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-101A11-DU2511-G020
APPROVED BY	
DATE	

☐ Preliminary Specification
☑ Formal Specification

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
Kokai	Simon	Tank

*This specification is subject to change without notice.

RECORD OF REVISION

Revision Date	Page	Contents	Editor
2022/03/11	--	New Release	Tank

1. FEATURES

This model is a color active matrix thin film transistor (TFT) liquid crystal display (LCD) that uses amorphous silicon TFT as a switching device. This model is composed of a TFT LCD panel, a driving circuit and a back light system. This TFT LCD has a 10.1 (16:10) inch diagonally measured active display area with 1920x1200 resolutions.

- 3.3 V Logic Power
- LVDS (2ch) Interface for 1920 RGB x 1200 resolution
- 16.7M color LVDS interface.
- Green Product (RoHS)
- Backlight with LED Driver Board

2. PHYSICAL SPECIFICATIONS

Items	Specifications	Unit
Screen Diagonal	10.1	Inch
Active Area	216.8 (H) x 135.50 (V)	mm
Pixel Format	1920 (H) x RGB x 1200 (V)	-
Pixel Pitch	0.03764 (W) x 0.11292 (H)	mm
Pixel Arrangement	R.G.B. Vertical Stripe	-
Display Mode	Normally Black	-
White Luminance	850 (Typ.)	cd /m2
Contrast Ratio	900: 1 (Typ.)	-
Input Voltage	3.3	V
Outline Dimensions	247.0(H) x 166.0(V) x 11.35(D)	mm
Support Color	16.7M	-

3. ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBOL	VALUES		UNIT	REMARK
		MIN	MAX		
Power Supply Voltage	VDD	-0.3	3.6	V	Ta=25℃
Power Supply for LED Driver	VLED	-0.3	12	V	Ta=25℃
Operation Temperature	T_{OP}	-20	70	℃	
Storage Temperature	T_{ST}	-30	80	℃	

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

4. ELECTRICAL CHARACTERISTICS

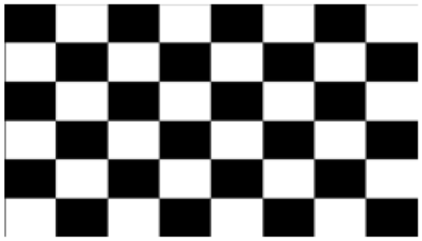
4.1 LCD driving

Item		Symbol	Min.	Typ.	Max.	Unit	Note
Power Supply Voltage		V_{DD}	3.0	3.3	3.6	V	GND=0
VDD Current	White Pattern	I_{DD}	--	300	360	mA	(1)
VDD Power Consumption	White Pattern	P_{DD}	--	1.0	1.2	W	
Rush Current		I_{rush}			3.0	A	(2)
Input Logic High Voltage		V_{IH}	2.7		3.3	V	
Input Logic Low Voltage		V_{IL}	0		0.5	V	

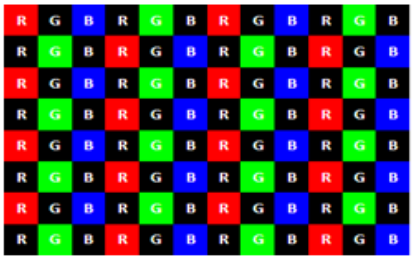
Note (1)

The supply voltage is measured and specified at the interface connector of LCM.
The current draw and power consumption specified is for VDD=3.3V, Frame rate f_V=60Hz and Clock frequency = 80MHz. Test Pattern of power supply current

a) Typ : Mosaic 8 x 6 Pattern(L0/L255)



b) Max : skip subPixel(L255)



Note (2)

The duration of rush current is about 2ms and rising time of Power Input is 1ms(min)

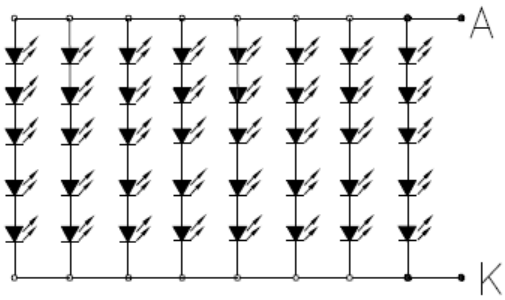
4.2 Backlight Unit

Item	Symbol	Min.	Typ.	Max.	Unit	Condition
LED Backlight Voltage	V_{AK}	14	14.3	14.5	V	Ta=25℃
LED Backlight Current	I_{AK}	-	600	--	mA	
LED Life Time		50k	--	-	Hrs	(2),(3)

