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-480272QHZQW-10H**
Approved by	
Date	

☐ **Preliminary Specification**
☑ **Formal Specification**

AMPIRE CO., LTD.
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TEL:886-2-26967269 , FAX:886-2-26967196 or 26967270

Approved by	Checked by	Organized by
Patrick	Mark	Tank

*This specification is subject to change without notice.

RECORD OF REVISION

Revision Date	Page	Contents	Editor
2021/09/17	--	New Release	Tank

1. Introduction

4.3 inch Amorphous-TFT-LCD (Thin Film Transistor Liquid Crystal Display) module. This model is composed of a 4.3inch TFT-LCD panel, a driving circuit and LED backlight system. This TFT-LCD has a high resolution 480(R.G.B) X 272.

1.1 Features

(1) Construction: 4.3” a-Si TFT active matrix, White LED Backlight, and PCBA.
(2) Resolution (pixel): 480(R.G.B) X 272
(3) Number of the Colors : 262K colors (R , G , B 6 bit digital each)
(4) LCD type : IPS, Transmissive, Normally Black
(5) Viewing Direction: All Direction.
(6) Interface: 40 pin pitch 0.5
(7) LCD Power Supply Voltage: 3.3V single power input. Built-in power supply circuit.

2. Physical Specifications

Item	Specifications	unit
Display Resolution(dot)	480RGB (W) x 272(H)	dots
Pixel Pitch	0.198 (W) x 0.198 (H)	mm
Color Configuration	R.G.B Vertical stripe	
Overall Dimension	105.5 (W) x 67.2 (H) x 6.71(D)	mm
Brightness	500	cd/m^2
Contrast Ratio	800 : 1	
Backlight Unit	LED	
Display Color	16.7 M	colors
Display Mode	Normally Black	

3. Electrical specification

3-1 Absolute max. ratings

3-1-1 Electrical Absolute max. ratings

Item	Symbol	Condition	Min.	Max.	Unit	Remark
Power Voltage	V_{CC}	V_{SS}=0	-0.3	4.0	V	
Input Voltage	V_{IN}		-0.3	V_{CC}+0.3	V	Note(1)

Note(1) DCLK, Hsync, Vsync, DE, R0~R5, G0~G5, B0~B5

3-1-2 Environmental Absolute max. ratings

Item	Operating		Storage		Remark
	Min	Max	Min	Max	
Temperature	-30	80	-40	85	Note(2),(3),(4),(5),(6),(7)
Humidity	Note(1)		Note(1)		
Corrosive Gas	Not Acceptable		Not Acceptable		

Note(1) 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℃ < 240h, at 85℃ < 240h

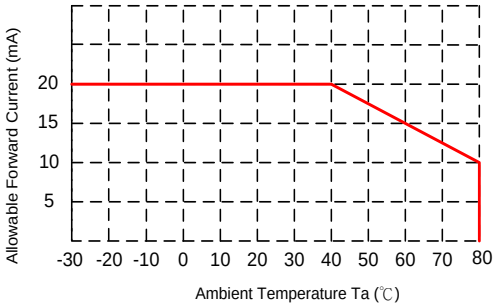
For operating condition Ta at -20℃ < 240h, at 80℃ < 240h

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) LED BL : When LCM is operated over 40℃ ambient temperature, the IAK of the LED back-light should be follow :



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

Note(8) LED BL: When LCM is operated over than 40℃, the life time of the LED back-light will be reduced.

4 Electrical Characteristics

4-1 DC Electrical characteristic of the LCD

Typical operating conditions (V_{SS}=0V)

Item		Symbol	Min.	Typ.	Max.	Unit	Remark
Power Supply for LCD		V_{CC}	3.0	3.3	3.6	V	
Power Supply for LED		V_{LED}	--	5.0	--	V	
Logic Input Voltage	H Level	V_{IH}	V_{CC}*0.7	-	V_{CC}	V	Note(1)
	L Level	V_{IL}	V_{SS}	-	V_{CC}*0.3	V	
ADJ Input Voltage	H Level	V_{IH}	3.0	-	5.0	V	Note(2)
	L Level	V_{IL}	V_{SS}		0.3	V	
Power Supply current		IDD	-	TBD	-	mA	Note(3)

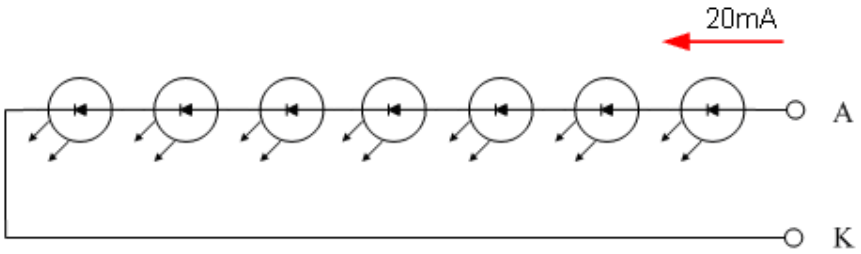
Note(1) DCLK, Hsync, Vsync, DE, R0~R5, G0~G5, B0~B5

