



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-1920360ATZQW-00
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
	Emil	

RECORD OF REVISION

Revision Date	Page	Contents	Editor
2015/12/17	--	New Release	Jessica
2016/10/11	7	Add LED connector type	Jessica

1. Features

LCD:

1.1 TFT 19 inch display, normally black type.

1.1 1920 (RGB) X 360 dots Matrix

1.2 Display color: 16.7M

2. PHYSICAL SPECIFICATIONS

Item	Specifications	unit
Display resolution(dot)	1920 RGB (W) x 360 (H)	dots
Active area	89.37 (H) x 476.64 (W)	mm
Pixel pitch	0.24825 (W) x 0.24825 (H)	mm
Color configuration	R.G.B Vertical stripe	
Overall dimension	127.8 (H) x 502.8 (W) x 20 (T)	mm
Weight	TBD	g
Brightness	700 nit (typ)	cd/m ²
Contrast ratio	3000 : 1	
Backlight unit	LED	
Display color	16.7M	colors

3. ABSOLUTE MAX. RATINGS

ITEM	SYMBOL	MIN	MAX	UNIT
Storage Temperature	Tst	-20	60	°C
Operating Temperature	Top	0	50	°C
Storage humidity	Hst	5	90	[%RH]
Operating humidity	Hop	5	90	[%RH]

The above values are maximum operation conditions. If you exceeded those values, it may cause faulty operation or damage.

4. ELECTRICAL CHARACTERISTICS

4-1 TFT LCD Power Specification

Input power specifications are as following:

Symbol	Parameter	Min	Typ	Max	Unit	Conditions
VDD	Logic/LCD Drive Voltage	4.5	5.0	5.5	[Volt]	+/-10%
IDD	Input Current	-	0.69	0.83	[A]	VDD= 5.0V, All White Pattern At 60Hz
			0.8	0.96	[A]	VDD= 5.0V, All White Pattern At 75Hz
PDD	VDD Power	-	3.45	4.15	[Watt]	VDD= 5.0V, All White Pattern At 60Hz
			4	4.8	[Watt]	VDD= 5.0V, All White Pattern At 75Hz
IRush	Inrush Current	-	-	3	[A]	Note 1
VDDrp	Allowable Logic/LCD Drive Ripple Voltage	-	-	500	[mV] p-p	VDD= 5.0V, All White Pattern At 75Hz

Note 1: Measurement conditions:

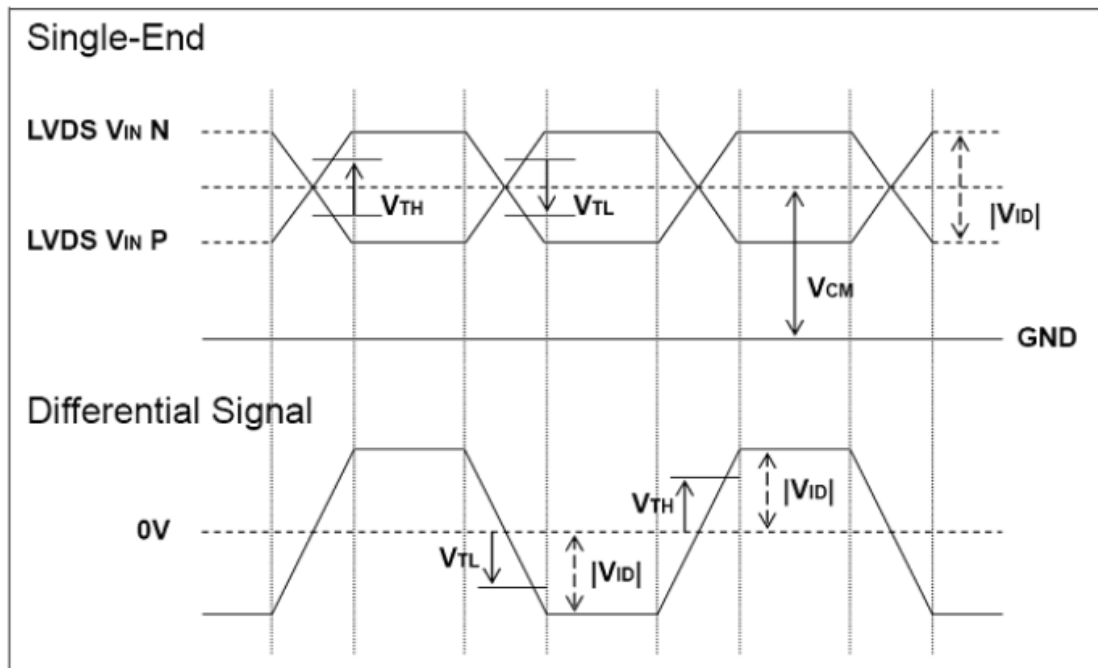
The duration of rising time of power input is 470us.