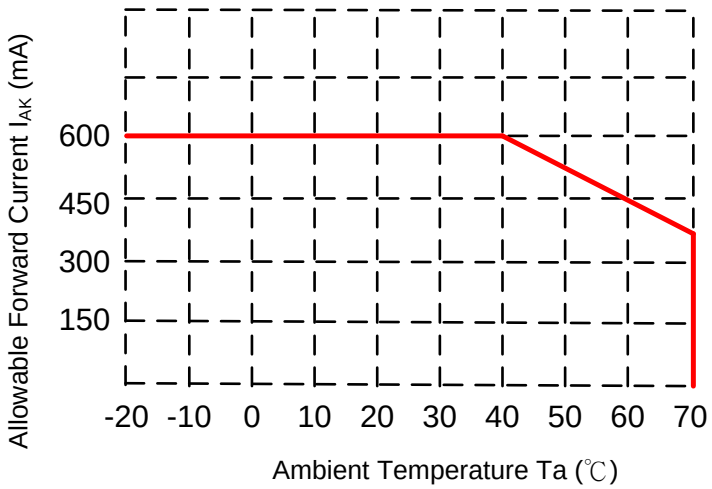
Note(1) The backlight system is an edge-lighting type with 40 LED.

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

LED CIRCUIT DIAGRAM:

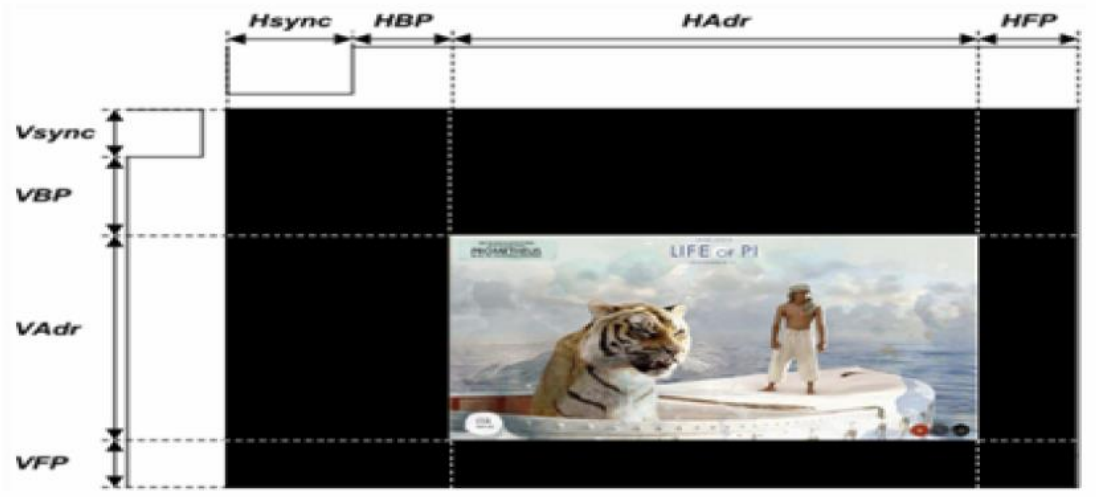


Note(3) When LCM is operated over 40℃ ambient temperature, the I_{AK} should be follow :



