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-800480NATZQW-T00H**
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
Parker	Simon	Jessica

RECORD OF REVISION

Revision Date	Page	Contents	Editor
2019/09/11	-	New Release	Jessica

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: 5” a-Si TFT active matrix and White LED Backlight.

(2) Resolution (pixel): 800(R.G.B) X 480

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

(4) LCD type : **IPS : Transmissive , normally Black**

(5) Viewing Direction: All Direction.

(6) LCD Interface : 24 Bit TTL RGB interface

(7) Power Supply Voltage: 3.3V single power input. Built-in power supply circuit.

(8) Touch panel

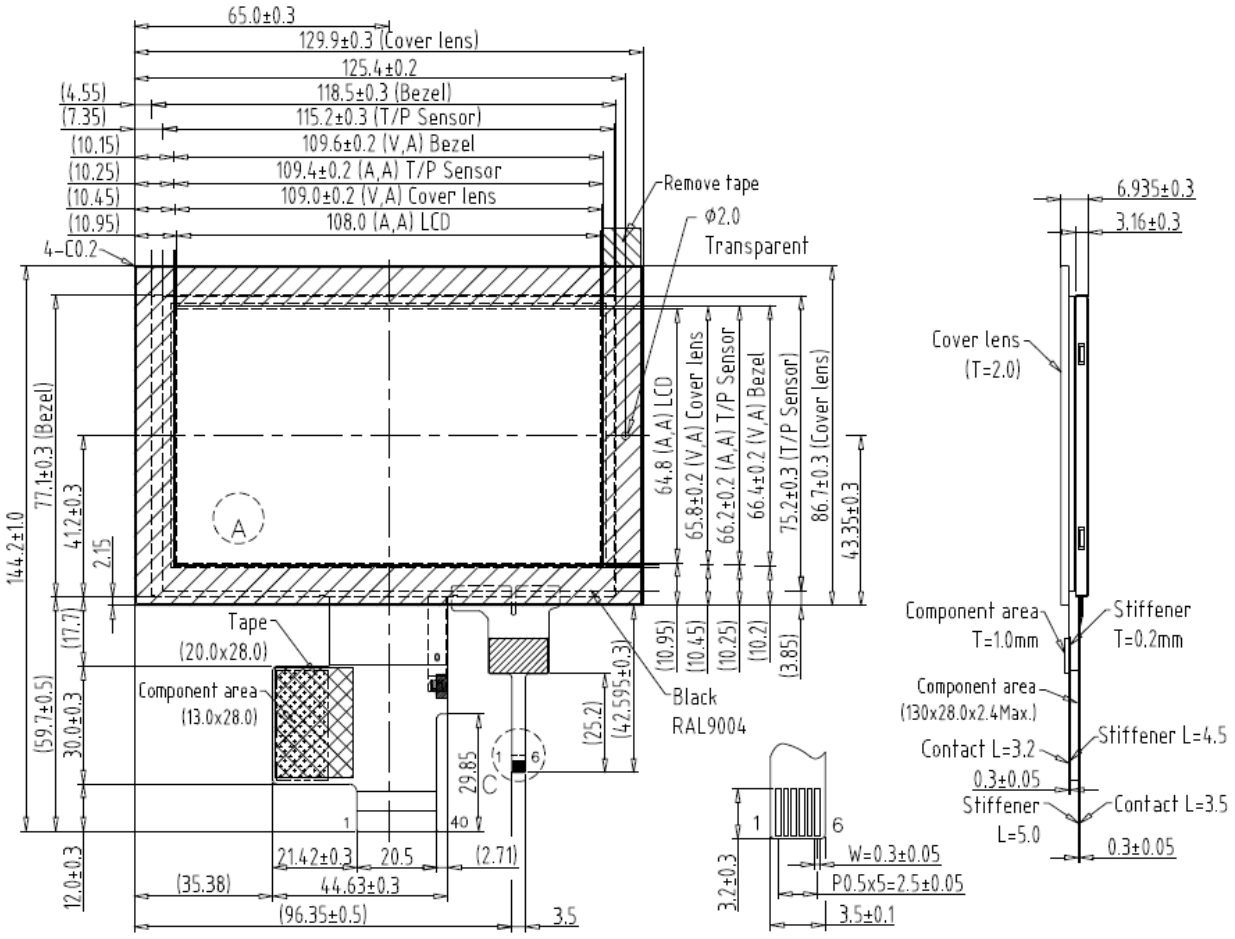
- ✧ IC: ILI2117A
- ✧ Interface: I2C

(9) Cover glass

- ✧ Thickness: 2mm

2. Physical Specifications

NO	Item	Specification	Remark
1	LCD Size	5.0 inch (Diagonal)	
2	Driver element	a-Si TFT active matrix	
3	Resolution	800 x 3 (RGB) x 480	
4	Display Mode	Normally Black. Transmissive	
5	Dot pitch	0.135(W) x 0.135(H) mm	
8	Color arrangement	RGB-stripe	
9	Luminance	**425** (typ.)	cd/m^2



3. Absolute Maximum Ratings

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

3.1 Electrical Absolute max. ratings

Item	Symbol	Condition	Min.	Max.	Unit	Remark
Power voltage	VDD	GND=0	-0.3	4.0	V	
Input voltage	VIN		-0.3	VDD+0.3	V	Note(1)

Note(1) Hsync, Vsync, DE, PCLK, DISP, R0~R7, G0~G7, B0~B7, LEFT/RGIHT, UP/DOWN.

