



SPECIFICATIONS FOR LCD MODULE

CUSTOMER	
CUSTOMER PART NO.	
AMPIRE PART NO.	AMA-070A10-DU2511-G010
APPROVED BY	
DATE	

☐ Preliminary Specification

☒ Formal Specification

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Approved by	Checked by	Organized by
Kokai	Simon	Tank

*This specification is subject to change without notice.

RECORD OF REVISION

Revision Date	Page	Contents	Editor
2023/06/27	--	New Release	Tank

1. General Specifications

7 inch Amorphous-TFT-LCD (Thin Film Transistor Liquid Crystal Display) module.

This module is composed of a 7" TFT-LCD panel and backlight unit.

1.1 Features

- 7 inch (16:9 diagonal) configuration
- 262K colors (R , G , B, 6bit digital each)
- RoHS
- PCBA With LED Driver
- Capacitive Touch Panel
 - Cover Lens (T=1.1mm)
 - Interface: USB

1.2 Product Summary

NO	Item	Specification	Remark
1	LCD Size	7.0 inch (Diagonal)	
2	Resolution	800 x 3 (RGB) x 480	
3	Display Mode	Normally Black.	
4	Pixel Pitch	0.1905 (W) x 0.1905(H) mm	
5	Active Area	152.4(W) x 91.44(H) mm	
6	Interface	LVDS	
7	Color Arrangement	RGB-stripe	
8	Luminance	425	cd/m ²
9	Viewing Direction	All direction	

2. Absolute Maximum Ratings

Item	Symbol	Min.	Max.	Unit	Remakes
Supply Voltage	V_{DD}	-0.3	3.6	V	-
Input Voltage of Logic	V_I	-0.3	$V_{DD}+0.3$	V	Note 1
Supply Voltage For LED Driver	V_{LED}	-0.3	7.0	V	
Operating Temperature	T_{OP}	-30	80	°C	Note 2
Storage Temperature	T_{ST}	-30	80	°C	Note 2

Note 1: The rating is defined for the signal voltages of the interface such as CLK and pixel data pairs.

Note2: The maximum rating is defined as above based on the chamber temperature, which might be different from ambient temperature after assembling the panel into the application. Moreover, some temperature-related phenomenon as below needed to be noticed:

- Background color, contrast and response time would be different in temperatures other than 25°C.
- Operating under high temperature will shorten LED lifetime.

3. Electrical Characteristics

3.1 Recommended Operating Condition

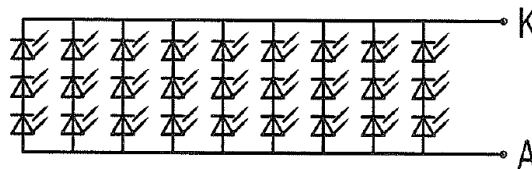
Item	Symbol	Min.	Typ.	Max.	Unit	Note
LCD Supply Voltage	V_{DD}	3.0	3.3	3.6	V	-
Logic Input Voltage	V_{IH}	$0.7V_{DD}$	-	V_{DD}		
	V_{IL}	GND	-	$0.3V_{DD}$	V	
LCD Supply Current	I_{DD}	-	T.B.D.	-	mA	(1)
Power Supply Voltage For LED Driver	V_{LED}	-	5.0	-	V	(1)
Power Supply Current For LED Driver	I_{LED}	-	360	-	mA	$V_{LED}=5V$
Differential Input High Threshold	V_{TH}	-	-	+100	mV	$V_{OC}=+1.2V$
Differential Input Low Threshold	V_{TL}	-100	-	-	mV	