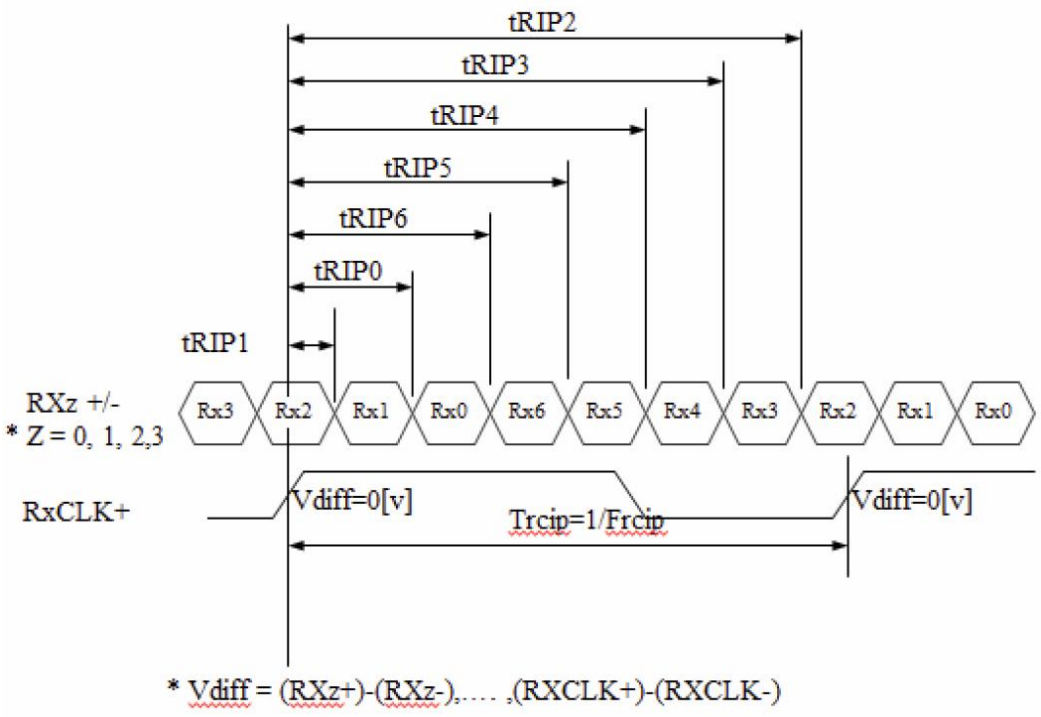
4.3 LVDS Signal Timing Diagram of Interface Signal

Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
DCLK Frequency	Fdclk	74.5	77.56	85	MHz
Horizontal display area	Thd		960		DCLK
HSYNC period time	Th	989	1040	1248	DCLK
Horizontal Blank	THB	29	80	288	DCLK
HSYNC pulse width	Thp	2	10	255	DCLK
HSYNC back porch	thbp	3	6	255	DCLK
HSYNC Front porch	thfp	24	64	260	DCLK
Vertical display area	Tvd		1200		H
VSYNC period time	Tv	1243	1243	1560	H
Vertical Blank	TVB	43	43	360	H
VSYNC Pluse width	Tvp	4	4	20	H
VSYNC back porch	Tvbp	20	20	255	H
VSYNC front porch	Tvfp	19	19	260	H
Frequency	fV	-	60	-	Hz