3.2 Environmental Absolute max. Ratings

Item	Operating		Storage		Remark
	Min.	Max.	Min.	Max.	
Temperature	-20	70	-30	80	Note(2),(3),(4),(5),(6),(7)
Humidity	Note(1)		Note(1)		
Corrosive Gas	Not Acceptable		Not Acceptable		

Note(1) Ambient temperature Ta <= 40℃ : 85% RH max
Ta > 40℃: Absolute humidity must be lower than the humidity of 85%RH at 40 ℃

Note(2) For storage condition Ta at -30℃ < 48h , at 80℃ < 100h
For operating condition Ta at -20℃ < 100h

Note(3) Background color changes slightly depending on ambient temperature. This phenomenon is reversible.

Note(4) The response time will be slower at low temperature.

Note(5) Only operation is guaranteed at operating temperature. Contrast, response time, another display quality are evaluated at +25℃

Note(6) When LCM panel is operated over 60℃ (center of the panel surface temperature), the IAK of the LED back-light should be adjusted to 105mA

Note(7) This is center of the panel surface temperature, not ambient temperature.

4. Electrical Characteristics

4.1 DC Characteristics

Typical operating conditions (GND=0V)

Item		Symbol	Min.	Typ.	Max.	Unit	Remark
Power supply		VDD	3.0	3.3	3.6	V	
Input Voltage for logic	H Level	VIH	0.7*VDD	--	VDD	V	Note(1)
	L Level	VIL	0	--	0.3*VDD	V	
Power Supply current		IDD		TBD	--	mA	Note(2)

Note(1) Hsync, Vsync, DE, PCLK, DISP, R0~R7, G0~G7, B0~B7, LEFT/RGIHT, UP/DOWN.

Note(2) TFT power supply current.

Note(3) VDD=3.3V, fv =60Hz, Ta=25℃, Display pattern: All White

4.2 Electrical characteristic of LED Back-light

Item	Symbol	Min.	Typ.	Max.	Unit	Note
LED Forward Voltage	VAK	8.4	9.0	10.2	V	IAK=140mA, Ta=25℃
LED Forward Current	IAK	--	140	--	mA	Ta=25℃
LED life time			30k	-	Hrs.	IAK=140mA, Ta=25℃

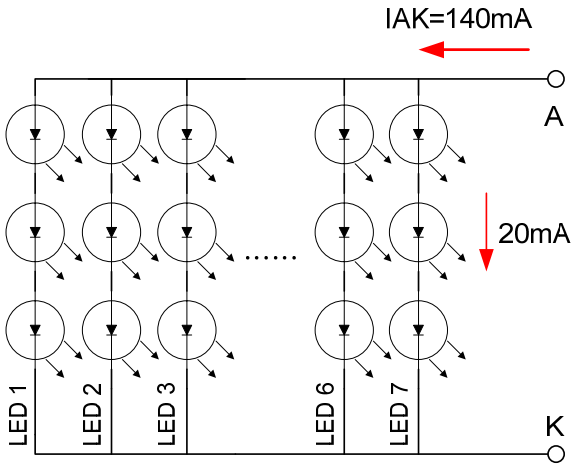
Note(1) Ta means ambient temperature of TFT-LCD module.

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

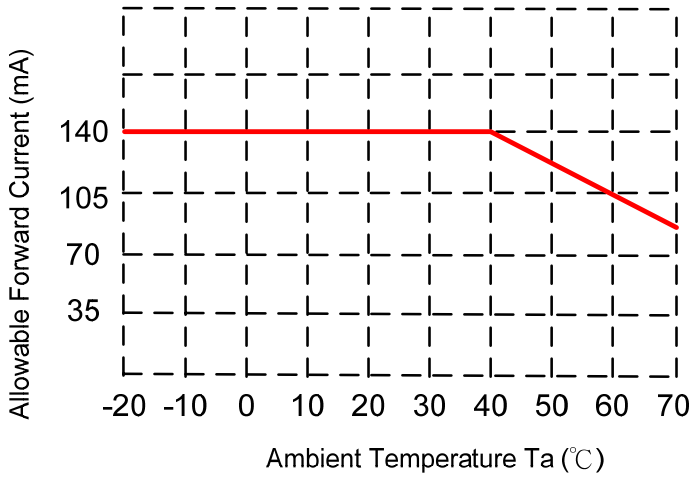
Note(3) The constant current source is needed for LED back-light driving.

Note(4) Operating life means brightness goes down to 50% minimum brightness. LED life time is estimated data. Ta=25℃

Note(5) The structure of LED B/L shows as below.



Note(6) When LCM is operated over 60℃ ambient temperature, the IAK of the LED backlight should be adjusted to 105mA max



5. Optical Characteristics of LCD

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Response Time		Tr + Tf	Θ=0°		30	40	ms ms	Note 1,2,3,5
Contrast ratio		CR	At optimized viewing angle	800	1000	-		Note 1,2,4,5
Viewing Angle	Top Bottom Left Right		CR≧10	75 75 75 75	85 85 85 85	- - - -	deg.	Note1,2, 5,6
Brightness		YL	IAK=140mA 25℃	**340**	**425**	-	cd/m^2	Note 7
Red chromaticity		XR	Θ=0° Θ=0°	Typ. -0.05	TBD	Typ. +0.05		Note 7 For reference only. These data should be update according the prototype.
		YR			TBD			
Green chromaticity		XG			TBD			
		YG			TBD			
Blue chromaticity		XB			TBD			
		YB			TBD			
White chromaticity		XW			**0.32**			
		YW			**0.37**			

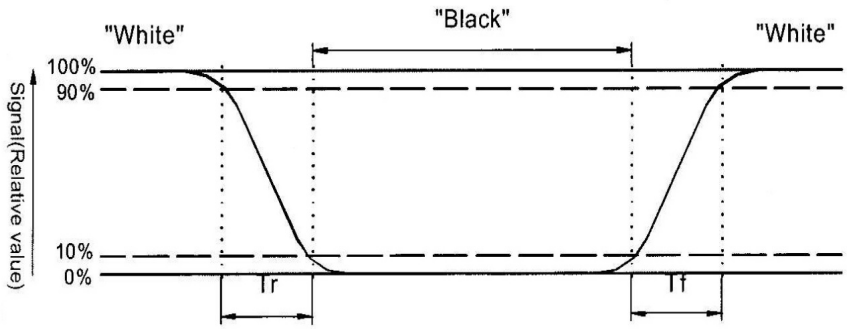
It's for reference only. These data should be update according the prototype.

