晶采光電科技股份有限公司
AMPIRE CO., LTD.

/SIMPLEPLUS Touch Displays

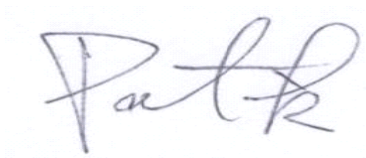
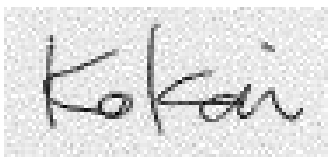
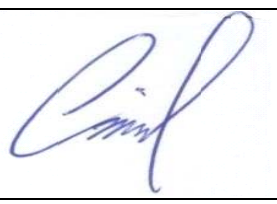
SPECIFICATIONS FOR LCD MODULE

CUSTOMER	
CUSTOMER PART NO.	
AMPIRE PART NO.	**AMA-050A02-DI2117A-G020**
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 City 221, Taiwan (R.O.C.)
22181 新北市 汐止區 新台五路一段 **116** 號 **4** 樓(東方科學園區 D 棟)
TEL:886-2-26967269 , FAX:886-2-26967196 or 26967270

APPROVED BY	CHECKED BY	ORGANIZED BY
		

RECORD OF REVISION

Revision Date	Page	Contents	Editor
2018/2/7	-	New Release	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, backlight unit, PCAP and 2mm cover glass.

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.
7. PACP with IIC interface touch panel controller.

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
Color configuration	R.G.B Vertical stripe	
Surface treatment	Without surface treatment	
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℃ : 85% RH max

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

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

For operating condition Ta at -30℃ < 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℃

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

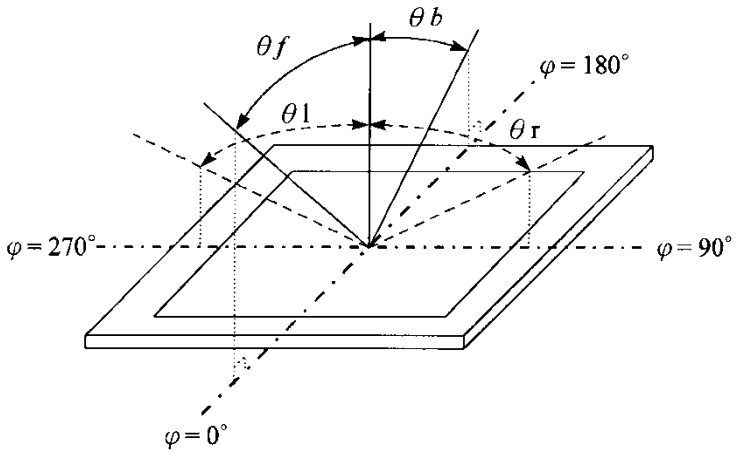
Note7 : This is center of the panel surface temperature, not ambient temperature.

4. OPTICAL CHARACTERISTICS

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Viewing Angle	Front	θ f	CR≧10	60	70	--	deg.	(1)(2)(3)
	Back	θ b		50	60	--		
	Left	θ l		56	75	--		
	Right	θ r		65	75	--		
Contrast ratio		CR	Θ=Φ=0°	480	600	--	--	(1)(3)
Response Time		T_r	Θ=Φ=0°	--	2	4	ms	(1)(4)
		T_f		--	6	12	ms	(1)(4)
Color chromaticity	Red	Rx	Θ=Φ=0°	0.626+/-0.15			--	(1)
		Ry		0.346+/-0.15				
	Green	Gx		0.322+/-0.15				
		Gy		0.552+/-0.15				
	Blue	Bx		0.149+/-0.15				
		By		0.183+/-0.15				
	White	Wx		0.310+/-0.15				
		Wy		0.349+/-0.15				
Luminance (ILED=240mA)		L	Θ=Φ=0°	680	850	--	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. LED Back-light IF=240mA.