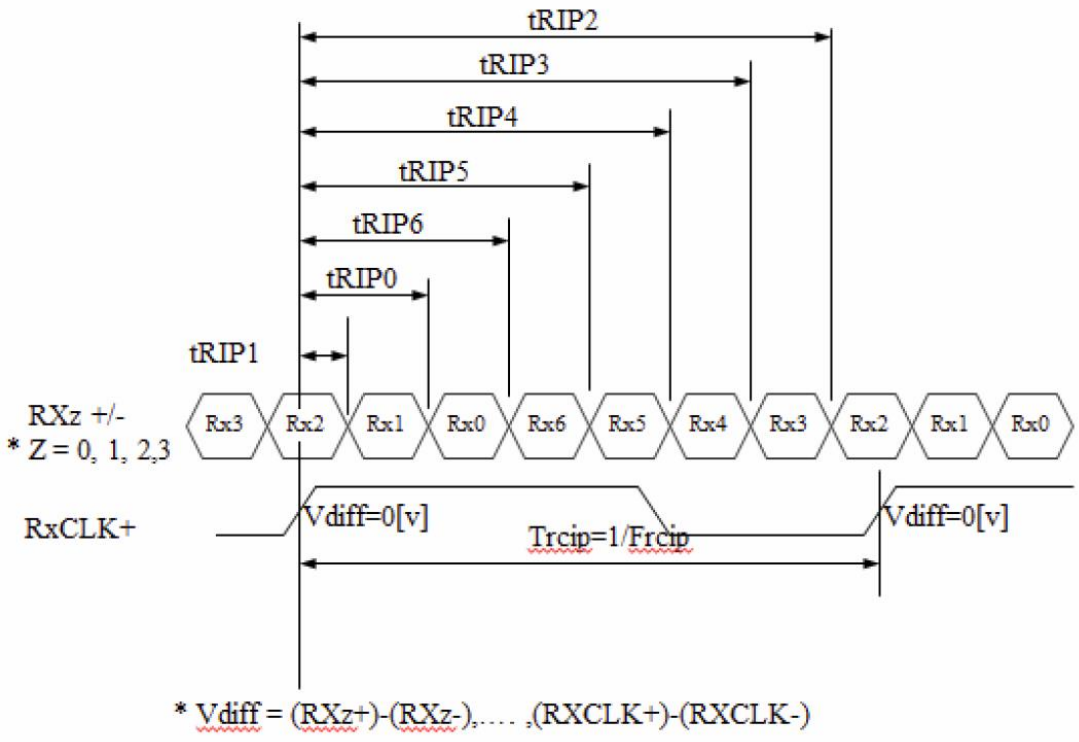
4.4 LVDS AC Timing Specification

Item	Symbol	Min	Typ	Max	Unit	Remark
CLKfrequency	Frcip	20	-	85	MHZ	
CLKIN Period	tRCIP	11.76	-	-	nsec	
Input Data 0	tRIP1	tRCIP/7×(-0.2)	0.0	tRCIP/7×0.2	nsec	
Input Data 1	tRIP0	tRCIP/7×0.8	tRCIP/7	tRCIP/7×1.2	nsec	
Input Data 2	tRIP6	tRCIP/7×1.8	tRCIP/7×2	tRCIP/7×2.2	nsec	
Input Data 3	tRIP5	tRCIP/7×2.8	tRCIP/7×3	tRCIP/7×3.2	nsec	
Input Data 4	tRIP4	tRCIP/7×3.8	tRCIP/7×4	tRCIP/7×4.2	nsec	
Input Data 5	tRIP3	tRCIP/7×4.8	tRCIP/7×5	tRCIP/7×5.2	nsec	
Input Data 6	tRIP2	tRCIP/7×5.8	tRCIP/7×6	tRCIP/7×6.2	nsec	