Note(1) Ambient temperature=25℃,and lamp current IAK=105mA.To be measured in the dark room.

Note(2) To be measured on the center area of panel with a viewing cone of 1°by Topcon luminance meter BM-7,after 10 minutes operation.

Note(3) 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(4) Definition of contrast ratio:

Contrast ratio is calculated with the following formula.

$$\text{Contrast ratio(CR)} = \frac{Brightness\ of\ All\ White}{Brightness\ of\ All\ Black}$$

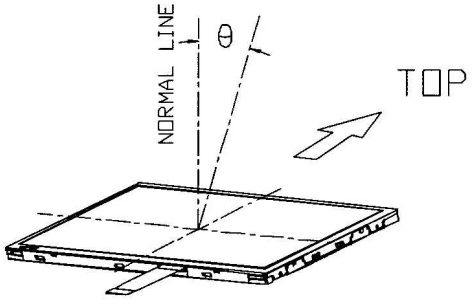
Note(5) White $V_i=V_{i50}$ +1.5V Black $V_i=V_{i50}$ +2.0V

“±”means that the analog input signal swings in phase with V_{COM} signal.

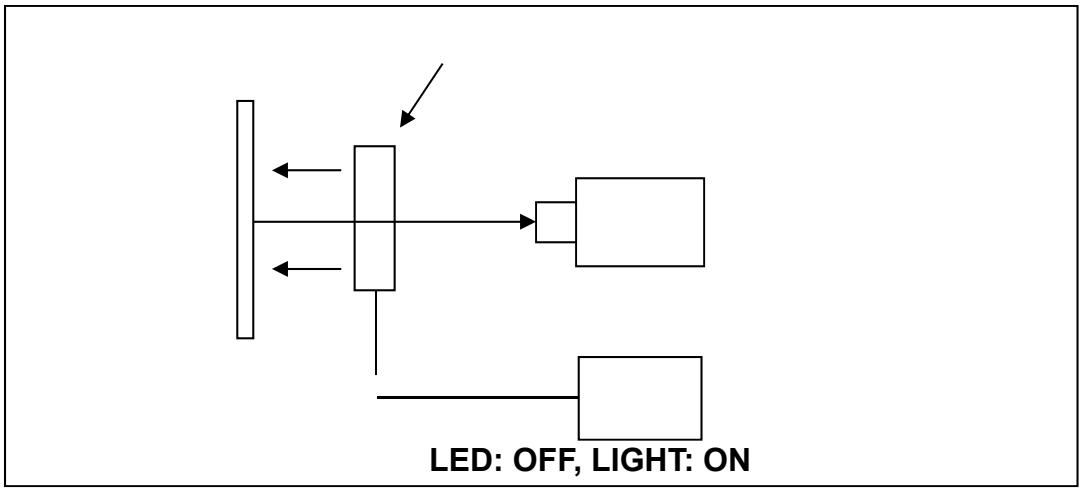
“ “ means that the analog input signal swings out of phase with V_{COM} signal.

V_{i50} : The analog input voltage when transmission is 50%.The 100% Transmission is defined as the transmission of LCD panel when all the Input terminals of module are electrically opened.

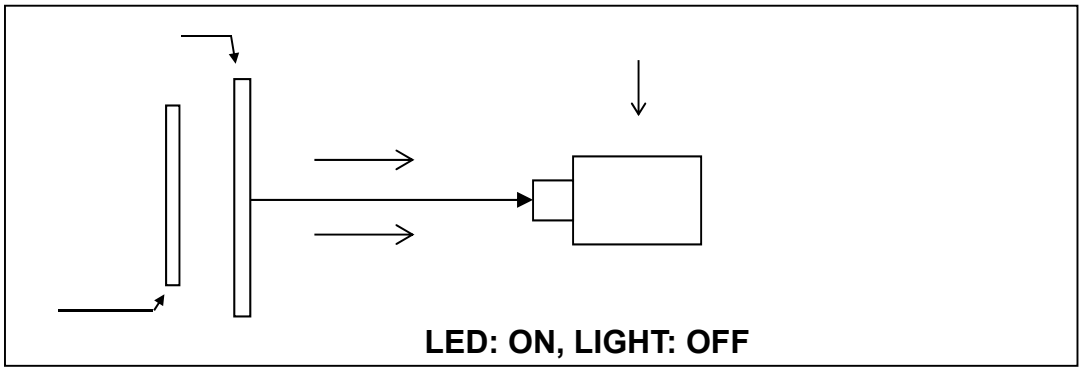
Note(6) Definition of viewing angle. Refer to figure as below.



Note(7) Measured at the center area of the panel when all the input terminals of LCD panel are electrically opened.