Note(2) ADJ

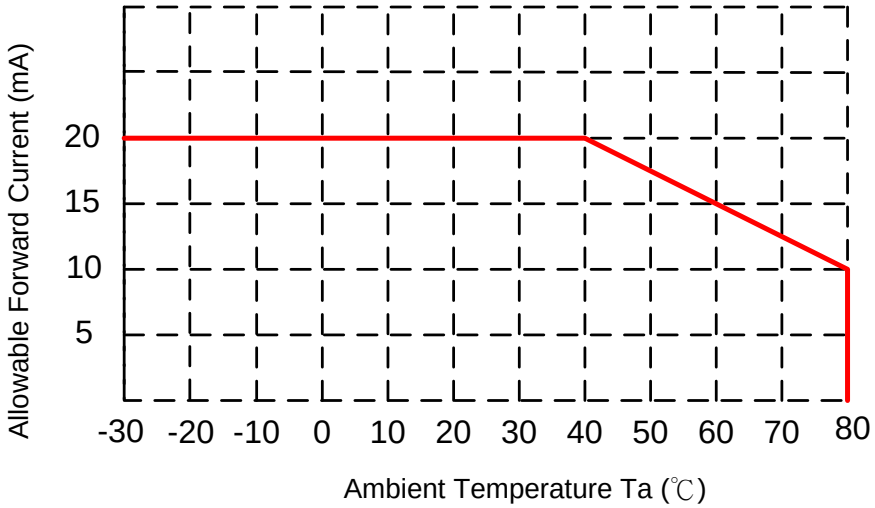
Note(3) fv =60Hz, Ta=25℃, Display pattern : All White

4-2 Electrical characteristic of LED Back-light

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conduction
LED Voltage	V_{AK}	--	22.4	25.2	V	I_{AK}=20mA, Ta=25℃
LED Life Time	--	--	30K	--		Note(1)
LED Forward Current	I_{AK}	--	20	--	mA	Ta=25℃
	I_{AK}	--	15	--	mA	Ta=60℃



Note(1) The IAK should follow:

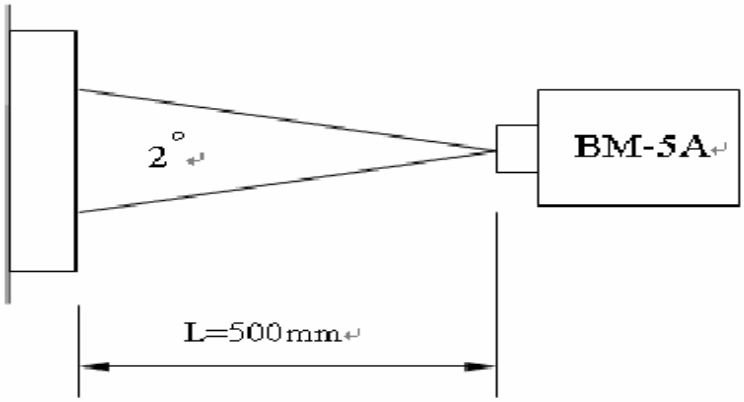


Note(2) Brightness to be decreased to 50% of the initial value. Ta=25℃

5 Optical Characteristics

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Contrast ratio		CR	Point - 5 Θ=Φ=0°	640	800	--	--	(1)(2)(3)
Luminance		Lw		**400**	**500**	-	cd/m^2	(1)(3)
Luminance Uniformity		ΔL		70	75	-	%	(1)(3)
Response Time (White – Black)		$T_r + T_f$		--	30	40	ms	(1)(3)(5)
Viewing Angle	Top Bottom Left Right		CR＞10	75	85	--	Deg.	(1)(2)(4)
Color chromaticity	Red	Rx	Point - 5 Θ=Φ=0°	-0.05	0.629	+0.05	--	(1)(3)
		Ry			0.326			
	Green	Gx			0.337			
		Gy			0.546			
	Blue	Bx			0.136			
		By			0.143			
	White	Wx			0.320			
		Wy			0.345			

Note(1) Measure conditions : 25℃±2℃ , 60±10%RH under 10Lux , in the dark room by BM-7TOPCON) ,viewing 2° , VDD=3.3V



Note(2) Definition of Contrast Ratio:

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

Note(3) Definition of Luminance:

Definition of Luminance Uniformity

Measure white luminance on the point 5 as figure9-1

Measure white luminance on the point 1 ~ 9 as figure9-1

$$\Delta L = \frac{L_{min}}{L_{max}} \times 100\%$$

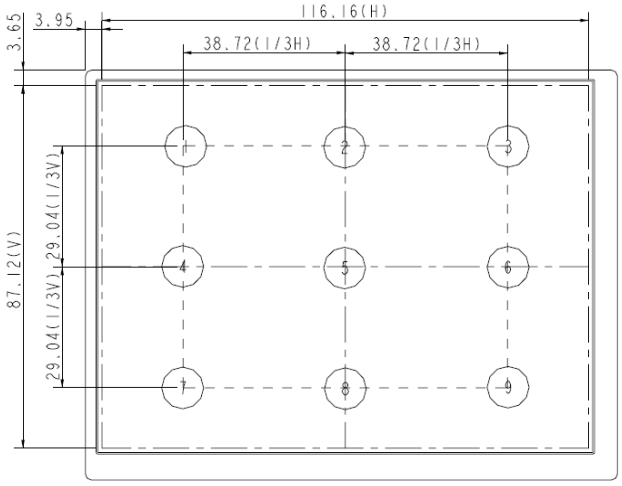


Fig9-1 Measuring point

Note(4) Definition of Viewing Angle(Θ,Φ), refer to Fig9-2 as below :

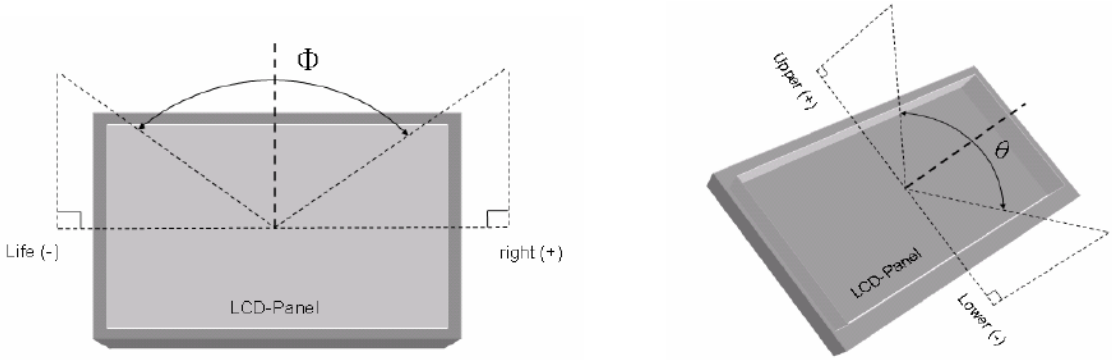


Fig9-2 Definition of Viewing Angle

Note(5) Definition of Response Time.(White – Black)

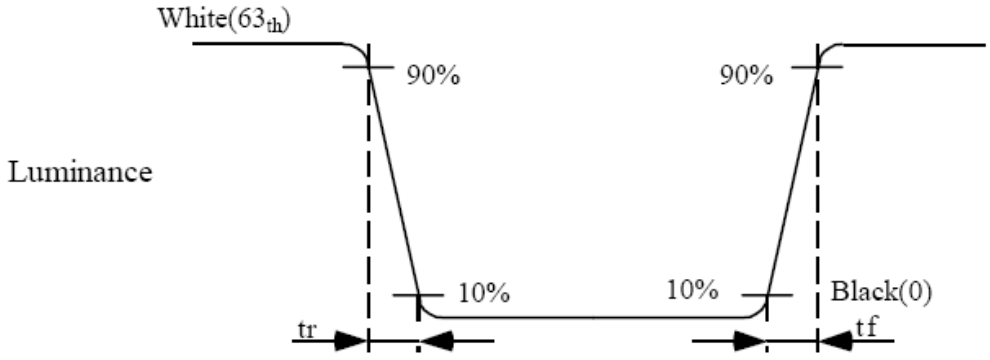


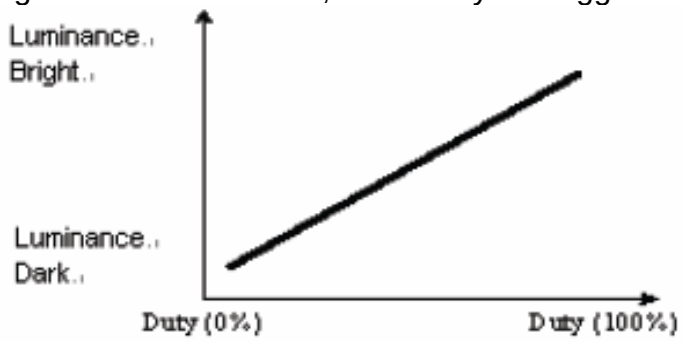
Fig9-3 Definition of Response Time(White-Black)