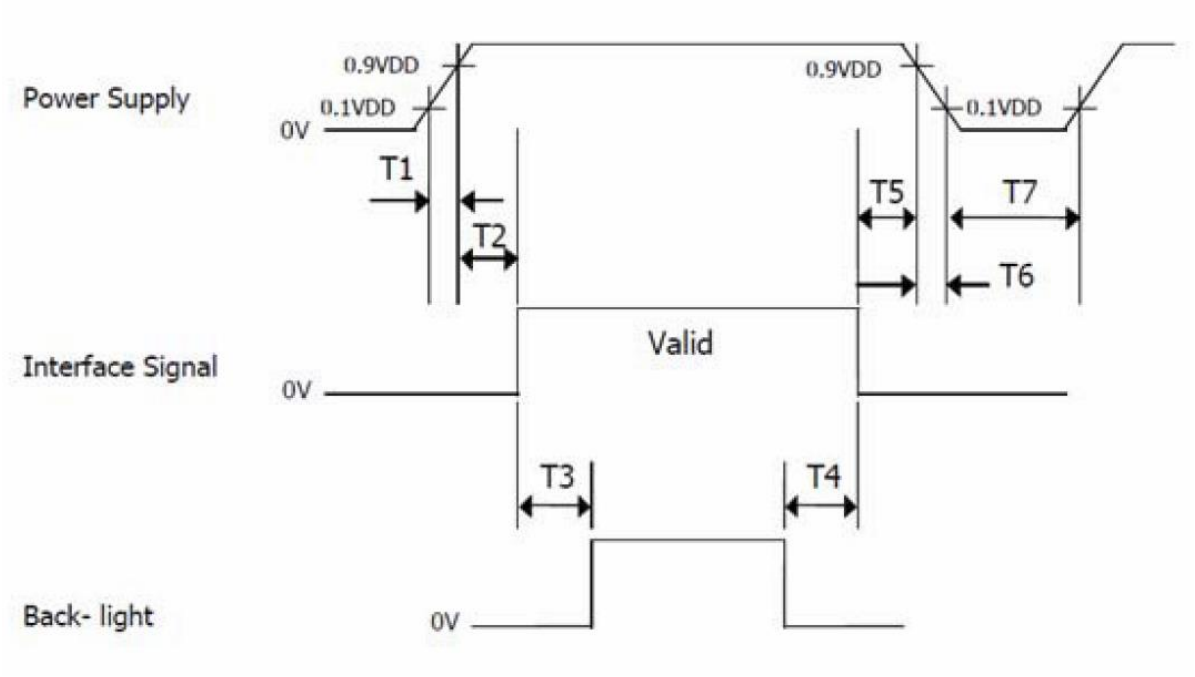


4.4 LVDS DC Timing Specification

Item	Symbol	Min	Typ	Max	Unit	Remark
CLKfrequency	Frcip	20	-	85	MHZ	
CLKIN Period	tRCIP	11.76	-	-	nsec	
Input Data 0	tRIP1	tRCIP/7×(-0.2)	0.0	tRCIP/7×0.2	nsec	
Input Data 1	tRIP0	tRCIP/7×0.8	tRCIP/7	tRCIP/7×1.2	nsec	
Input Data 2	tRIP6	tRCIP/7×1.8	tRCIP/7×2	tRCIP/7×2.2	nsec	
Input Data 3	tRIP5	tRCIP/7×2.8	tRCIP/7×3	tRCIP/7×3.2	nsec	
Input Data 4	tRIP4	tRCIP/7×3.8	tRCIP/7×4	tRCIP/7×4.2	nsec	
Input Data 5	tRIP3	tRCIP/7×4.8	tRCIP/7×5	tRCIP/7×5.2	nsec	
Input Data 6	tRIP2	tRCIP/7×5.8	tRCIP/7×6	tRCIP/7×6.2	nsec	



4.6 Power Sequence Specifications

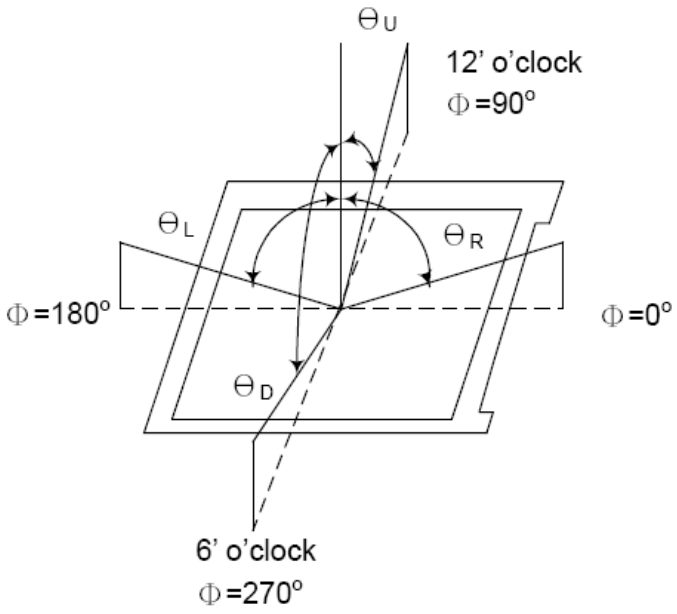


Parameter	Values			Units
	Min	Typ	Max	
T1	0	-	10	ms
T2	0	-	50	ms
T3	200	-	-	ms
T4	500	-	-	ms
T5	0	-	50	ms
T6	0	-	10	ms
T7	500	-	-	ms

5. Optical Specifications

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Response Time	TR	Ta=25℃	--	25	--	msec	Note 3
	TF		--		--		
Contrast Ratio	CR	At optimized viewing angle	700	900	-		Note 2
Viewing Angle	Top	CR≧10	80	85	-	deg.	Note1, 2
	Bottom		80	85	-		
	Left		80	85	-		
	Right		80	85	-		
Brightness	Y_L	I_{AK}=600mA Center	680	850	-	cd/m²	Note 4
Brightness Uniformity	BUNI	9 Points	75			%	Note 5
Red chromaticity	XR	Θ=0° Θ=0°	Typ. -0.05	0.644	Typ. +0.05		Note 4,5
	YR			0.344			
Green chromaticity	XG			0.315			
	YG			0.632			
Blue chromaticity	XB			0.157			
	YB			0.054			
White chromaticity	XW			0.285			
	YW			0.327			