Note 2: Definition of Viewing Angle



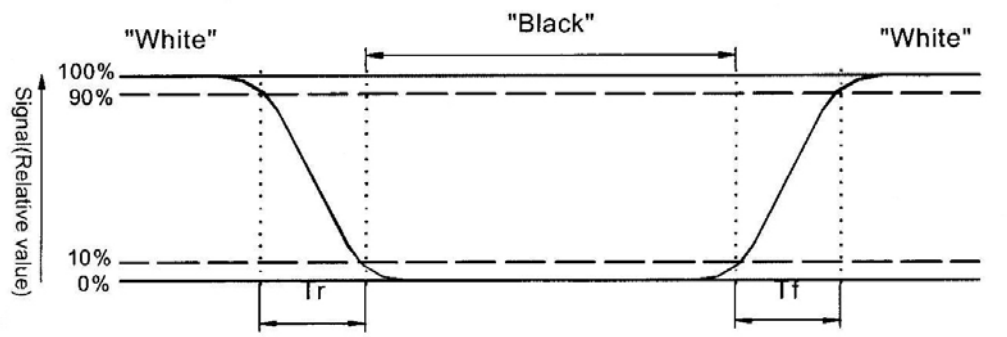
Note 3: Definition of contrast ratio:

Contrast ratio is calculated with the following formula.

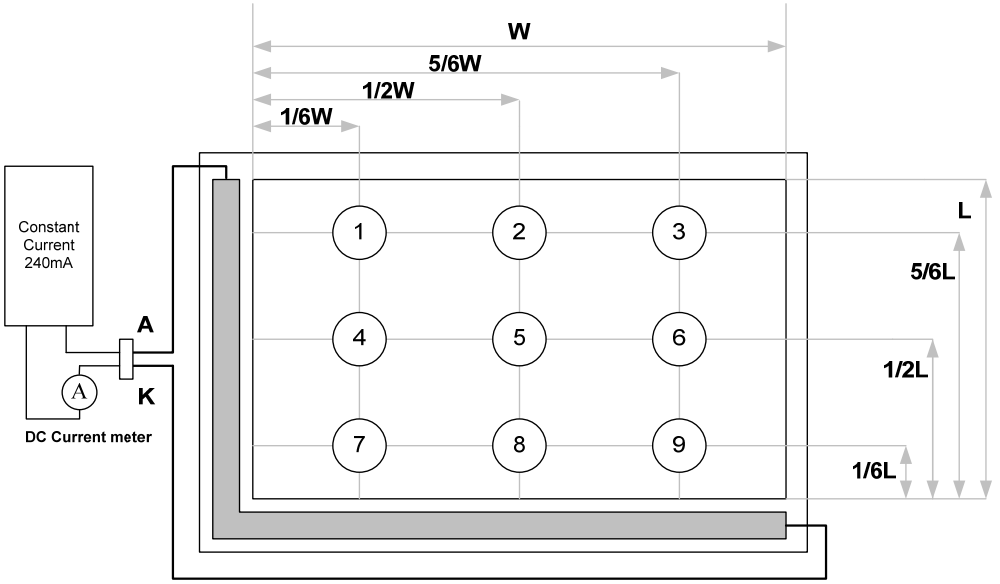
$$\text{Contrast ratio(CR)} = \frac{\text{Photo detector output when LCD is at "White" state}}{\text{Photo detector Output when LCD is at "Black" state}}$$

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

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		ICC	--	106	--	mA	(2)

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

Note 2: fV =60Hz , Ta=25℃ , 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℃ , A1+A2 total current
LED Forward Voltage	VF	7.8	9.0	10.5	V	IF=240mA, Ta=25℃
LED life time			50,000	-	Hr	IF=240mA, Ta=25℃

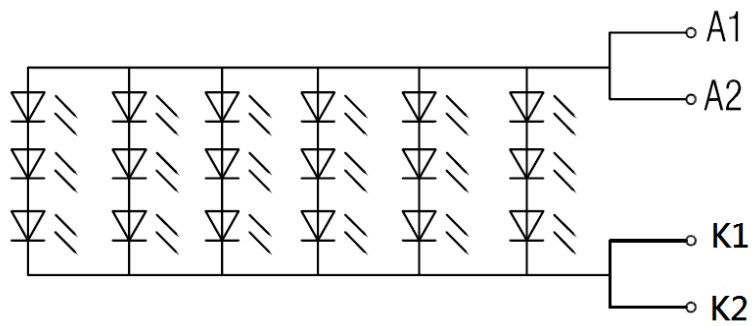
Note 1: Ta means ambient temperature of TFT-LCD module.