Note1: $T_a=25^{\circ}C$, Display pattern : All White

3.2 Recommended Driving Condition for Backlight

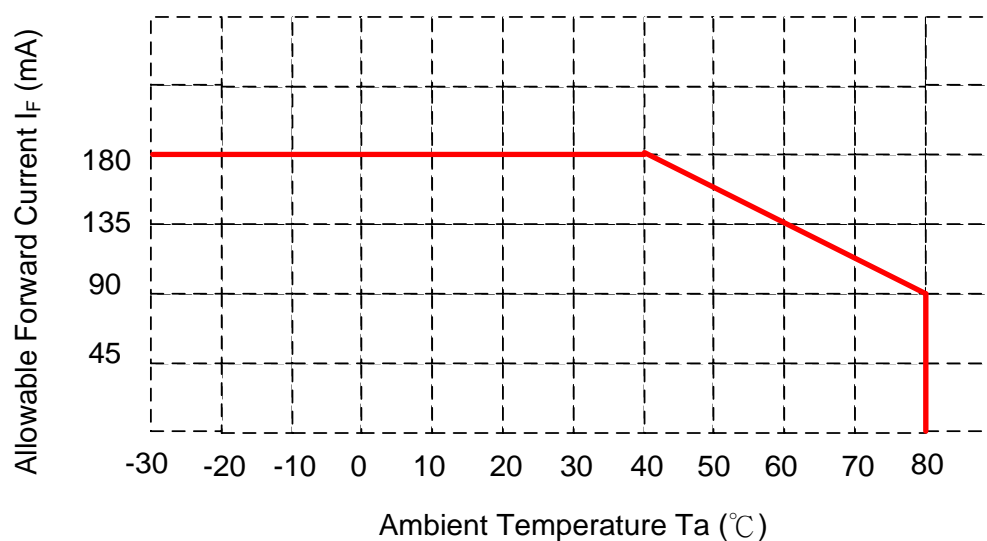
Item	Symbol	Min.	Typ.	Max.	Unit	Note
LED Driver Input Voltage	V_{LED}	--	5.0	6.0	V	
LED Driver Input Current	I_{LED}	--	360	--	mA	0% PWM duty
DIM Frequency	F_{PWM}	500		20K	Hz	
DIM Signal Logic High	V_{IH}	2.4	--	V_{LED}	V	
DIM signal logic Low	V_{IL}	0	--	0.7	V	
LED Forward Current	I_F	--	180	--	mA	$T_a=25^{\circ}\text{C}$
LED Forward Voltage	V_F	8.1	9.0	10.2	V	$I_F=180\text{mA}$, $T_a=25^{\circ}\text{C}$
LED life time			50,000	-	Hr	$I_F=180\text{mA}$, $T_a=25^{\circ}\text{C}$

Note(1) The backlight must be driven by constant current source.