4-2 Signal Electrical Characteristics

4-2-1 DC Characteristics

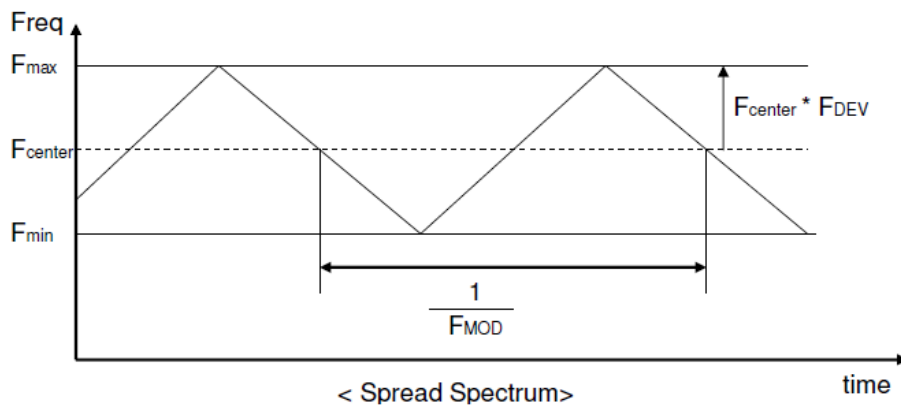
Symbol	Parameter	Min	Typ	Max	Units	Condition
V_{TH}	Differential Input High Threshold	-	-	+100	[mV]	$V_{CM} = 1.2V$ <i>Note 1</i>
V_{TL}	Differential Input Low Threshold	-100	-	-	[mV]	$V_{CM} = 1.2V$ <i>Note 1</i>
$ V_{ID} $	Input Differential Voltage	100	-	600	[mV]	<i>Note 1</i>
V_{CM}	Differential Input Common Mode Voltage	+1.0	+1.2	+1.5	[V]	$V_{TH}-V_{TL} = 200MV$ (max) <i>Note 1</i>

Note 1: LVDS Signal Waveform



4-2-2 AC Characteristics

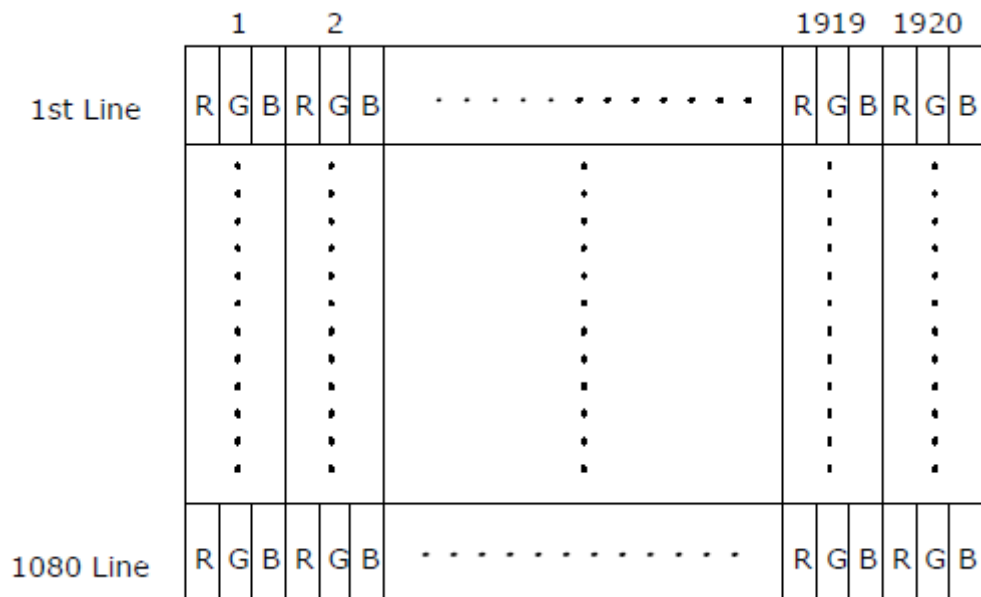
Description	Symbol	Min	Max	Unit	Note
Maximum deviation of input clock frequency during SSC	F_{DEV}	-	± 3	%	
Maximum modulation frequency of input clock during SSC	F_{MOD}	-	200	KHz	