Note 1: Definition of Viewing Angle



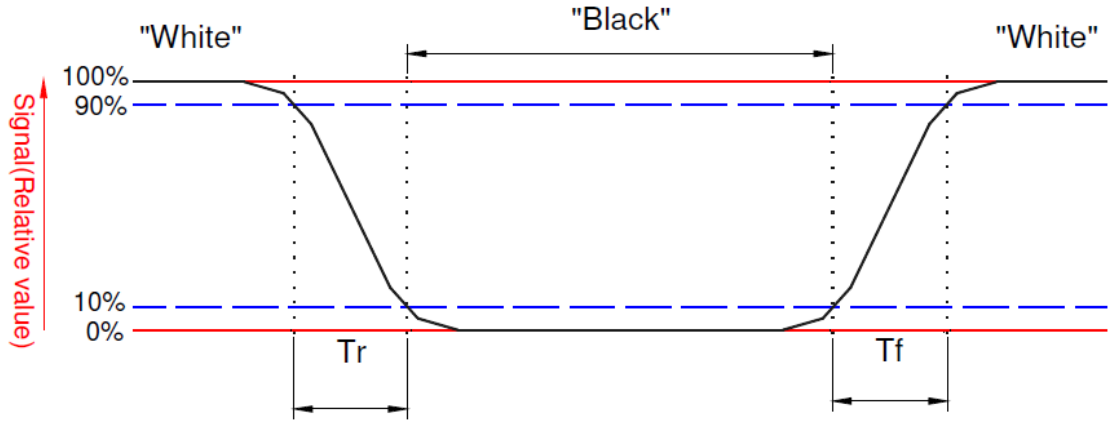
Note 2: Definition of Contrast Ratio (CR)

Measured at the center point of panel

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

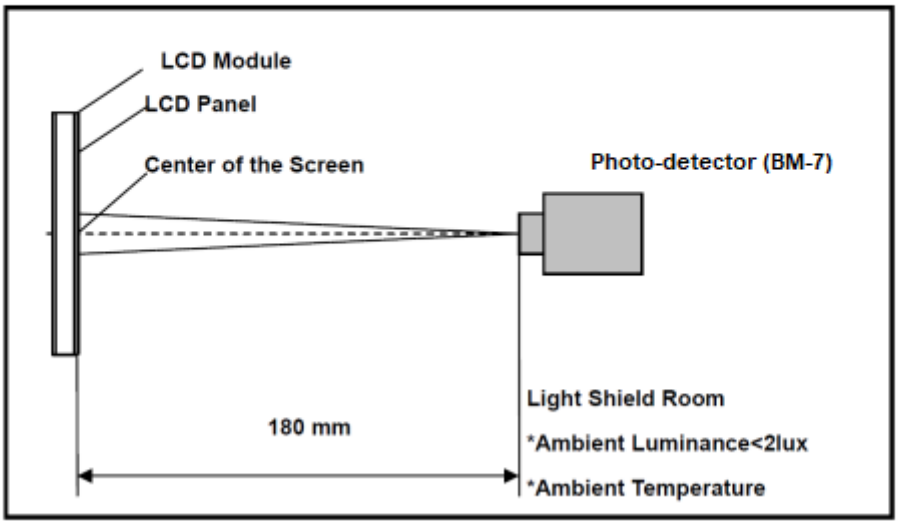
Note 3: Definition of Response Time (Tr, Tf)

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



Note 4: Measurement Setup

The LCD module should be stabilized at given temperature(25℃) for 15 minutes to Avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting backlight for 15 minutes in a windless room.

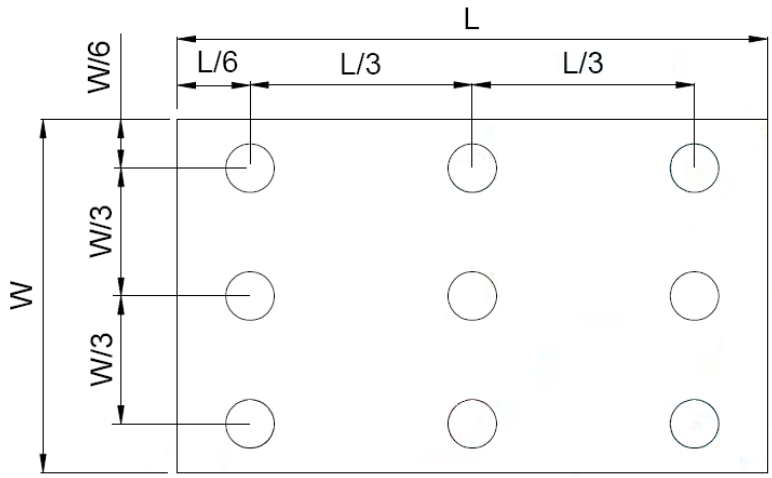


Note 5: Definition of Brightness Uniformity

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

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

L ----- Active area length W ----- Active area width



Bmax : The measured maximum luminance of all measurement position.

Bmin : The measured minimum luminance of all measurement position.