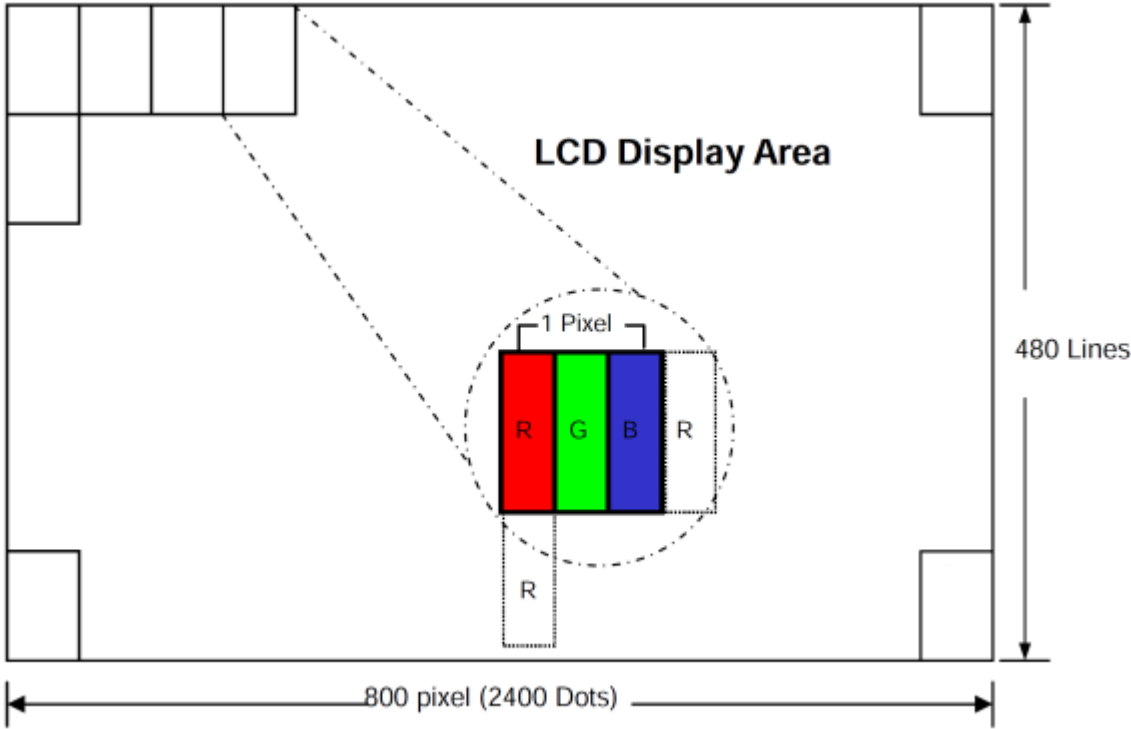


Note(2) Brightness to be decreased to 50% of the initial value. The “LED life time” is defined as the module brightness decrease to 50% original brightness at $T_a=25^{\circ}\text{C}$ and $I_F=180\text{mA}$. The LED lifetime could be decreased if operating I_F is larger than 180mA.

Note(3) When LCM is operated over 40°C ambient temperature, the I_{AK} should be follow :



3.3 Pixel format



4. Input/Output Terminals

Pin No.	Symbol	I/O	Description	Note
1	VDD	P	Power Voltage for Logic: 3.3V	
2	VDD	P	Power Voltage for Logic: 3.3V	
3	GND	P	Ground	
4	GND	P	Ground	
5	IN0-	I	- LVDS differential data input	
6	IN0+	I	+ LVDS differential data input	
7	GND	P	Ground	
8	IN1-	I	- LVDS differential data input	
9	IN1+	I	+ LVDS differential data input	
10	GND	P	Ground	
11	IN2-	I	- LVDS differential data input	
12	IN2+	I	+ LVDS differential data input	
13	GND	P	Ground	
14	CLK-	I	- LVDS differential data input	
15	CLK+	I	+ LVDS differential data input	
16	GND	P	Ground	
17	VLED	I	Power Voltage for Backlight	
18	VLED	I	Power Voltage for Backlight	
19	GND	P	Ground	
20	ADJ	P	PWM duty 0% to 100%	

5. Timing Chart

5.1 TFT-LCD Input Timing

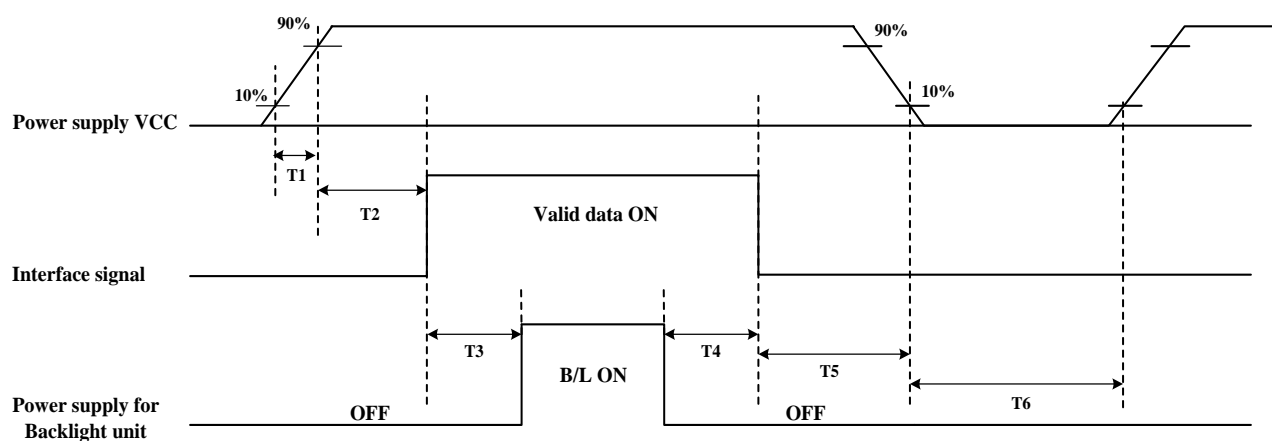
Horizontal Input Timing Table

Parameter	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
DCLK frequency	fclk	20	33.3	42.8	MHz	
Horizontal display area	thd	800			DCLK	
1 Horizontal Line	th	908	928	1178	DCLK	
HSD pulse width	thpw	1	48	87	DCLK	thb+thpw=88 DCLK is fixed.
HSD Back Porch (Blanking)	thb	87	40	1	DCLK	
HSD Front Porch	thfp	20	40	290	DCLK	