LED: OFF, LIGHT: ON



LED: ON, LIGHT: OFF

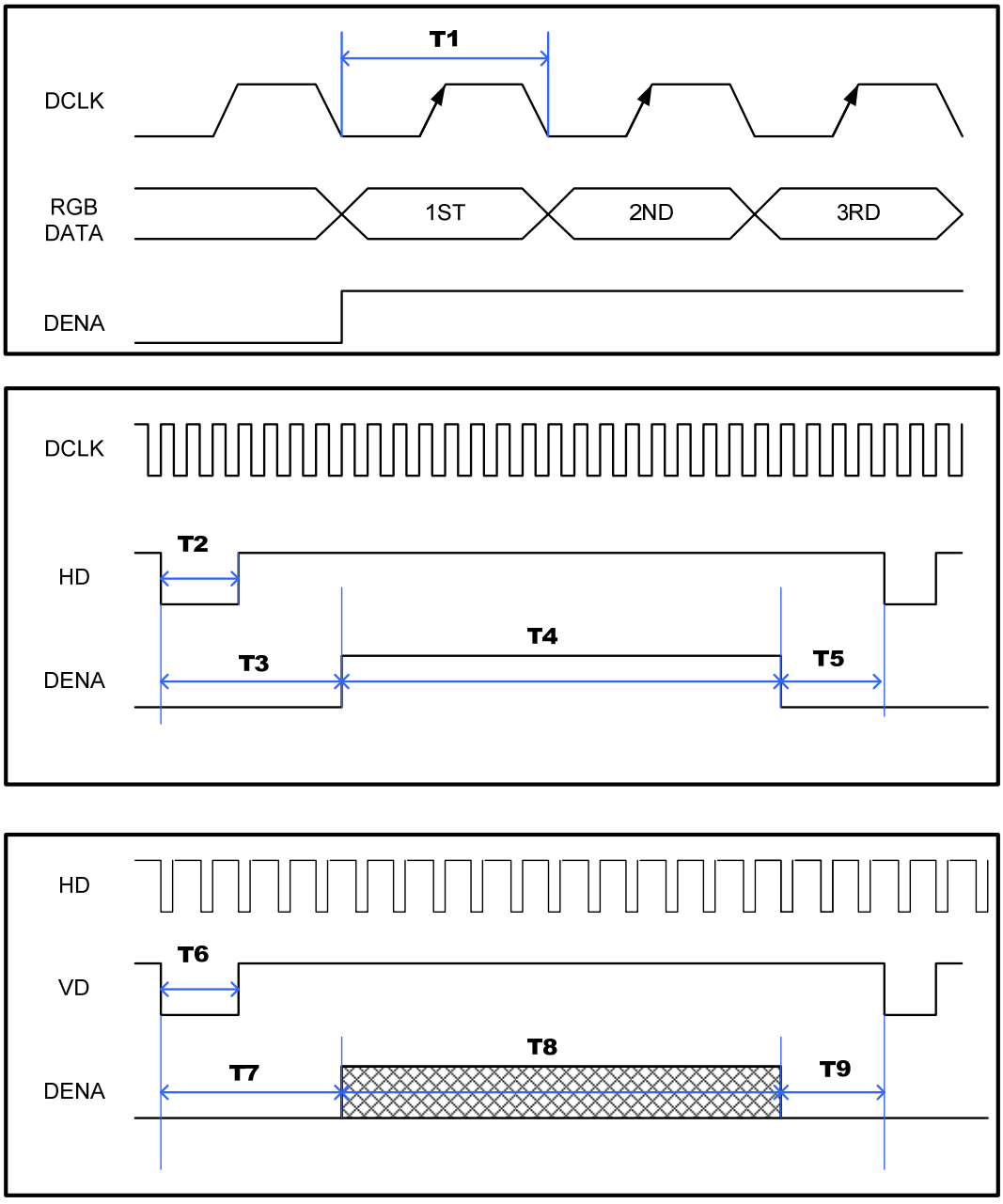
6. Interface

Pin no	Symbol	I/O	Description	Remark
1	LEDK	P	LED Back-light Cathode	
2	LEDA	P	LED Back-light Anode	
3	GND	P	Power GND	
4	VDD	P	Power supply for the logic (3.3V)	
5	R0	I	Red Data (LSB)	
6	R1	I	Red Data	
7	R2	I	Red Data	
8	R3	I	Red Data	
9	R4	I	Red Data	
10	R5	I	Red Data	
11	R6	I	Red Data	
12	R7	I	Green Data (MSB)	
13	G0	I	Green Data (LSB)	
14	G1	I	Green Data	
15	G2	I	Green Data	
16	G3	I	Green Data	
17	G4	I	Green Data	
18	G5	I	Green Data	
19	G6	I	Green Data	
20	G7	I	Green Data (MSB)	
21	B0	I	Blue Data (LSB)	
22	B1	I	Blue Data	
23	B2	I	Blue Data	
24	B3	I	Blue Data	
25	B4	I	Blue Data	
26	B5	I	Blue Data	
27	B6	I	Blue Data	
28	B7	I	Blue Data (MSB)	
29	GND	P	Power GND	
30	PCLK	I	Clock signal. Latching data at the rising edge.	
31	DISP	I	L: Standby mode. H: Normal display mode	
32	HSYNC	I	Horizontal sync input in digital RGB mode	
33	VSYNC	I	Vertical sync input in digital RGB mode.	

