B

By Silicon rubber tapping at same point

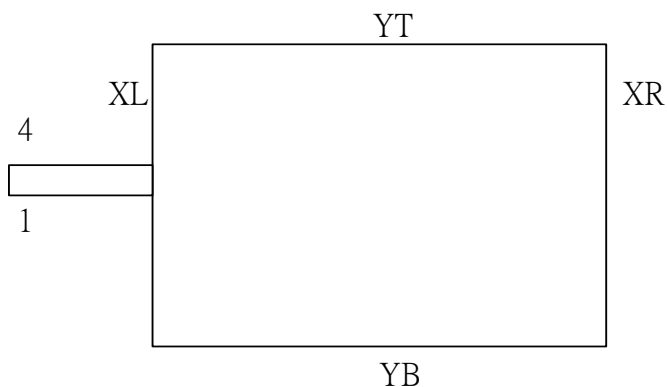
Shape of rubber end : R8

Load : 200g

Frequency : 5 Hz

### Interface

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



## 10. RELIABILITY

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
Storage Humidity Test	40 °C, Humidity 90%, 240 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).

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.  $1\text{M}\Omega$  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  $0^{\circ}\text{C}$  and  $35^{\circ}\text{C}$  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.

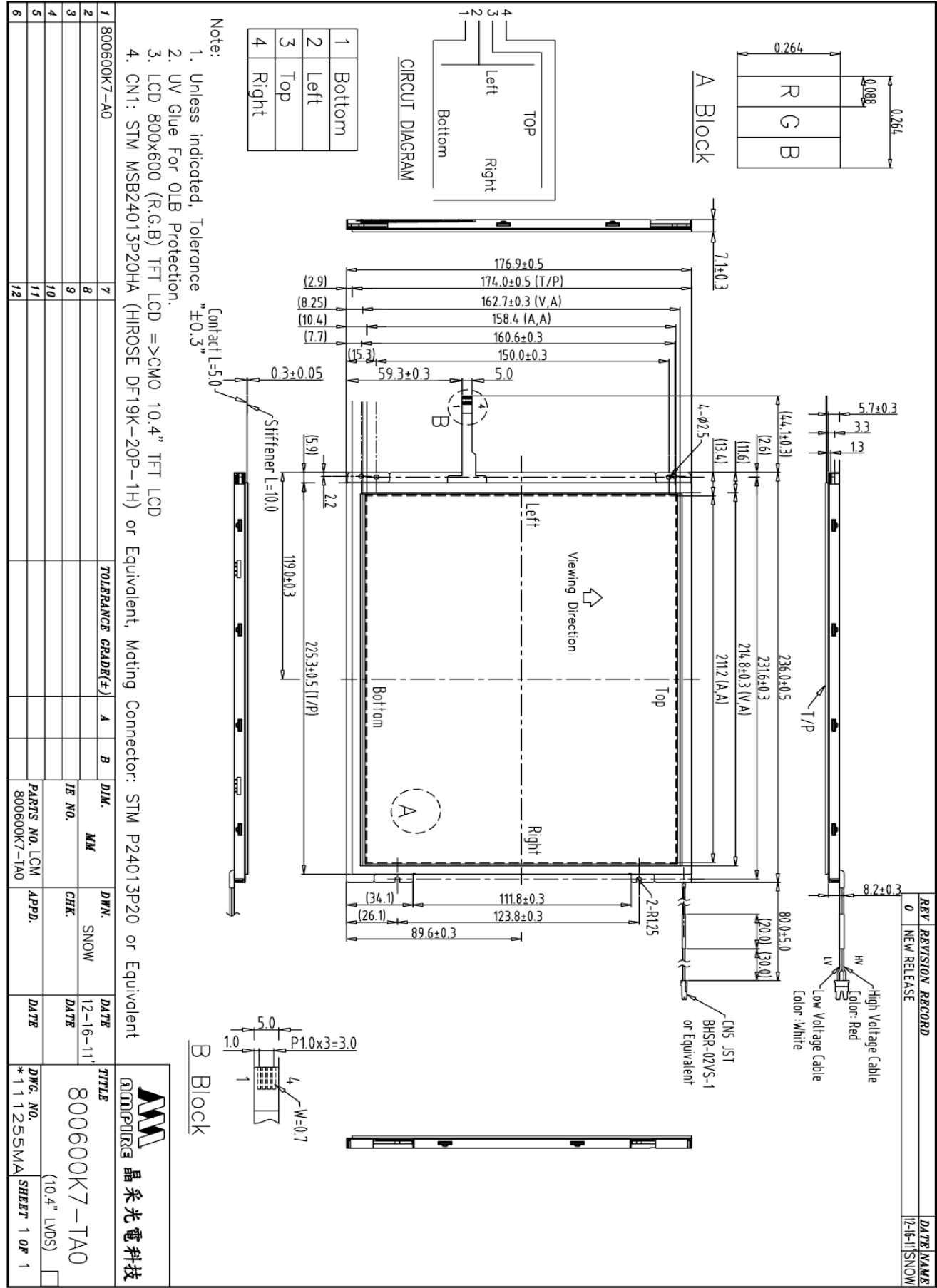
## 11.4 Operating precautions

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

12. OUTLINE DIMENSION







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Date : 2015/9/10

Date : 2015/9/10 AMPIRE CO., LTD.

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