Vertical Input Timing Table

Parameter	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
Vertical display area	tv	480			H	
VSD period time	tv	517	525	606	H	
VSD pulse width	tvpw	1	1	3	H	Tvpw+tvb=32 H is fixed
VSD Back Porch (Blanking)	tvb	31	31	29	H	
VSD Front Porch	tvfp	5	13	94	H	

5.2 POWER ON/OFF SEQUENCE



Parameter	SPEC.			Unit
	Min.	Typ.	Max.	
T1	1	-	2	[ms]
T2	0	60	100	[ms]
T3	200	-	-	[ms]
T4	200	-	-	[ms]
T5	1	-	-	[ms]
T6	1000	-	-	[ms]

6. Optical Characteristics

Item		Symbol	Condition	Min	Typ.	Max	Unit	Remark
View Angles		θT	CR≥10	80	85	-	Degree	Note2
		θB		80	85	-		
		θL		80	85	-		
		θR		80	85	-		
Contrast Ratio		CR	θ=0°	800	1000	-		Note4
Response Time		T _{ON} +T _{OFF}	25℃	-	25	35	ms	Note1,Note3
Chromaticity	White	x		Typ. -0.05	0.328	Typ. +0.05		Note1,Note5
		y			0.347			
	Red	x			0.615			
		y			0.321			
	Green	x			0.310			
		y			0.563			
	Blue	x			0.136			
		y			0.098			
Uniformity		U		70	-	-	%	Note1,Note5
Luminance		L		340	425	-	cd/m ²	Note7

Test Conditions:

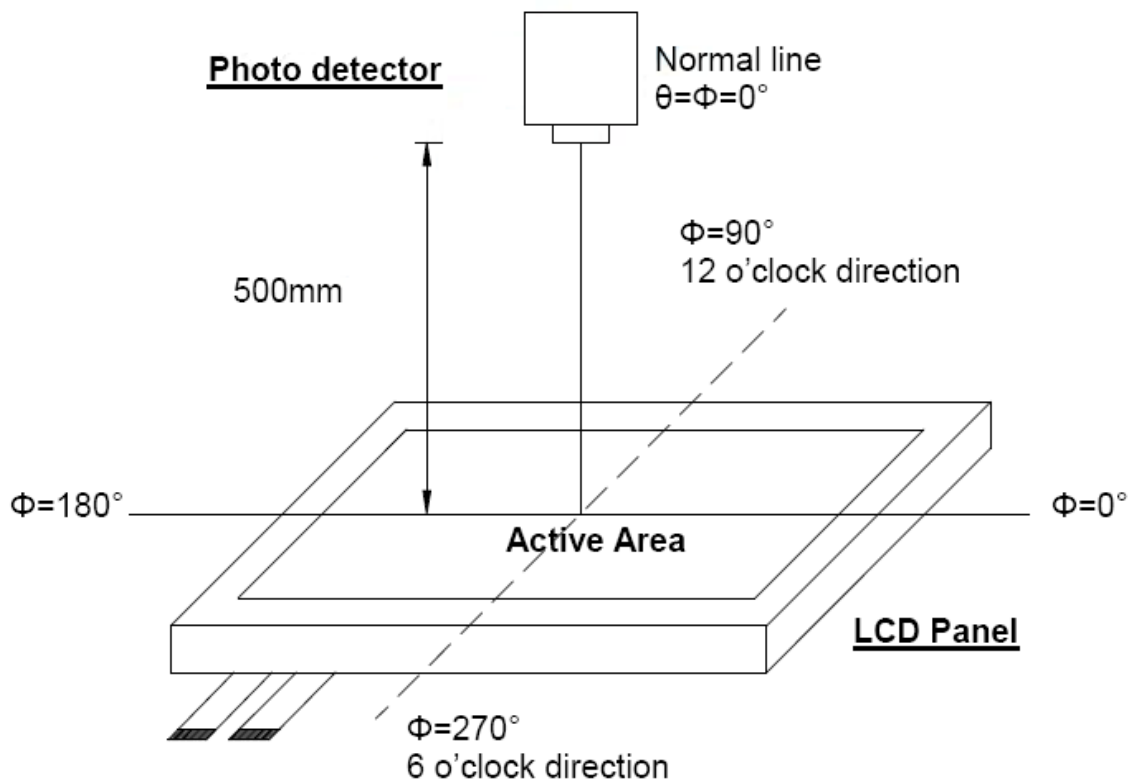
1. $I_F=180mA$, the ambient temperature is 25°C.
2. The test systems refer to Note 1 and Note2.