6. Interface

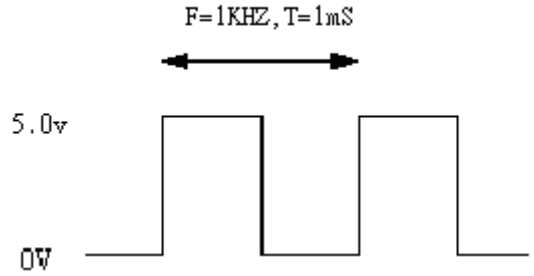
Pin No	Symbol	Function
1	U/D	Up or Down Display Control
2	(NC)	No connection
3	Hsync(NC)	Horizontal SYNC. (Sync mode used)
4	V_{LED}	Power Supply for LED 5V
5	V_{LED}	Power Supply for LED 5V
6	V_{LED}	Power Supply for LED 5V
7	Vcc	Power Supply for LCD
8	Vsync(NC)	Vertical SYNC. (Sync mode used)
9	DE	Data Enable
10	V_{SS}	Power Ground
11	V_{SS}	Power Ground
12	ADJ	Adjust for LED Brightness
13	B5	Blue Data 5 (MSB)
14	B4	Blue Data 4
15	B3	Blue Data 3
16	V_{SS}	Power Ground
17	B2	Blue Data 2
18	B1	Blue Data 1
19	B0	Blue Data 0 (LSB)
20	V_{SS}	Power Ground
21	G5	Green Data 5 (MSB)
22	G4	Green Data 4
23	G3	Green Data 3
24	V_{SS}	Power Ground
25	G2	Green Data 2
26	G1	Green Data 1
27	G0	Green Data 0 (LSB)
28	V_{SS}	Power Ground
29	R5	Red Data 5 (MSB)
30	R4	Red Data 4
31	R3	Red Data 3
32	V_{SS}	Power Ground
33	R2	Red Data 2
34	R1	Red Data 1
35	R0	Red Data 0 (LSB)
36	V_{SS}	Power Ground
37	V_{SS}	Power Ground
38	DCLK	Clock Signals
39	V_{SS}	Power Ground
40	L/R	Left or Right Display Control

NOTE:

1. ADJ adjusts brightness to control Pin, Pulse duty the bigger the brighter.



2. ADJ signal = 0 ~ 5.0V , operation frequency : 300Hz~1KHz

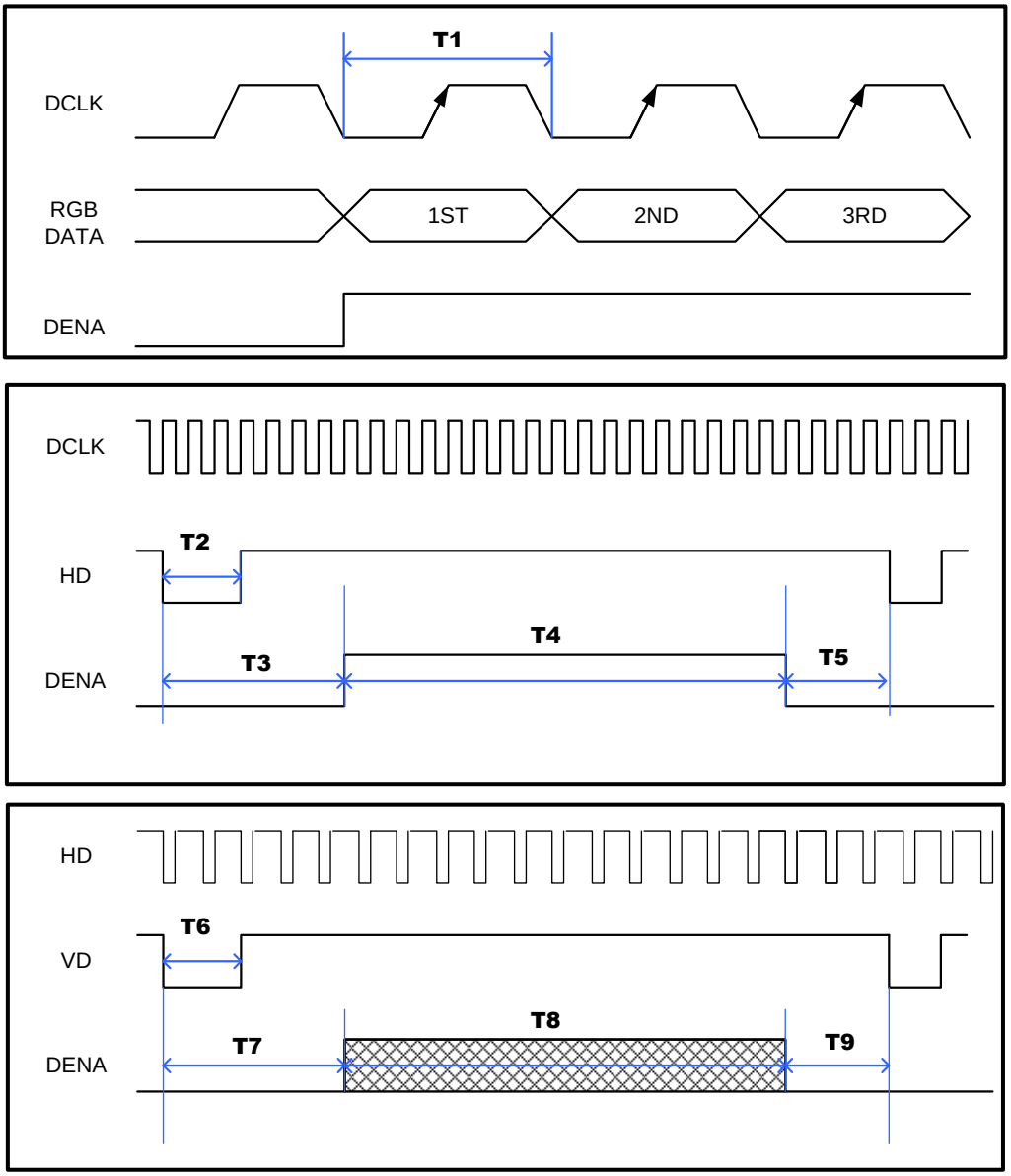


3. VSS Pin must ground contact, cannot be floating.

Note: The data is reference only

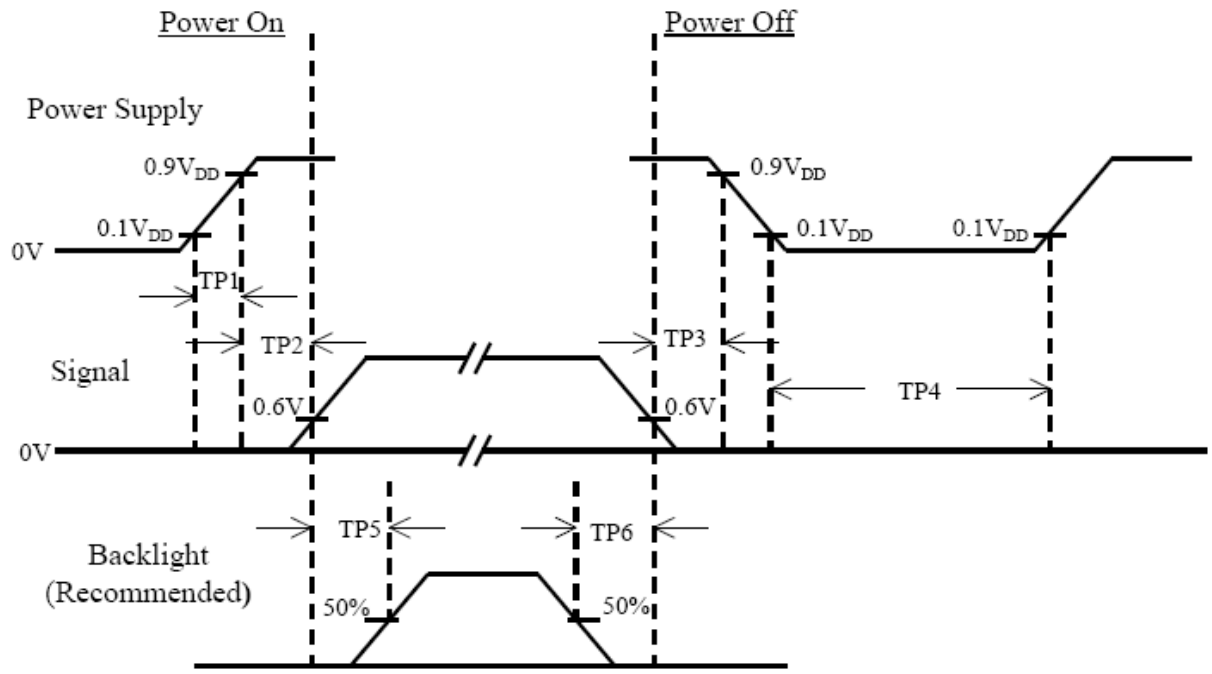
7. LCD TIMING

7-1 TTL RGB



ITEM	SYMBOL	MIN	TYP	MAX	UNIT
Clock Frequency	1/T1	8	9	12	MHz
HSYNC Pulse Wide	T2	2	4	43	clocks
HSYNC Back Porch	T3	3	43	43	Clocks
HSYNC Front Porch	T5	2	8	75	Clocks
Horizontal Display Period	T4		480		Clocks
Horizontal total Period	T3+T4+T5	485	531	598	Clocks
VSYNC Pulse Wide	T6	2	4	12	Lines
VSYNC Back Porch	T7	2	12	12	Lines
VSYNC Front Porch	T9	2	8	37	Lines
Vertical Display Period	T8		272		Lines
Vertical total Period	T7+T8+T9	276	292	321	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.

(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 VDD = 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. Displayed Color and Input Data

	Color & Gray Scale	DATA SIGNAL																	
		R5	R4	R3	R2	R1	R0	G5	G4	G3	G2	G1	G0	B5	B4	B3	B2	B1	B0
Basic Color	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(0)	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	Green(0)	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
	Blue(0)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
	Cyan	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
	Magenta	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	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
Red	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(62)	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	Red(61)	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Red(31)	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Red(1)	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(0)	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Green	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green(62)	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	Green(61)	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Green(31)	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Green(1)	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0
	Green(0)	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
Blue	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue(62)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Blue(61)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Blue(31)	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Blue(1)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0
	Blue(0)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1

9. Reliability Test Conditions

Test Item	Test Conditions	Note
High Temperature Operation	80±3°C , Dry t=240 hrs	
Low Temperature Operation	-30±3°C , Dry t=240 hrs	
High Temperature Storage	85±3°C , Dry t=240 hrs	1,2
Low Temperature Storage	-40±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) ~ 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 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 the 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.

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.