6. Interface Connections

6.1 LVDS (2ch) Interface

Pin No.	Symbol	I/O	Function	Remark
1	VDDIN	P	Power for Analog Circuit(3.3V)	
2	VDDIN	P	Power for Analog Circuit(3.3V)	
3	VDDIN	P	Power for Analog Circuit(3.3V)	
4	VDDIN	P	Power for Analog Circuit(3.3V)	
5	VDDIN	P	Power for Analog Circuit(3.3V)	
6	GND	P	Ground	
7	VDD_OTP	P	OTP Power Supply VDD_OTP:8.6V Keep it floating for normal use.	NC
8	I2C_SCL	I	OTP_SCL	NC
9	I2C_SDA	I	OTP_SDA	NC
10	GND	P	Ground	
11	OLV0N	I	- LVDS differential data input	
12	OLV0P	I	+ LVDS differential data input	
13	GND	P	Ground	
14	OLV1N	I	- LVDS differential data input	
15	OLV1P	I	+ LVDS differential data input	
16	GND	P	Ground	
17	OLVCLKN	I	- LVDS differential clock input	
18	OLVCLKP	I	+ LVDS differential clock input	
19	GND	P	Ground	
20	OLV2N	I	- LVDS differential data input	
21	OLV2P	I	+ LVDS differential data input	
22	GND	P	Ground	
23	OLV3N	I	- LVDS differential data input	
24	OLV3P	I	+ LVDS differential data input	
25	GND	P	Ground	
26	ELV0N	I	- LVDS differential data input	
27	ELV0P	I	+ LVDS differential data input	

28	GND	P	Ground	
29	ELV1N	I	- LVDS differential data input	
30	ELV1P	I	+ LVDS differential data input	
31	GND	P	Ground	
32	ELVCLKN	I	- LVDS differential clock input	
33	ELVCLKP	I	+ LVDS differential clock input	
34	GND	P	Ground	
35	ELV2N	I	- LVDS differential data input	
36	ELV2P	I	+ LVDS differential data input	
37	GND	P	Ground	
38	ELV3N	I	- LVDS differential data input	
39	ELV3P	I	+ LVDS differential data input	
40	GND	P	Ground	
41	NC	--	Not connected	
42	NC	--	Not connected	
43	NC	--	Not connected	
44	NC	--	Not connected	
45	NC	--	Not connected	

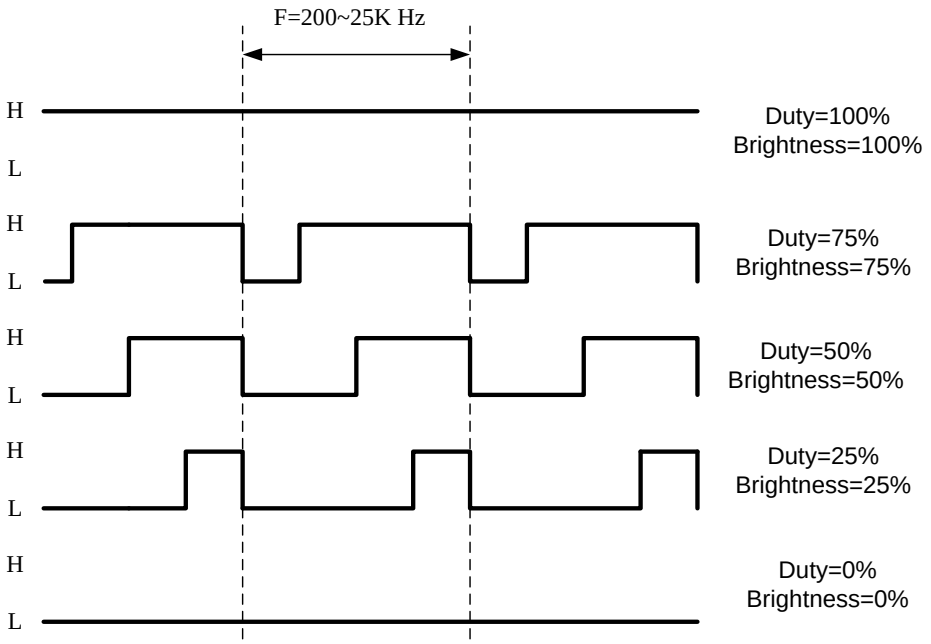
Matting Connector: FH34SRJ-45S-0.5SH(45) or equivalent.