Note 1: Definition of optical measurement system.

The optical characteristics should be measured in dark room. After 10 Minutes operation, the optical properties are measured at the center point of the LCD screen. All input terminals LCD panel must be ground when measuring the center area of the panel.

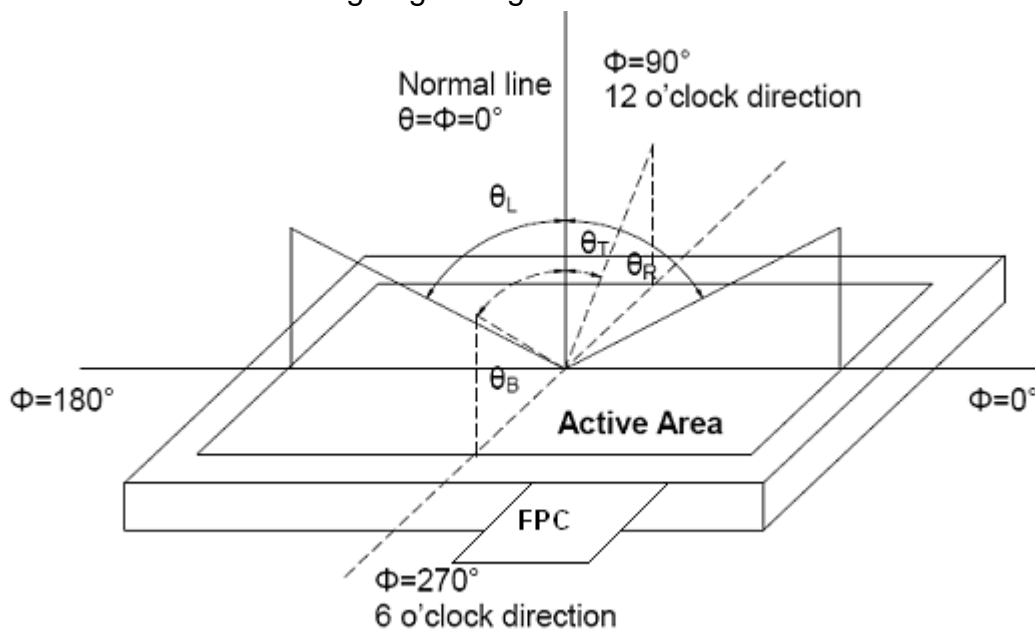
Note 1 : Definition of optical measurement system.

The optical characteristics should be measured in dark room. After 30 minutes operation, the optical properties are measured at the center point of the LCD screen. (Response time is measured by Photo detector TOPCON BM-7, other items are measured by BM-5A/Field of view : 1° / Height : 500mm.)