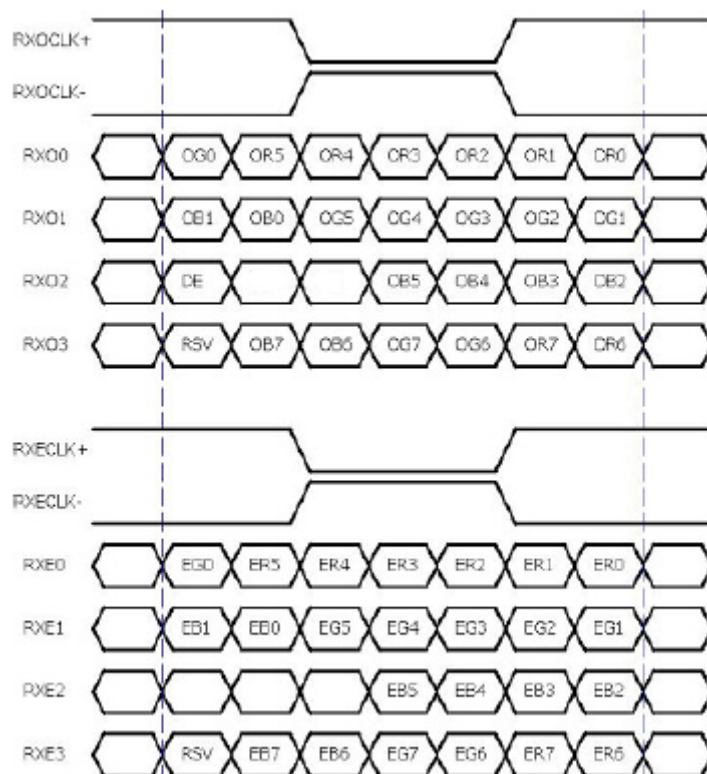
4-3 Signal Characteristics

Pixel Format Definition

Following figure shows the relationship of the input signals and LCD pixel format.