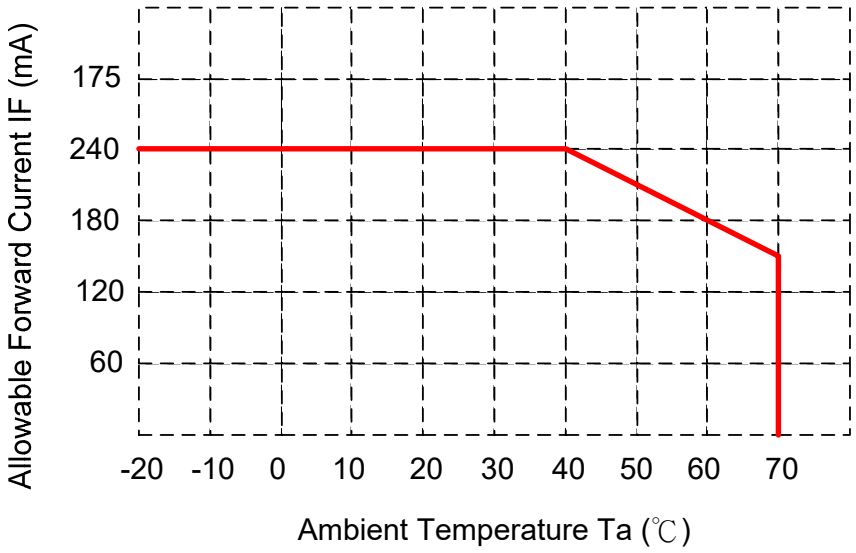
Note 2: If the module is driven by high current or at high ambient temperature & humidity condition. The operating life will be reduced.

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.