34	DE	I	Input data enable control	
35	NC	-	No connection	
36	GND	P	Power GND	
37	LEFT/RIGHT	I	L: From right to left H: From left to right	
38	UP/DOWN	I	L: From down to left H: From up to down	
39	NC		No connection	
40	NC		No connection	

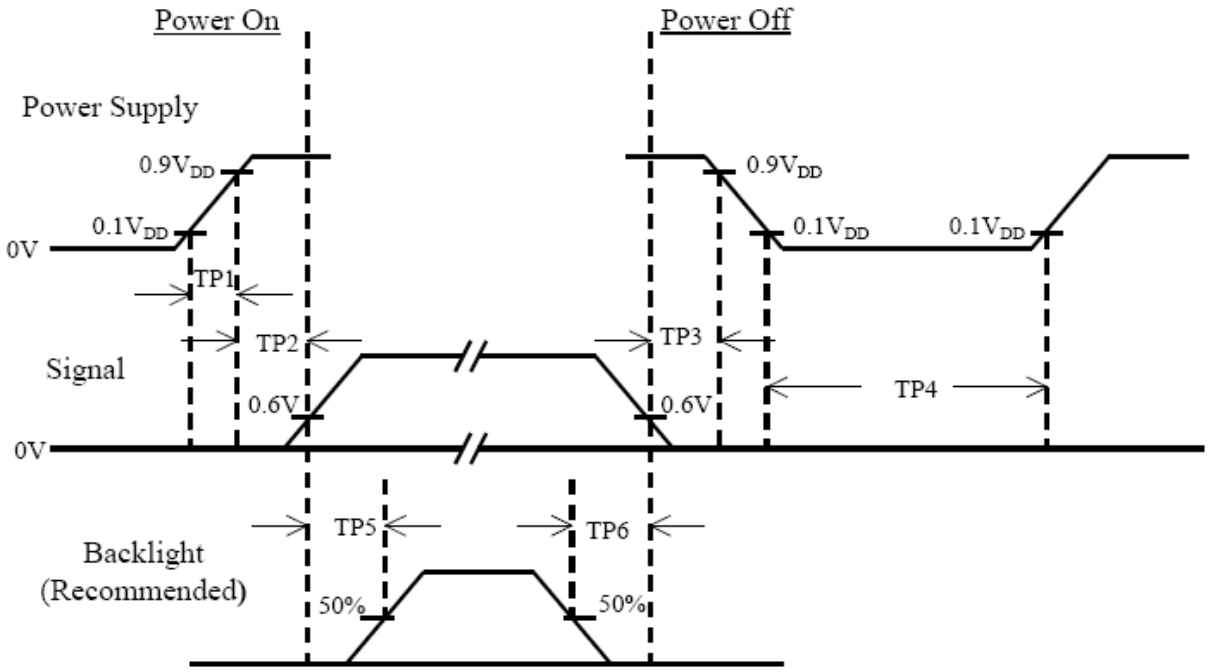
7. LCD Interface Timing

7.1 TTL RGB



Item	Symbol	Min.	Typ.	Max.	Unit
Clock Frequency	1/T1	23	25	27	MHz
HSYNC Pulse Wide	T2	2	8	8	clocks
HSYNC Back Porch	T3	4	8	48	Clocks
HSYNC Front Porch	T5	4	8	48	Clocks
Horizontal Display Period	T4		800		Clocks
Horizontal total Period	T3+T4+T5	808	816	896	Clocks
VSYNC Pulse Wide	T6	2	4	8	Lines
VSYNC Back Porch	T7	4	8	12	Lines
VSYNC Front Porch	T9	4	8	12	Lines
Vertical Display Period	T8		480		Lines
Vertical total Period	T7+T8+T9	488	496	504	Lines

7.2 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	250	--	--	msec	
TP6	100	--	--	msec	

Note(1) The supply voltage of the external system for the module input should be the same as the definition of VDD.

Note(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.

Note(3) In case of VDD = off level, please keep the level of input signal on the low or keep a high impedance.

Note(4) TP4 should be measured after the module has been fully discharged between power off and on period.

Note(5) Interface signal shall not be kept at high impedance when the power is on.

8. Touch Panel Electrical Specification

8.1. Basic Characteristics

Item	Specification
Interface Type	Projective Capacitive Multi-Touch Panel
Activation	Two-fingers or Single-finger
X/Y Position Reporting	Absolute Position
Touch Force	No contact pressure required
Calibration	No need for calibration
Report Rate	Approx. 100 points/sec
Interface	**I2C**
Control IC	**ILI2117A**

8.2. Optical Characteristics

Item	Specification
Transmittance	85% (min)

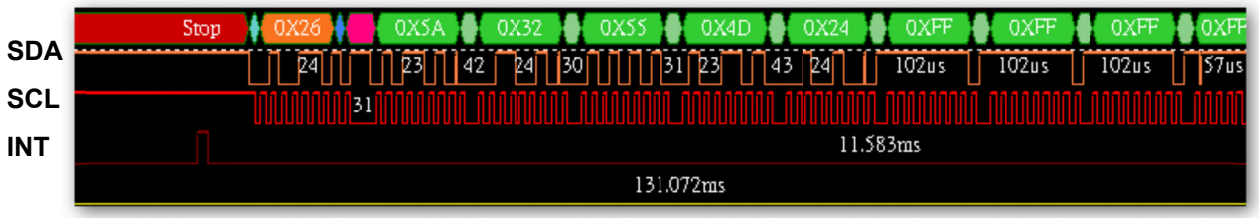
8.3. Electrical Characteristic

Item	Specification
I2C Interface	Power & signal Input 3.3V

8.4. Interface Pin Assign

Pin	Name	Description
1	SCL	I2C Clock
2	SDA	I2C Data
3	VDD	Power 3.3V
4	RESET	Active “Low”
5	INT	Active “Low”
6	GND	Power GND