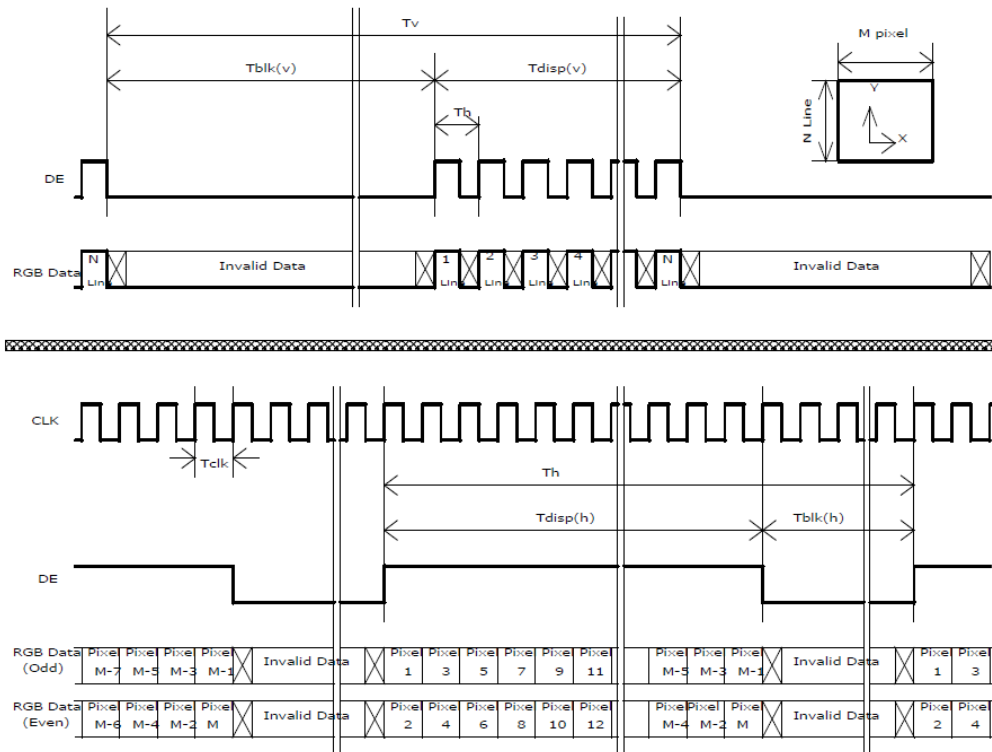


The input data format



Note (1) R/G/B data 7: MSB, R/G/B data 0: LSB O="First Pixel Data" E="Second Pixel Data".

5. Timing diagram



6. Backlight DC Input Specification

Item	Symbol	Min	Typ	Max	Unit
LED forward voltage per channel	VLED	40.5	42.5	45	V
LED forward current per channel	ILED	--	480	528	mA

LED connector: CivLux CI1404S0000-NH

7. INTERFACE

PIN #	SIGNAL NAME	DESCRIPTION
1	RxO0-	Negative LVDS differential data input (Odd data)
2	RxO0+	Positive LVDS differential data input (Odd data)
3	RxO1-	Negative LVDS differential data input (Odd data)
4	RxO1+	Positive LVDS differential data input (Odd data)
5	RxO2-	Negative LVDS differential data input (Odd data, DSPTMG)
6	RxO2+	Positive LVDS differential data input (Odd data, DSPTMG)
7	GND	Power Ground
8	RxOCLK-	Negative LVDS differential clock input (Odd clock)
9	RxOCLK+	Positive LVDS differential clock input (Odd clock)
10	RxO3-	Negative LVDS differential data input (Odd data)
11	RxO3+	Positive LVDS differential data input (Odd data)
12	RxE0-	Negative LVDS differential data input (Even data)
13	RxE0+	Positive LVDS differential data input (Even data)
14	GND	Power Ground
15	RxE1-	Negative LVDS differential data input (Even data)
16	RxE1+	Positive LVDS differential data input (Even data)
17	GND	Power Ground
18	RxE2-	Negative LVDS differential data input (Even data)
19	RxE2+	Positive LVDS differential data input (Even data)
20	RxECLK-	Negative LVDS differential clock input (Even clock)
21	RxECLK+	Positive LVDS differential clock input (Even clock)
22	RxE3-	Negative LVDS differential data input (Even data)
23	RxE3+	Positive LVDS differential data input (Even data)
24	GND	Power Ground
25	NC	No connection (for AUO test only. Do not connect)
26	NC	No connection (for AUO test only. Do not connect)
27	NC	No connection (for AUO test only. Do not connect)
28	VDD	Power +5V
29	VDD	Power +5V
30	VDD	Power +5V

Note (1) Input signals of odd and even clock shall be the same timing.