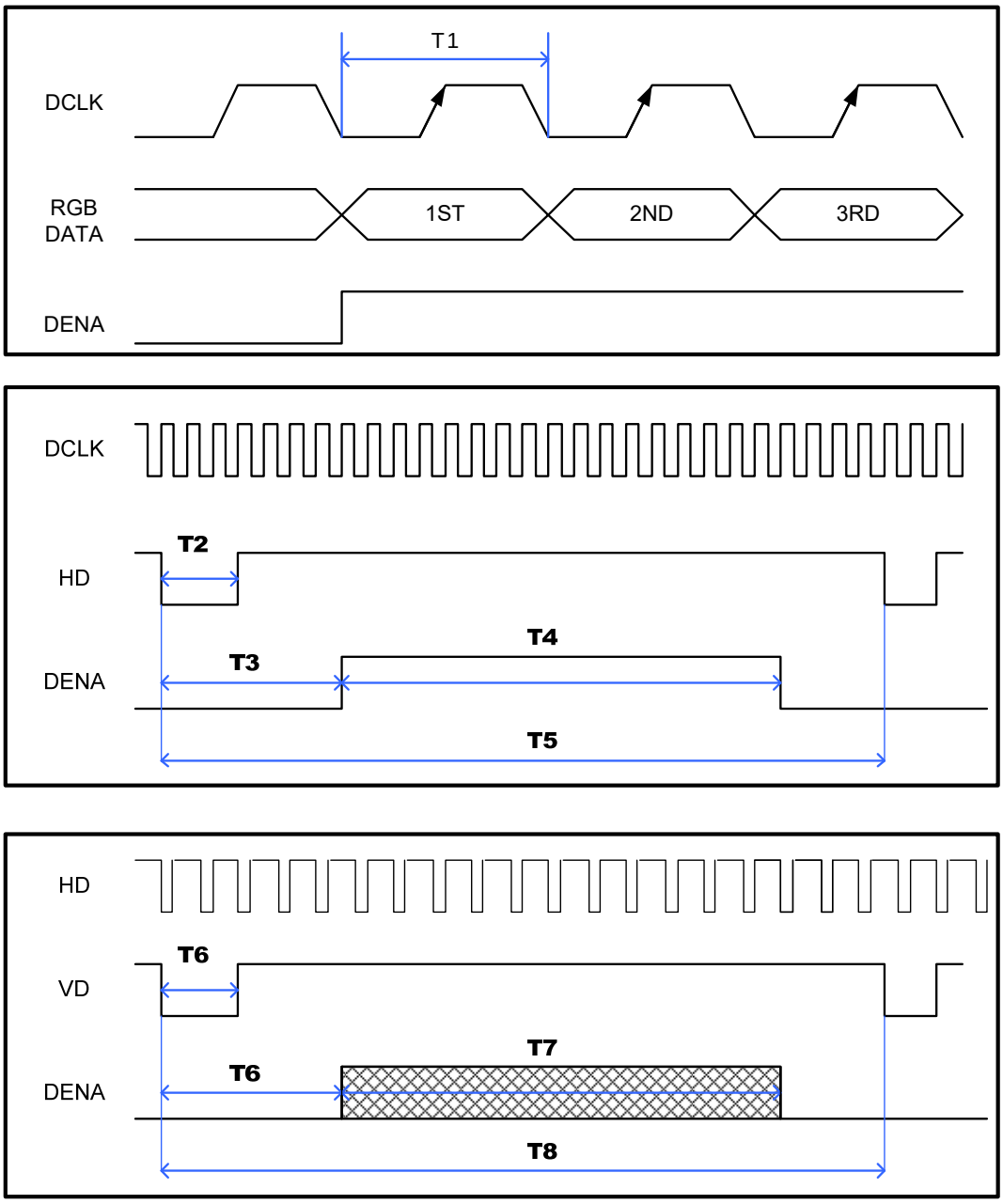

Allowable Forward Current IF (mA)
175
240
180
120
60
-20
-10
0
10
20
30
40
50
60
70
Ambient Temperature Ta (℃)

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.

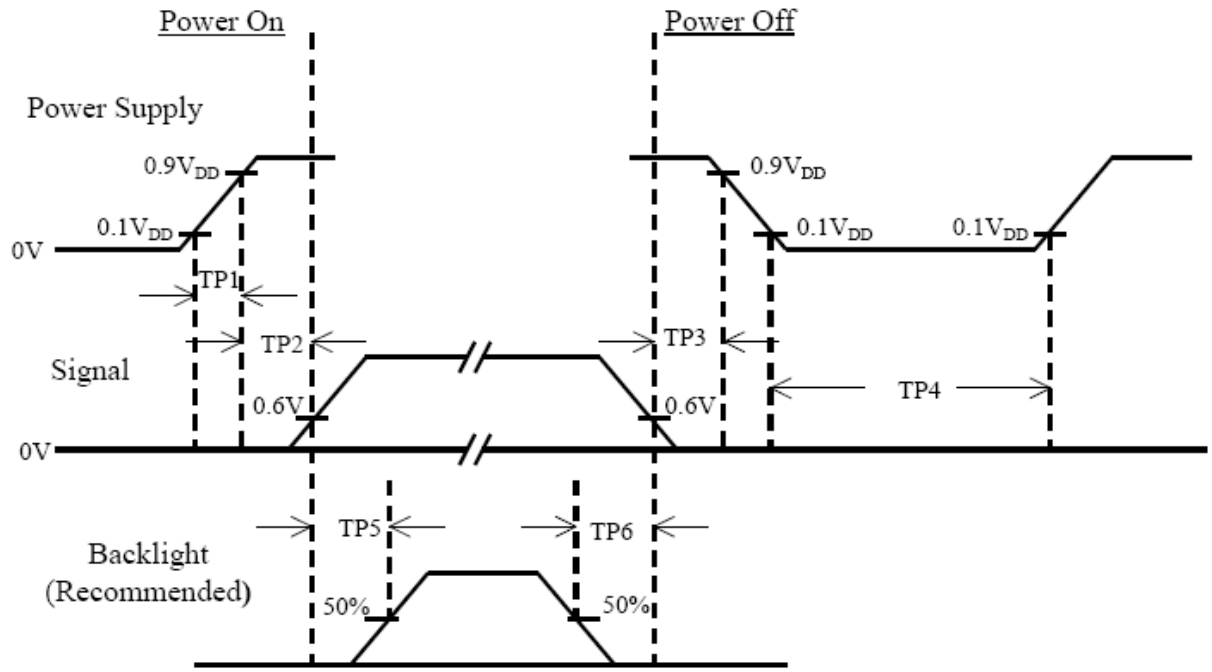
40	GND	Power Ground
41	GND	Power Ground
42	LED_K	LED cathode
43	LED_A	LED anode
44	LED_K	LED cathode
45	LED_A	LED anode

7. INTERFACE TIMING



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.