8.5. I2C AC Waveform

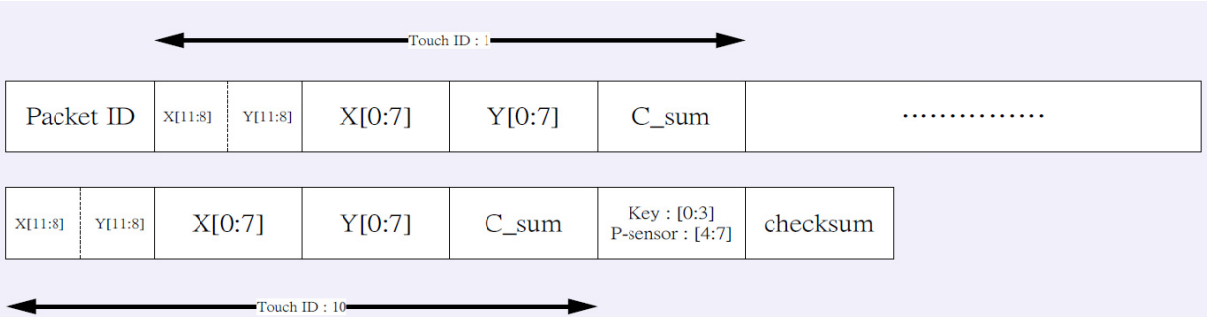


8.6. I2C Characteristics

1. Slave address: 0x26
2. Clock: up to 400 kHz
3. Packet length : 43 byte
4. Finger_i touch end: The data which belongs to finger_i is 0xFF
5. Position_X[11:0] and Position_Y[11:0] are ranging from 0~2047
6. Touch end: all data is 0xFF except for packet ID (0x5A) and checksum.
7. C_sum : total delta_C of each finger touch

8.7. Data Format

Slave Address	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
0x26(r)	Packet ID (0x5A)	X00[11:8] Y00[11:8]	X00[7:0]	Y00[7:0]	C_sum	X01[11:8] Y01[11:8]	X01[7:0]	Y01[7:0]
	C_sum	X02[11:8] Y02[11:8]	X02[7:0]	Y02[7:0]	C_sum	X03[11:8] Y03[11:8]	X03[7:0]	Y03[7:0]
	C_sum	X04[11:8] Y04[11:8]	X04[7:0]	Y04[7:0]	C_sum	X05[11:8] Y05[11:8]	X05[7:0]	Y05[7:0]
	C_sum	X06[11:8] Y06[11:8]	X06[7:0]	Y06[7:0]	C_sum	X07[11:8] Y07[11:8]	X07[7:0]	Y07[7:0]
	C_sum	X08[11:8] Y08[11:8]	X08[7:0]	Y08[7:0]	C_sum	X09[11:8] Y09[11:8]	X09[7:0]	Y09[7:0]
	C_sum	Key[3:0]	Checksum					



9. Reliability Test Items

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
Storage at High Temperature and Humidity	60°C, 90% RH , 240 hrs	1,2
Thermal Shock Test	-20°C (30min) ~ 70°C (30min) 100 cycles	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 inspired after 1 hour storage in normal conditions (15~35℃, 45~65%RH).

Note(3) The module shouldn't be tested over one condition, and all the tests are independent.

Note(4) All reliability tests should be done without the protective film.

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 initial value.

10. General Precautions

10.1 Safety

(1) Liquid crystal is poisonous. Do not put it your month. If liquid crystal touches your skin or clothes, wash it off immediately by using soap and water.

10.2 Handling

(1) The LCD panel is plate glass. Do not subject the panel to mechanical shock or to excessive force on its surface.

(2) The polarizer attached to the display is easily damaged. Please handle it carefully to avoid scratch or other damages.

(3) To avoid contamination on the display surface, do not touch the module surface with bare hands.

(4) Keep a space so that the LCD panels do not touch other components.

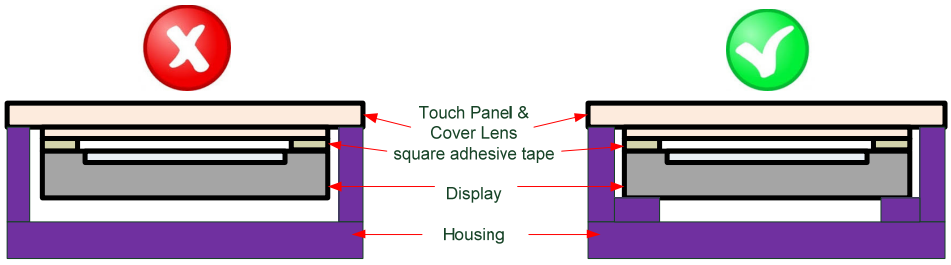
(5) Put cover board such as acrylic board on the surface of LCD panel to protect panel from damages.

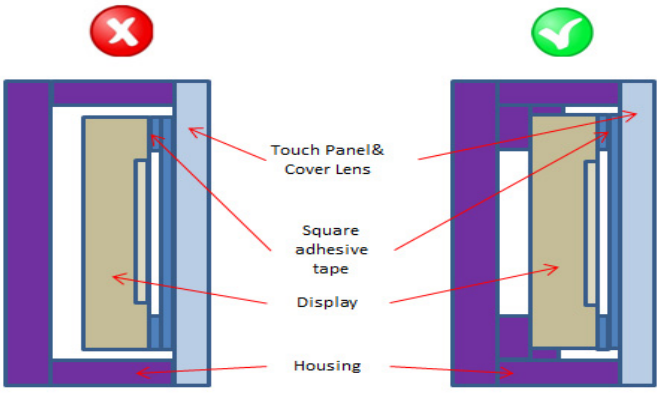
(6) Transparent electrodes may be disconnected if you use the LCD panel under environmental conditions where the condensation of dew occurs.

(7) Do not leave module in direct sunlight to avoid malfunction of the ICs.