8. OPTICAL CHARACTERISTICS

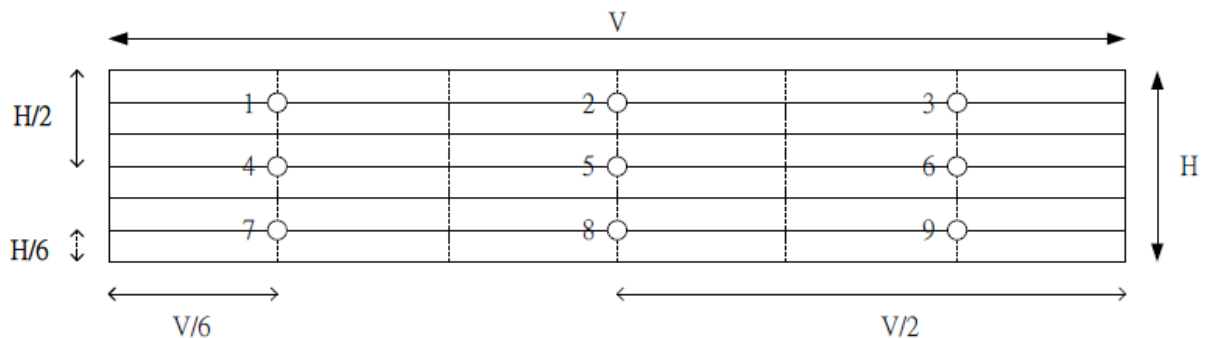
Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Response Time	T_r	--	-	25	--	ms	(1)(5)
Contrast ratio	CR	$\Theta=0^\circ$	2000	3000			(1)(2)
Viewing Angle	x axis, right ($\varphi=0^\circ$)	Θ_r			89	Degree	(1)(6)
	x axis, left ($\varphi=180^\circ$)	Θ_l			89	Degree	
	y axis, up ($\varphi=90^\circ$)	Θ_u			89	Degree	
	y axis, down ($\varphi=270^\circ$)	Θ_d			89	Degree	
Luminance	L	$\Theta=\Phi=0^\circ$	630	700		cd/m ²	(1)(3)
Uniformity	U		76			%	(1)(4)

Note (1) The values are references.

Note (2) CR is defined as

$$\text{Contrast Ratio} = \text{Surface Luminance of } L_{\text{on5}} / \text{Surface Luminance of } L_{\text{off5}}$$

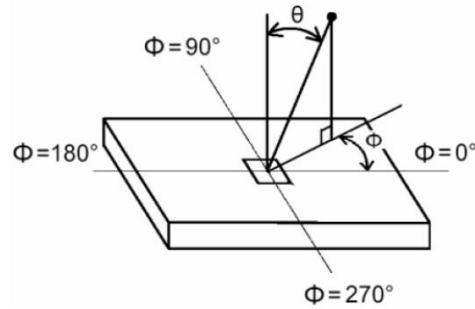
Note (3) Surface luminance is luminance value at point 5 across the LCD surface 0cm from the surface with all pixels displaying white. For more information see the figure bellow. $L_{\text{WH}} = L_{\text{on5}}$ where L_{on5} is the luminance with all pixels displaying white at center 5 location.



Note (4) The uniformity in surface luminance, $U(9P)$, is defined as $U(9P) = \text{Min}(L_{\text{on1}}, L_{\text{on2}}, \dots, L_{\text{on9}}) / \text{Max}(L_{\text{on1}}, L_{\text{on2}}, \dots, L_{\text{on9}})$

Note (5) Response time T_r is the average time which required for display transition by switching the input signal for five luminance ratio (0%, 25%, 50%, 75%, 100% brightness matrix) and basing on $F_v=60\text{Hz}$ to optimize.

Note (6) According to the original panel specification, the viewing angle is the angle where the contrast ratio is greater than 10. The angles are determined for the horizontal (x axis) and vertical (y axis) with respect to the z axis which is normal to the LCD surface. The viewing angle values are defined as the same of the initial panel specification. For more information see the figure below.



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, you could soak a soft cotton cloth or chamois leather into 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 elements breaks or any LC stuff leaks, you cannot suck or lick it. Besides, you need to wash thoroughly with the soap and water immediately if LC stuff stuck with your skin or clothing.

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 or clothing, you need to earth the human body properly using the high resistance and discharge static electricity during the operation. However, the resistance value should be approx. in this case. $1M\Omega$ 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 carefully. 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, you have to be sure to earth it.
- (2) When you are installing the module and ICs, you cannot bend or twist them. If you fail to do so, it may crack LC elements and cause circuit failures.
- (3) To protect LC elements, the polarizing plate, especially we use a transparent protective plate (e.g., acrylic plate, glass etc.) for the product case.
- (4) Do not use adhesive materials like a both-side adhesive tape which uses to make LCD surface (polarizing plate) and product case stick together. If you fail to do so, it may cause the polarizing plate to peel off.