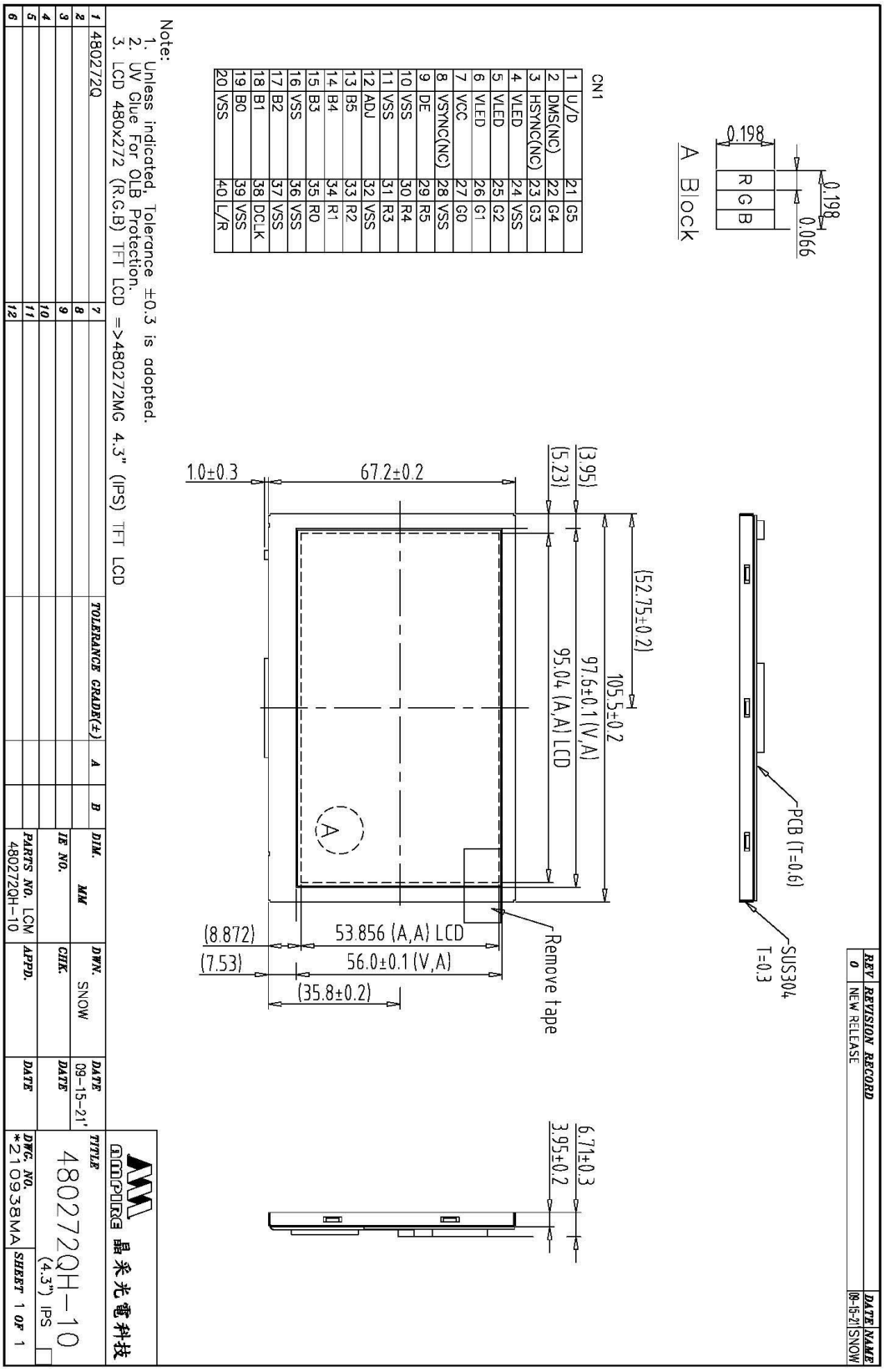
10.5 Cleaning

(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.

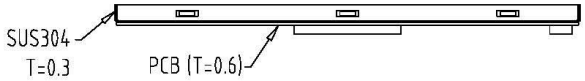
10.6 Others

(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

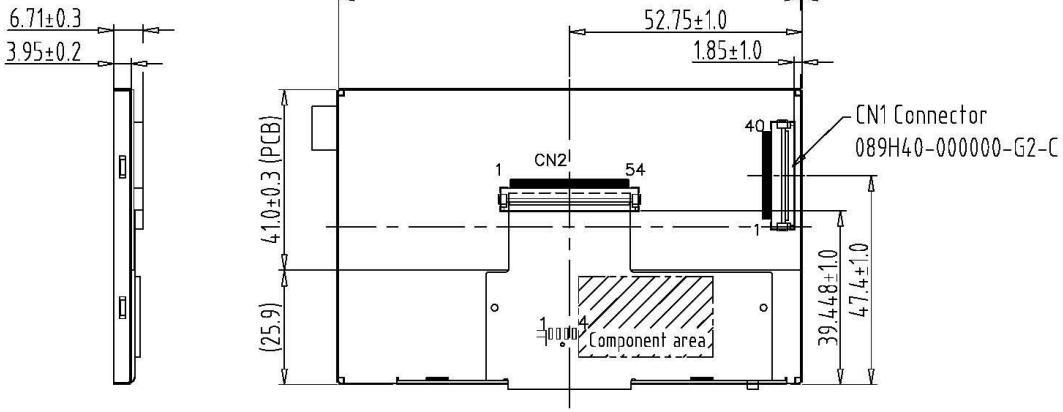


REV	REVISION RECORD	DATE	NAME
0	NEW RELEASE	09-15-21	SNOW



CN1

1	U/D	21	G5
2	DMS(NC)	22	G4
3	HSYNC(NC)	23	G3
4	VLED	24	VSS
5	VLED	25	G2
6	VLED	26	G1
7	VCC	27	G0
8	VSYNC(NC)	28	VSS
9	DE	29	R5
10	VSS	30	R4
11	VSS	31	R3
12	ADJ	32	VSS
13	B5	33	R2
14	B4	34	R1
15	B3	35	R0
16	VSS	36	VSS
17	B2	37	VSS
18	B1	38	DCLK
19	B0	39	VSS
20	VSS	40	L/R