8. Touch Panel SPECIFICATION

8.1. Basic Characteristic

ITEM	SPECIFICATION
Type	Projective Capacitive Touch Panel
Activation	Multi-finger
X/Y Position Reporting	Absolute Position
Touch Force	No contact pressure required
Calibration	No need for calibration
Report Rate	Approx 100 points/sec
Control IC	ILI2117A
Conductive susceptibility IEC/EN61000-4-6	10Vrms
Cover Glass	2mm chemically strength glass with black border
Bonding method	CG to sensor: optical bonding
	TP module to LCM: tape bonding

8.2. Optical Characteristic

ITEM	SPECIFICATION
Transmittance	80% (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

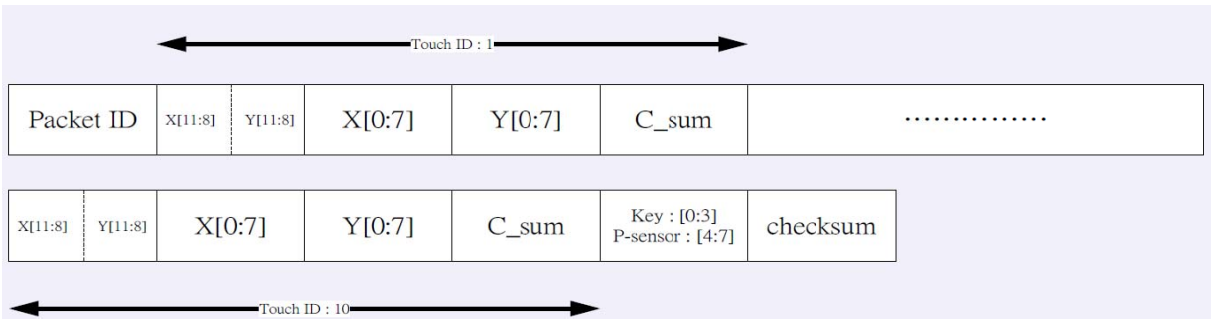
8.5. I2C AC Waveform

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. 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

9. RELIABILITY TEST CONDITIONS

Test Item	Test Conditions	Note
High Temperature Operation	60±3°C , Dry t=240 hrs	
Low Temperature Operation	-20±3°C , Dry t=240 hrs	
High Temperature Storage	70±3°C , Dry t=240 hrs	1,2
Low Temperature Storage	-30±3°C , Dry 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.) ~ 25°C(5min.) ~ 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 inspected after 1 hour storage in normal conditions (15-35°C , 45-65%RH).

Note 3 : The module shouldn't be tested more than one condition, and all the test conditions are independent.

Note 4 : All the reliability tests should be done without protective film on the module.

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.

10. GENERAL PRECAUTION

10-1 Safety

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.

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.