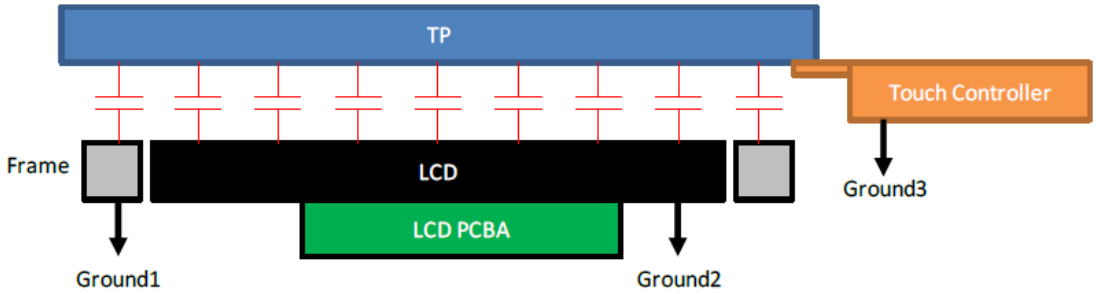
(8) Please hold the LCD module properly when you use or store it.

(9) The square adhesive tape which is between the touch panel and display can't provide well supporting in the long term and high ambient temperature condition. Whether upright or horizontal position the support holder which is in the back side of the display is needed. Do not let the display floating.





(10) TP needs to work in environment with stable stray capacitance. In order to minimize the variation in stray capacitance, all conductive mechanical parts must not be floating. Intermittent floating any conductive part around the touch sensor may cause significant stray capacitance change and abnormal touch function. It is recommended to keep all conductive parts having same electrical potential as the GND of the touch controller module.



GND1, GND2 and GND3 should be connected together to have the same ground

10.3 Static Electricity

(1) Be sure to ground module before turning on power or operation module.
(2) Do not apply voltage which exceeds the absolute maximum rating value.

10.4 Storage

(1) Store the module in a dark room where must keep at +25±10℃ and 65%RH or less.
(2) Do not store the module in surroundings containing organic solvent or corrosive gas.
(3) Store the module in an anti-electrostatic container or bag.

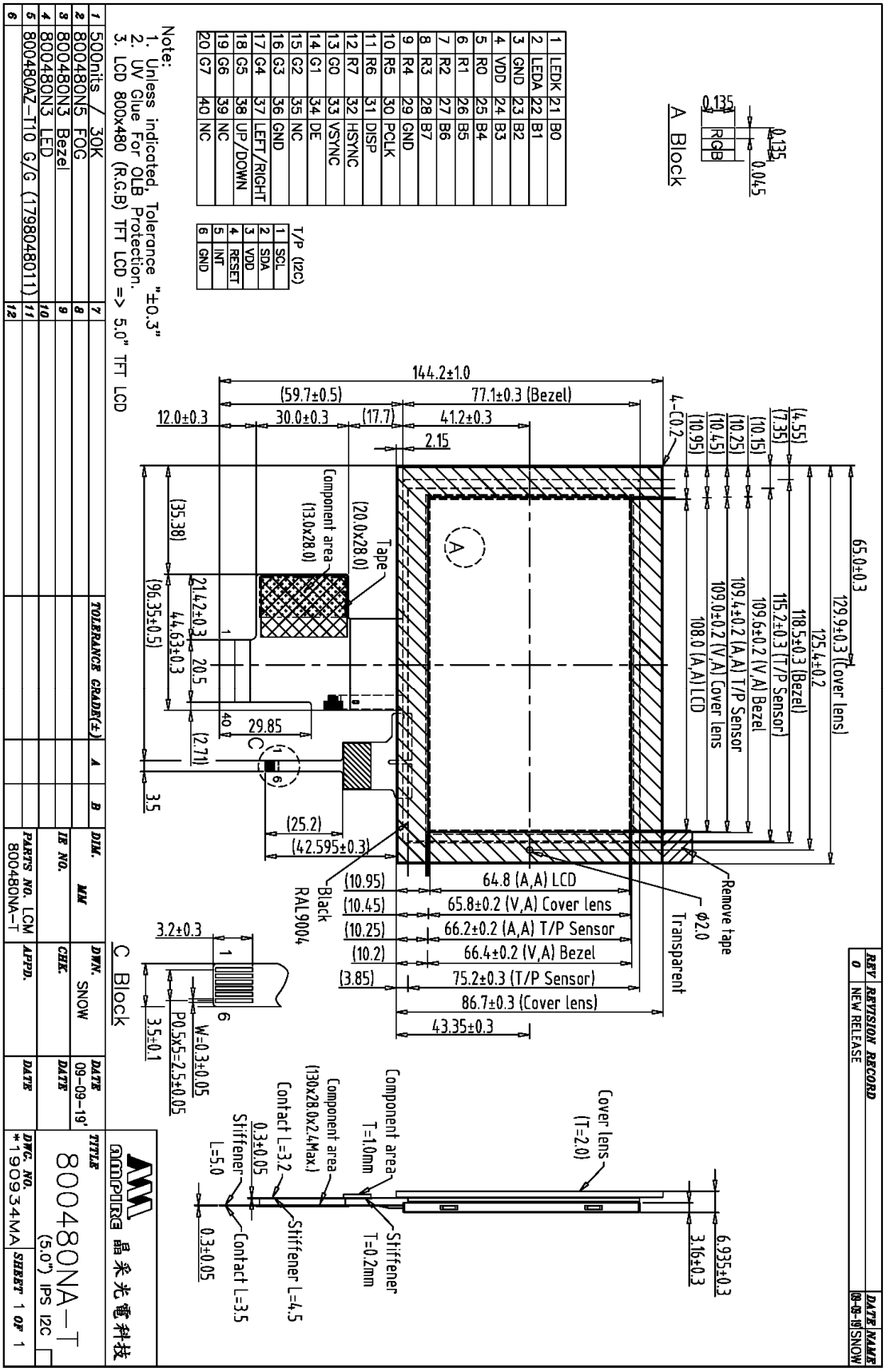
10.5 Cleaning

(1) Do not wipe the polarizer with dry cloth. It might cause scratch.
(2) Only use a soft sloth with IPA to wipe the polarizer, other chemicals might permanent damage to the polarizer.