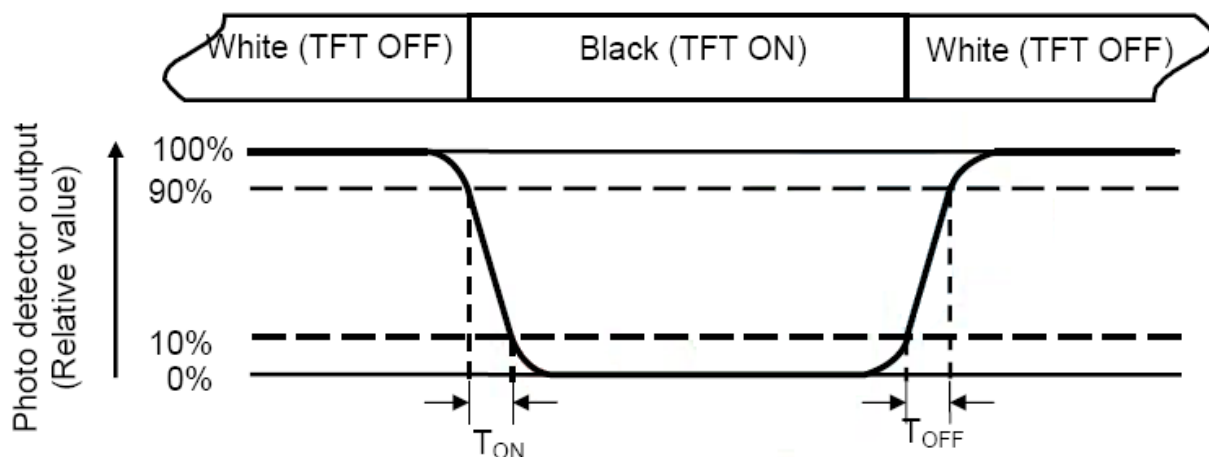
Note

Note 2 : Definition of viewing angle range



Note 3 : Definition of Response time

The response time is defined as the LCD optical switching time interval between “White” state and “Black” state. Rise time (T_{ON}) is the time between photo detector output intensity changed from 90% to 10%. And fall time (T_{OFF}) is the time between photo detector output intensity changed from 10% to 90%.



Note 4 : Definition of contrast ratio

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD on the "White" state}}{\text{Luminance measured when LCD on the "Black" state}}$$

Note 5 : Definition of color chromaticity (CIE1931)

Color coordinated measured at center point of LCD.

Note 6 : All input terminals LCD panel must be ground when measuring the center area of the panel.

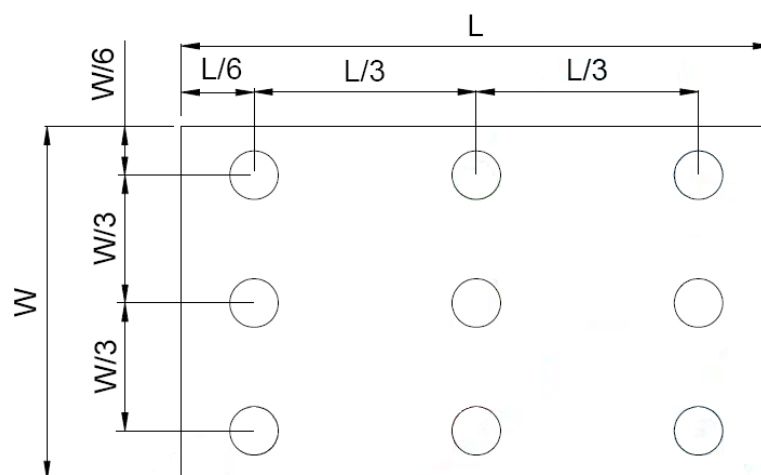
Note 7 : Definition of Luminance Uniformity

Active area is divided into 9 measuring areas (Refer to bellow figure). Every measuring point is placed at the center of each measuring area.

$$\text{Luminance Uniformity (Yu)} = \frac{B_{\min}}{B_{\max}}$$

L ----- Active area length

W ----- Active area width



B_{\max} : The measured maximum luminance of all measurement position.

B_{\min} : The measured minimum luminance of all measurement position.

7. Touch Panel Unit

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
Interface	USB
Control IC	ILI2511
Bonding method	CG to sensor: optical bonding
	TP module to LCM: tape bonding

Specify the normal operating condition (GND=0V)

Item	Symbol	Min.	Typ.	Max.	Unit
Power Supply Voltage	VDD	4.75	5.0	5.25	V
Power Consumption	I _{VDD}		T.B.D		mA

Interface

Pin No.	Symbol	Function
1	GND	POWER GND
2	D-	USB Data-
3	D+	USB Data+
4	VDD	USB power input 5V
5	NC	No connection
6	NC	No connection

8. Reliability Test Items

Test Item	Test Conditions	Note
High Temperature Operation	80±3°C , t=240 hrs	
Low Temperature Operation	-30±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	40°C, 85% RH , 240 hrs	1,2
Thermal Shock Test	-20°C (30min) ~ 70°C (30min) 50 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.

9. General Precautions

9-1 Safety

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

9-2 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.

9-3 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.