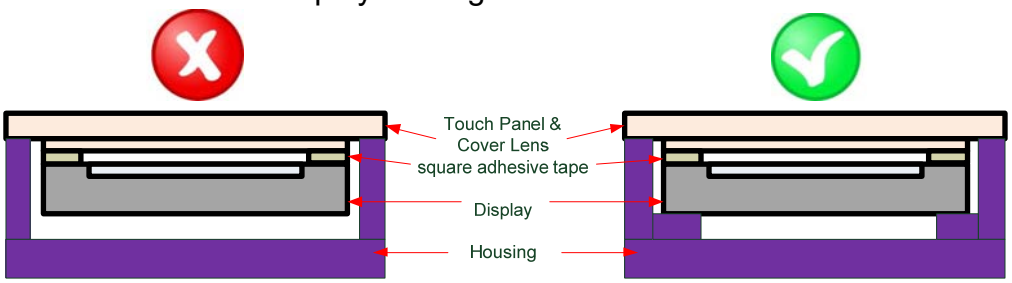
10-5 Cleaning

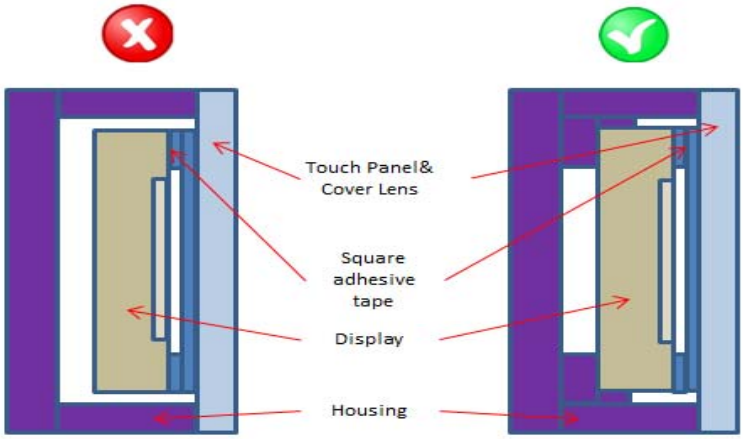
1. Do not wipe the polarizer with dry cloth. It might cause scratch.
2. Only use a soft sloth with IPA to wipe the polarizer, other chemicals might permanent damage to the polarizer.

10-6 Mechanism (if the LCM using air bonding)

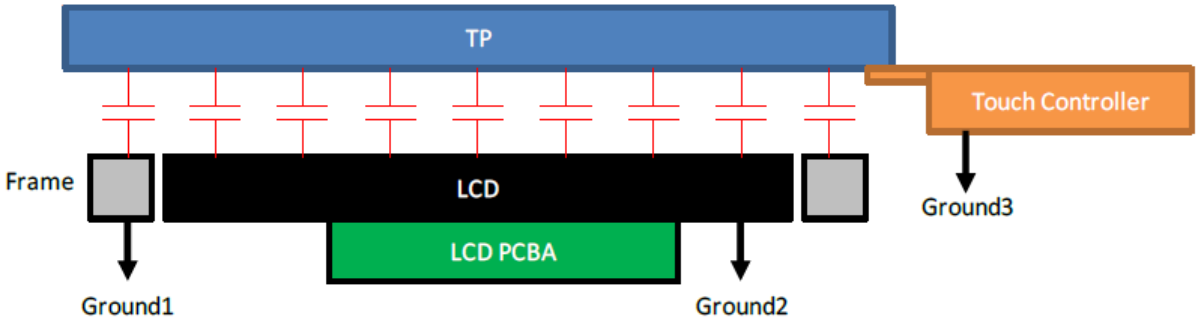
(1) Please mount LCD module by using mounting holes arranged in four corners tightly.

(2) 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.





(3) 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.