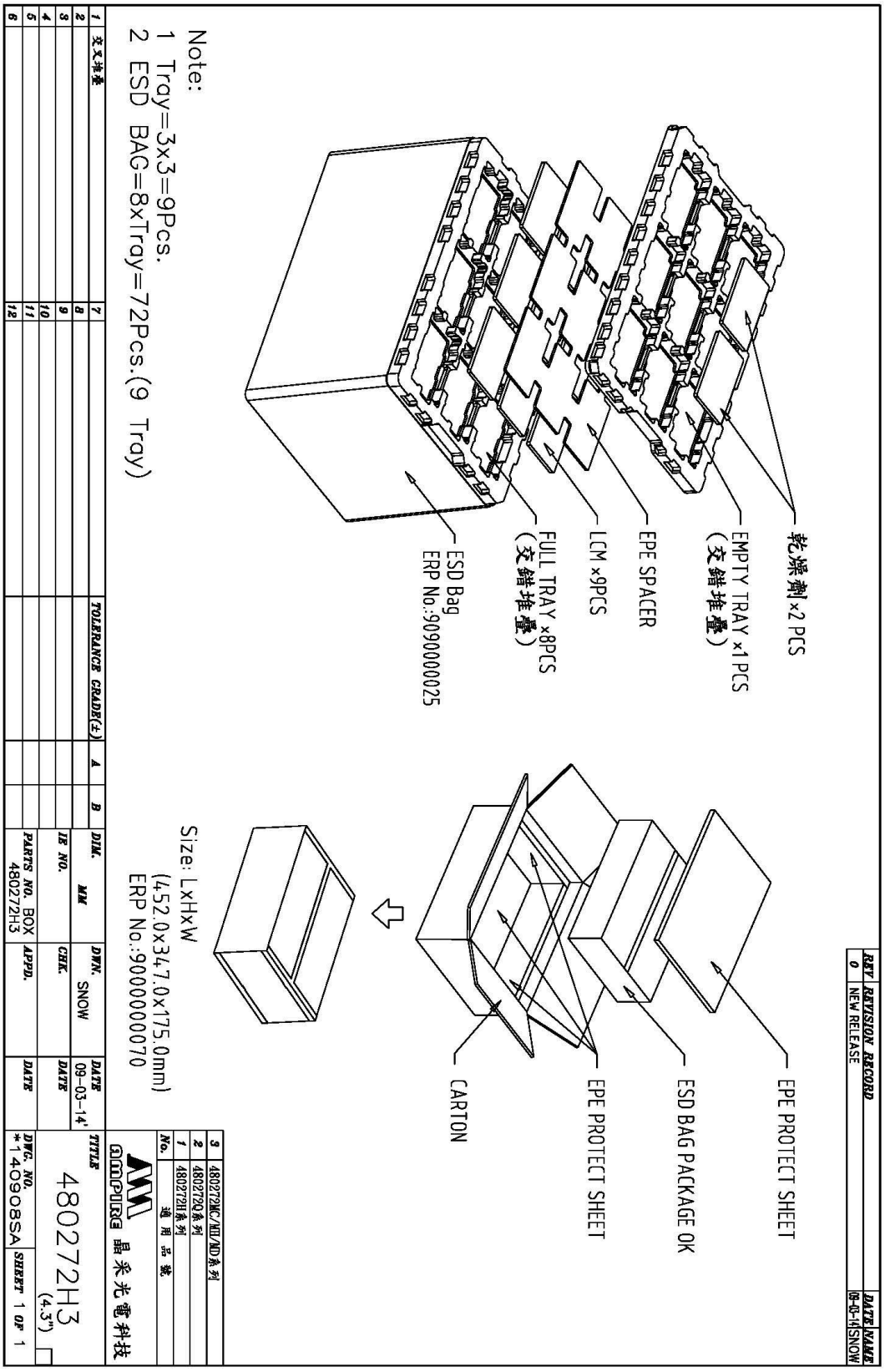
Back View

Note:
1. Unless indicated, Tolerance ±0.3 is adopted.
2. UV Glue For OLB Protection.
3. LCD 480x272 (R.G.B) TFT LCD =>480272MG 4.3" (IPS) TFT LCD

				TOLERANCE GRADE(±)	A	B	DIM. MM	DWN. SNOW	DATE 09-15-21	TITLE 480272QH-10 (4.3") IPS
1	480272Q	7								
2		8								
3		9					IE NO.	CHK.	DATE	
4		10								
5		11					PARTS NO. LCM-1 480272QH-10	APPD.	DATE	DWG. NO. *210939MA
6		12								SHEET 1 OF 1

AMPIRE 晶采光電科技

12. Package


REV. REVISION RECORD DATE NAME
0 NEW RELEASE 09-03-14 SNOW
乾燥劑×2 PCS
EMPTY TRAY ×1 PCS
(交錯堆疊)
EPE SPACER
LCM ×9PCS
FULL TRAY ×8PCS
(交錯堆疊)
ESD Bag
ERP No.:9090000025
EPE PROTECT SHEET
ESD BAG PACKAGE OK
EPE PROTECT SHEET
CARTON
Note:
1 Tray=3x3=9Pcs.
2 ESD BAG=8xTray=72Pcs.(9 Tray)
Size: LxHxW
(452.0x347.0x175.0mm)
ERP No.:9000000070
交叉堆疊
TOLERANCE GRADE(±)
DIM. MM
LB NO.
PARTS NO. BOX 480272H3
DWN. SNOW
CHK.
APPD.
DATE 09-03-14'
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DATE
3 480272MC/MD/MD系列
2 480272QQ系列
1 480272H系列
No. 通用品號
AMPIRE 晶采光電科技
TITLE 480272H3 (4.3")
DWG. NO. *1409085A
SHEET 1 OF 1