9-4 Storage

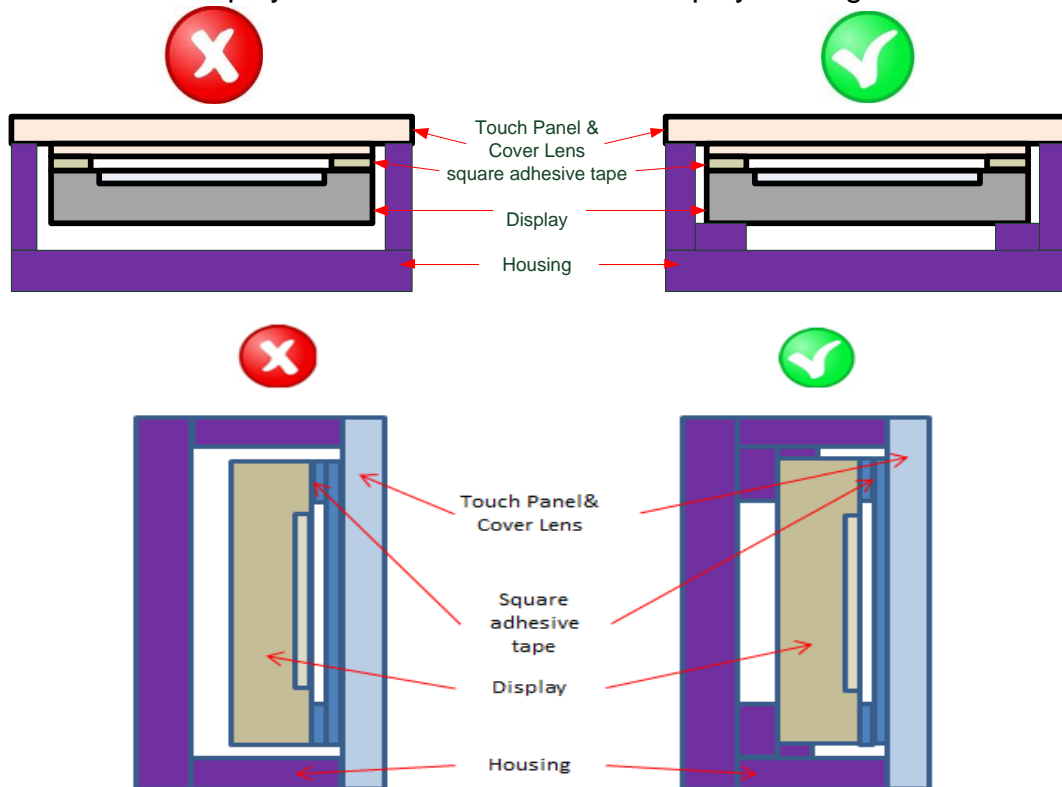
1. Store the module in a dark room where must keep at $+25\pm 10^{\circ}\text{C}$ and 65%RH or less.
2. Do not store the module in surroundings containing organic solvent or corrosive gas.
3. Store the module in an anti-electrostatic container or bag.

9-5 Cleaning

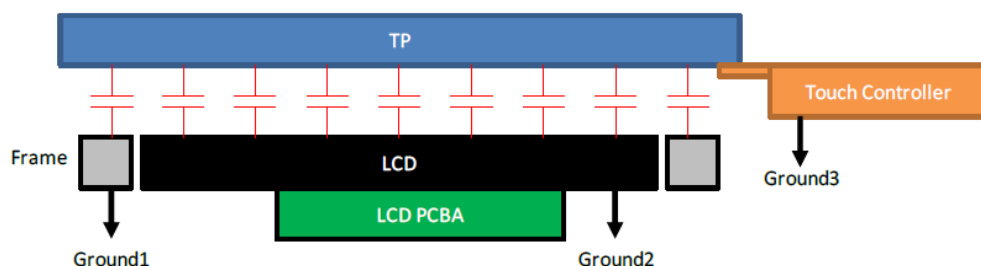
1. Do not wipe the polarizer with dry cloth. It might cause scratch.
2. Only use a soft cloth with IPA to wipe the polarizer, other chemicals might permanent damage to the polarizer.

9-6 Mechanism

- (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.