9-3 Storage precautions

- (1) Avoid the high temperature and humidity area. Keep the temperature between 0°C to 35°C and the humidity below 60%.
- (2) Choose the dark spaces where the product won't be exposed to direct sunlight or fluorescent light.
- (3) Store the products as they put in the boxes which are provided from us or in the same conditions as we recommend.

9-4 Operating precautions

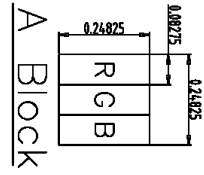
- (1) Do not boost the applied drive voltage abnormally. If you fail to do so, it may break the ICs. When you are applying power voltage, you need to check the electrical features beforehand and carefully. You need to always turn off the power to the LC module controller before removing or inserting the LC module input connector. The LC module internal circuit may break if the input connector is removed or inserted as the power is turned on.
- (2) The display response may be late if the operating temperature is below the normal standard. Besides, it may be out of order if it is above the normal standard. However, this is not a failure, and it will be restored as it is within the normal standard.
- (3) The LCD contrast varies depending on the visual angle, ambient temperature, power voltage etc. You can obtain the optimum contrast by adjusting the LC drive voltage.
- (4) When you are carrying out the test, you cannot take a module out of the low-temperature space suddenly. If you fail to do so, it will cause a module condensing and leading to malfunctions.
- (5) You need to be 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, you need to always connect the module during noise level measurements.
- (6) The CMOS ICs are incorporated in the module. However, the pull-up and pull-down functions are not adopted for the input so you need to avoid putting the input signal open while the power is ON.
- (7) The characteristic of the semiconductor elements changes when semiconductor elements exposed to light emissions. Therefore, ICs on the LCD may malfunction if they receive light emissions. To prevent these malfunctions, we need to design and assemble ICs so that they are shielded from light emissions.

- (8) Crosstalk occurs due to characteristics of the LCD. In general, crosstalk occurs when the regularized display maintain. Moreover, crosstalk is affected by the LC drive voltage. We need to design the contents of the display and consider crosstalk issue.

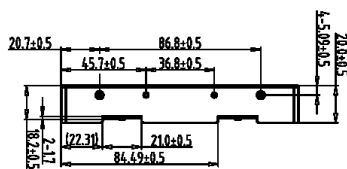
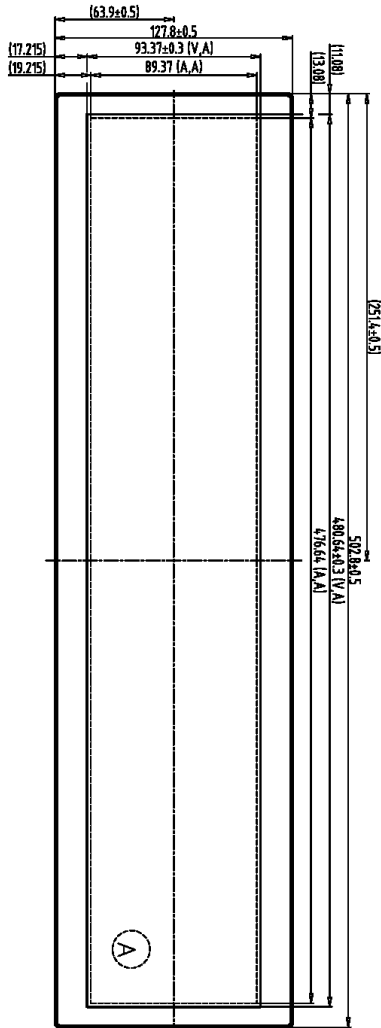
9-5 Other

- (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 shows for hours. However, it will disappear when another display pattern shows or the drive is interrupted, which left for a while. Nonetheless, 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.
- (4) Do not keep the LCD at the same display pattern continually. The residual image will happen and it will damage the LCD. Please use screen saver.