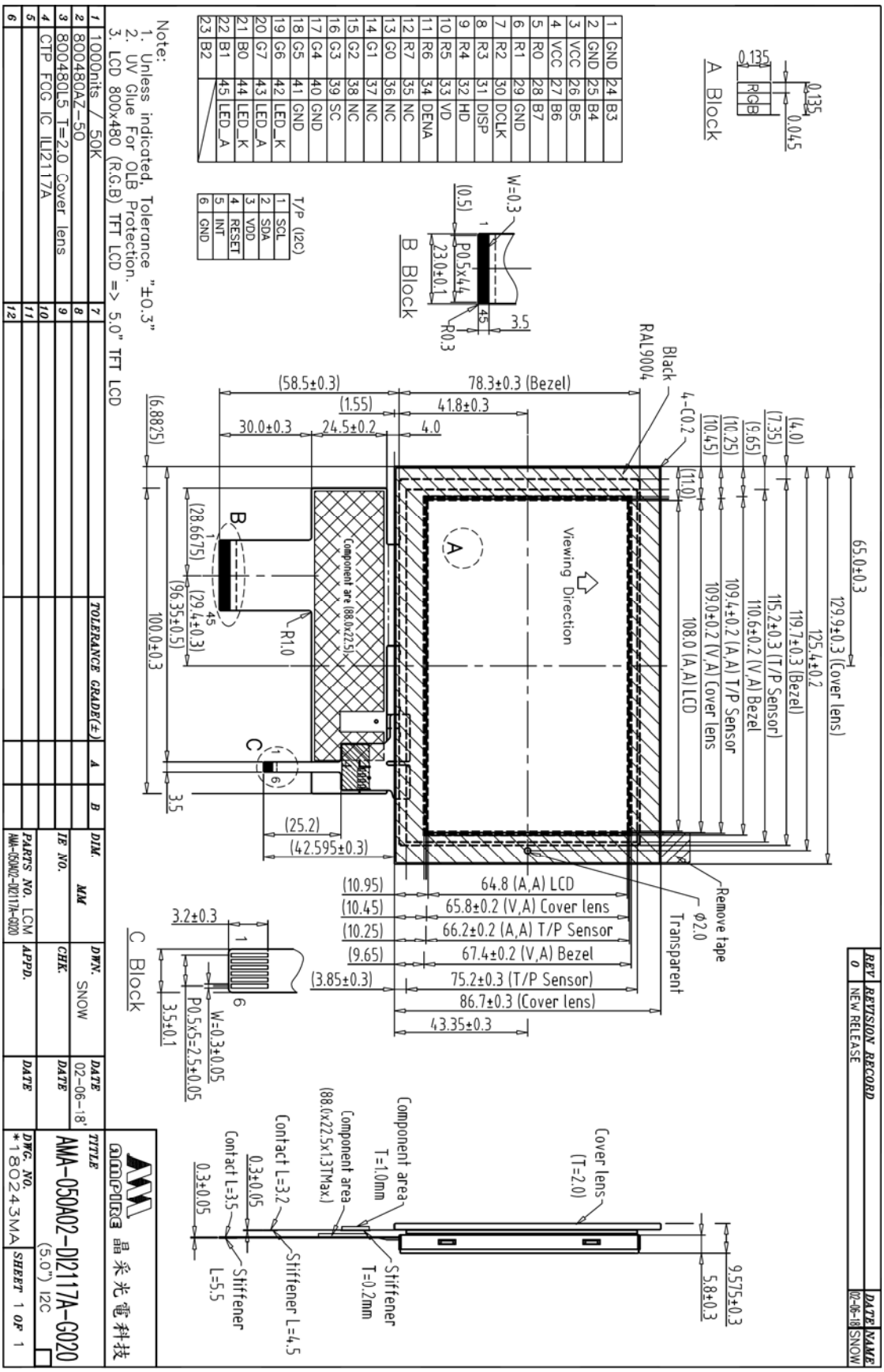


GND1, GND2 and GND3 should be connected together to have the same ground

10-7 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



REV
0
REVISION RECORD
NEW RELEASE
DATE
02-06-18
NAME
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 DCLK
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
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
Back view
Remove tape
43.35±0.3
86.7±0.3 (Cover lens)
(42.595±0.3)
(1.55)
41.8±0.3
3.5±0.1
Tape
(12.0x6.0x0.06T)
45
(92.4±0.5)
23.0±0.1
20.1±0.3
58.5±0.3
78.3±0.3 (Bezel)
129.9±0.3 (Cover lens)
119.7±0.3 (Bezel)
65.0±0.3
(4.0)
9.575±0.3
5.8±0.3
Cover lens
(T=2.0)
Component area
T=1.0mm
Component area
(88.0x22.5x1.3TMax.)
Stiffener
T=0.2mm
Stiffener L=4.5
Contact L=3.2
0.3±0.05
Stiffener
L=5.5
Contact L=3.5
0.3±0.05
1 1000nits / 50K
2 800480AZ-50
3 800480L5 T=2.0 Cover lens
4 CTP FCG IC IL2117A
TOLERANCE GRADE(±)
A
B
DIM. MM
IE NO.
PARTS NO. LCM-1 AMA-050A02-DI2117A-G020
DWN. SNOW
CHK.
APPD.
DATE 02-06-18
DATE
DATE
AMPIRE 晶采光電科技
TITLE
AMA-050A02-DI2117A-G020
(5.0") I2C
DWG. NO. *180244MA
SHEET 1 OF 1