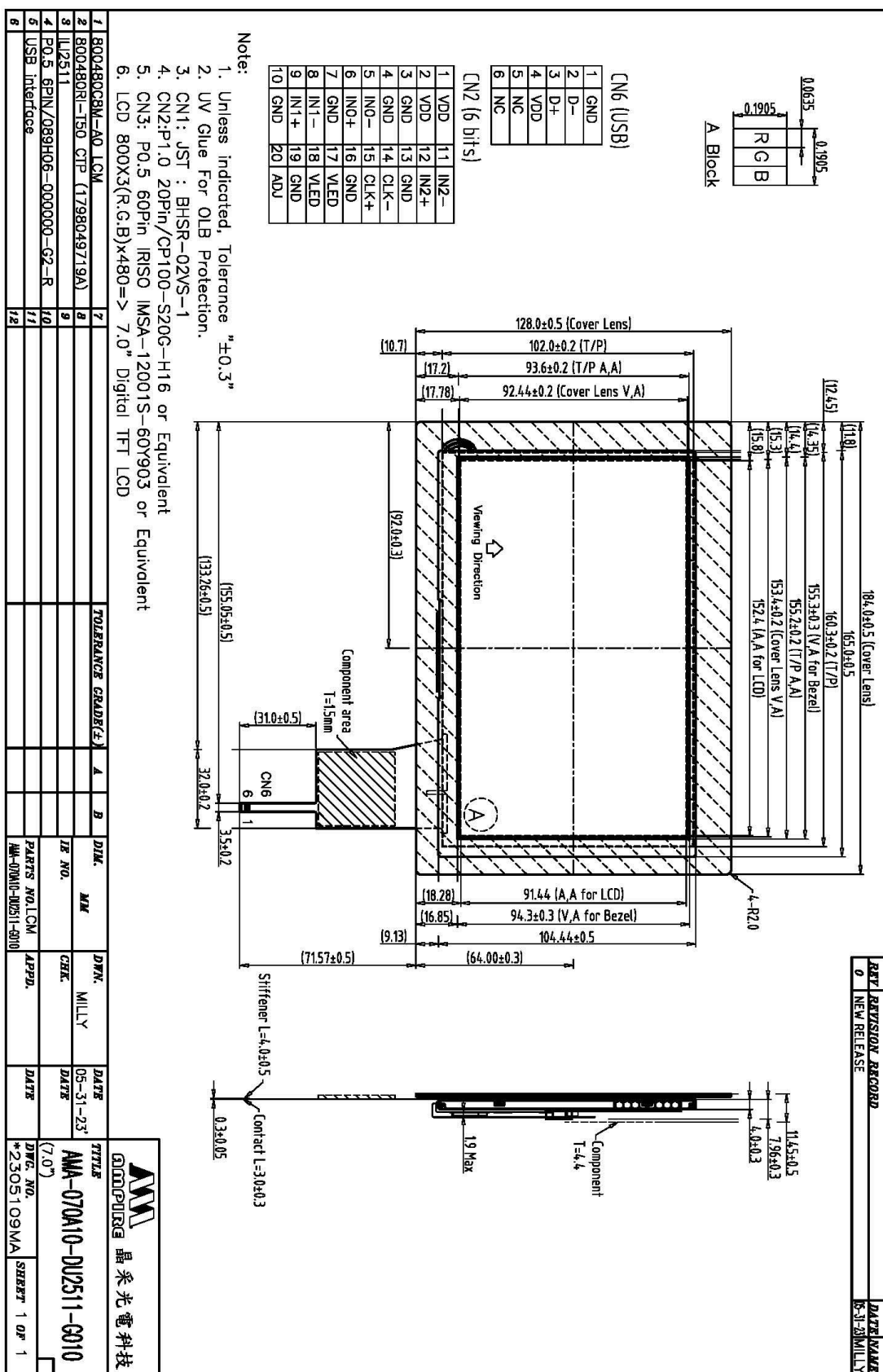


GND1, GND2 and GND3 should be connected together to have the same ground

9-7 Others

1. 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.
2. AMIPRE will provide one year warranty for all products and three months warranty for all repairing products.

10. OUTLINE DIMENSION



CN2 (6 bits)

10	GND	20	ADJ
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1. Unless indicated, Tolerance “ ± 0.3 ”

- Back View



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