10. OUTLINE DIMENSION



1	Rx00-	16	RxE1+
2	Rx00+	17	GND
3	Rx01-	18	RxE2-
4	Rx01+	19	RxE2+
5	Rx02-	20	RxE0LK-
6	Rx02+	21	RxE0LK+
7	GND	22	RxE3-
8	Rx00LK+	23	RxE3+
9	Rx00LK+	24	GND
10	Rx03-	25	NC
11	Rx03+	26	NC
12	RxE0-	27	NC
13	RxE0+	28	VDD
14	GND	29	VDD
15	RxE1-	30	VDD



- Note:
1. Unless indicated, Tolerance "±0.3"
 2. UV Glue For OLB Protection.
 3. LVDS connector type:MSCKT2407P30HB or Equivalent

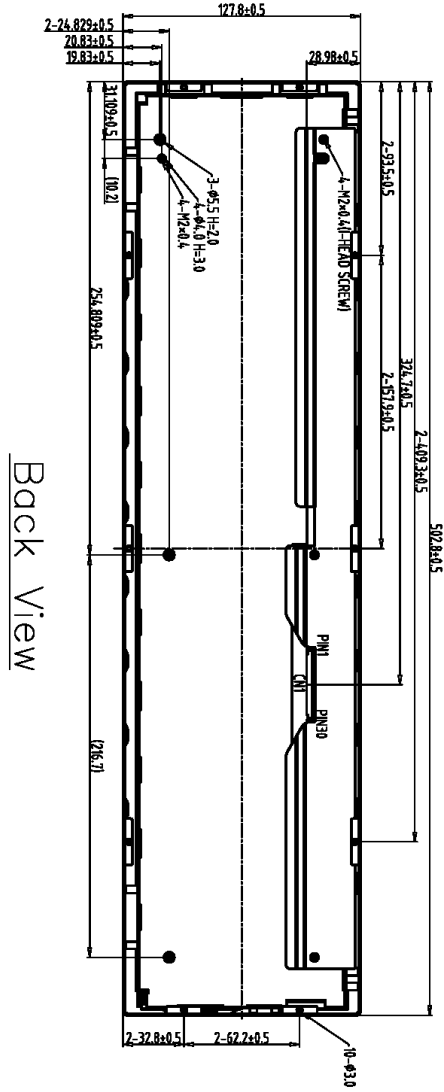
1	7	TOLERANCE GRADIENT	A	B	DIM.	MM	DRAW.	DATE	TITLE
2	8				IE NO.		Dj-Wen	12-17-15	1920360A
3	9						CHEK	DATE	(19.0°)
4	10				PARTS NO.	LCM	APPD.	DATE	DWG. NO.
5	11				1920360A				*151278MA
6	12								SHEET 1 OF 1



REV	REVISION RECORD	DATE	NAME
0	NEW RELEASE	12-17-15	Dj-Wen

REV	REVISION RECORD	DATE	NAME
0	NEW RELEASE	2-17-15	Wen

1	Rx00-	16	RxE1+
2	Rx00+	17	GND
3	Rx01-	18	RxE2-
4	Rx01+	19	RxE2+
5	Rx02-	20	RxECLK-
6	Rx02+	21	RxECLK+
7	GND	22	RxE3-
8	RxOCLK-	23	RxE3+
9	RxOCLK+	24	GND
10	RxO3-	25	NC
11	RxO3+	26	NC
12	RxE0-	27	NC
13	RxE0+	28	VDD
14	GND	29	VDD
15	RxE1-	30	VDD



Note:

1. Unless indicated, Tolerance "±0.3"
2. UV Glue For OLB Protection.
3. LVDS connector type:MSCKT2407P30HB or Equivalent

1	7	TOLERANCE GRADE(±)	A	B	DIR.	MM	DWR.	DATE	STYLE
2	8				TE NO.		DI-Wen	12-17-15	1920360A
3	9						CHK.		(19.0°)
4	10								
5	11				PARTS NO(LCM-1)		APPD.	DATE	DWG. NO.
6	12				1920360A				*151279MA
									SHEET 1 OF 1

AMP
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