10.6 Others

(1) AMIPRE will provide one year warrantee for all products and three months warrantee for all repairing products.
(2) 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.

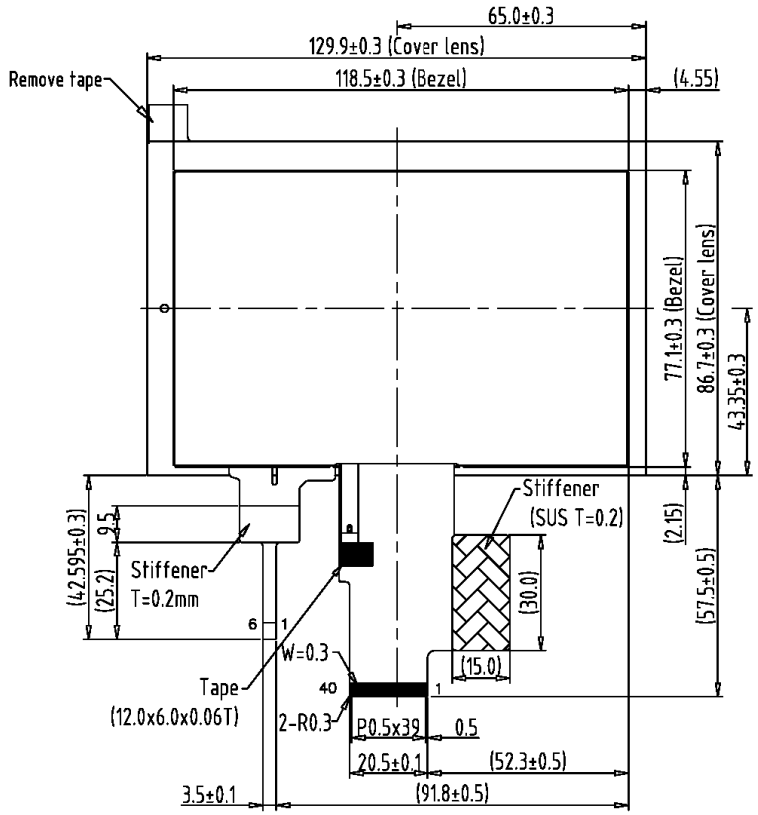
11. Outline Dimension



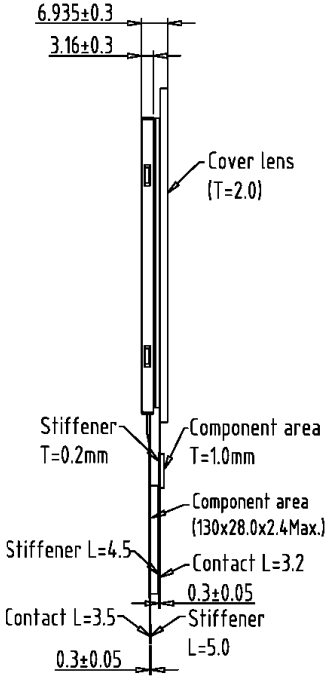
1	LEDK	21	B0
2	LEDA	22	B1
3	GND	23	B2
4	VDD	24	B3
5	R0	25	B4
6	R1	26	B5
7	R2	27	B6
8	R3	28	B7
9	R4	29	GND
10	R5	30	PCLK
11	R6	31	DISP
12	R7	32	HSYNC
13	G0	33	VSYNC
14	G1	34	DE
15	G2	35	NC
16	G3	36	GND
17	G4	37	LEFT/RIGHT
18	G5	38	UP/DOWN
19	G6	39	NC
20	G7	40	NC

T/P (I2C)	
1	SCL
2	SDA
3	VDD
4	RESET
5	INT
6	GND

REV	REVISION RECORD	DATE	NAME
0	NEW RELEASE	09-09-19	SNOW



Back view



1	LEDK	21	B0
2	LEDA	22	B1
3	GND	23	B2
4	VDD	24	B3
5	R0	25	B4
6	R1	26	B5
7	R2	27	B6
8	R3	28	B7
9	R4	29	GND
10	R5	30	PCLK
11	R6	31	DISP
12	R7	32	HSYNC
13	G0	33	VSYNC
14	G1	34	DE
15	G2	35	NC
16	G3	36	GND
17	G4	37	LEFT/RIGHT
18	G5	38	UP/DOWN
19	G6	39	NC
20	G7	40	NC

T/P (I2C)

1	SCL
2	SDA
3	VDD
4	RESET
5	INT
6	GND

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

1	500nits / 30K	7		TOLERANCE GRADE(±)	A	B	DIM. MM	DWN. SNOW	DATE 09-09-19'	TITLE 800480NA-T (5.0") IPS I2C	
2	800480N5 FOG	8					IE NO.	CHK.	DATE		
3	800480N3 Bezel	9									
4	800480N3 LED	10									
5	800480AZ-T10 G/G (1798048011)	11					PARTS NO. LCM-1 800480NA-T	APPD.	DATE	DWG. NO. *190935MA	SHEET 1 OF 1
6		12									

AMPIRE 晶采光電科技

12. Package

TBD