6.2 LED Driver Board

Item	Symbol	Min.	Typ.	Max.	Unit	Condition
LED Driver Power Voltage	V_{LED}	--	12	--	V	Ta=25℃
LED Driver Current Consumption	I_{LED}		700		mA	Duty = 100%
Enable Input Voltage	V_{EN}_H	2.4	3.3	5	V	Ta=25℃
	V_{EN}_L	0	--	0.5	V	
PWM Input Voltage	V_{PWM}_H	2.5	3.3	5	V	
	V_{PWM}_L	0	--	0.3	V	
PWM Input Freq.	F_{PWM}	200		25K	Hz	

6.2.1 Interface

Pin No.	Symbol	I/O	Function
1	VIN	P	LED Power Supply
2	LED_EN	I	LED Enable Pin：High→Enable
3	GND	P	Ground
4	PWM	I	PWM Signal for LED Dimming Control



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
Conductive susceptibility IEC/EN61000-4-6	10Vrms
Radiated Susceptibility IEC/EN61000-4-3	30V/m
Cover Glass	2mm chemically strength glass with black border
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	Note
Power Supply Voltage	VIN	4.75	5.0	5.25	V	
Power Consumption	IVIN		T.B.D		mA	

Interface

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

8. Reliability Test

The reliability test items and its conditions are shown below.

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 axes Duration : 30 min/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 PRECAUTION

9.1 Use Restriction

This product is not authorized for use in life supporting systems, aircraft navigation control systems, military systems and any other application where performance failure could be life-threatening or otherwise catastrophic.

9.2 Disassembling or Modification

Do not disassemble or modify the module. It may damage sensitive parts inside LCD module, and may cause scratches or dust on the display. AMPIRE does not warrant the module, if customers disassemble or modify the module.

9.3 Breakage of LCD Panel

(1) If LCD panel is broken and liquid crystal spills out, do not ingest or inhale liquid crystal, and do not contact liquid crystal with skin.
(2) If liquid crystal contacts mouth or eyes, rinse out with water immediately.
(3) If liquid crystal contacts skin or cloths, wash it off immediately with alcohol and rinse thoroughly with water.
(4) Handle carefully with chips of glass that may cause injury, when the glass is broken.

9.4 Electric Shock

(1) Disconnect power supply before handling LCD module.
(2) Do not pull or fold the LED cable.
(3) Do not touch the parts inside LCD modules and the fluorescent LED's connector or cables in order to prevent electric shock.

9.5 Absolute Maximum Ratings and Power Protection Circuit

(1) Do not exceed the absolute maximum rating values, such as the supply voltage variation, input voltage variation, variation in parts' parameters, environmental temperature, etc., otherwise LCD module may be damaged.
(2) Please do not leave LCD module in the environment of high humidity and high temperature for a long time.
(3) It's recommended to employ protection circuit for power supply.

9.6 Operation

(1) Do not touch, push or rub the polarizer with anything harder than HB pencil lead.

(2) Use fingerstalls of soft gloves in order to keep clean display quality, when persons handle the LCD module for incoming inspection or assembly.

(3) When the surface is dusty, please wipe gently with absorbent cotton or other soft material.

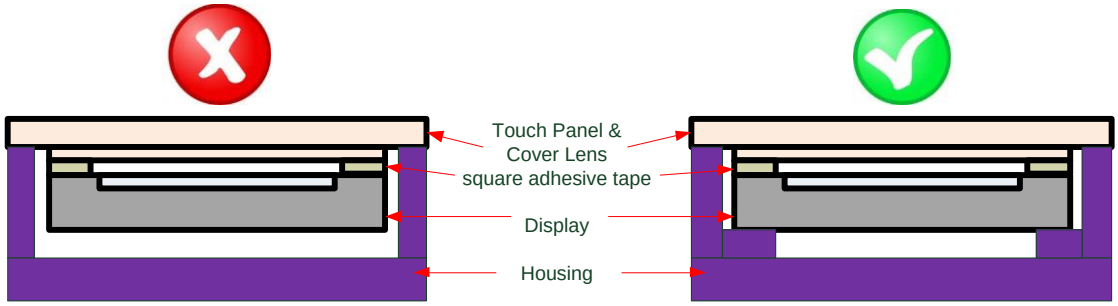
(4) Wipe off saliva or water drops as soon as possible. If saliva or water drops contact with polarizer for a long time, they may cause deformation or color fading.

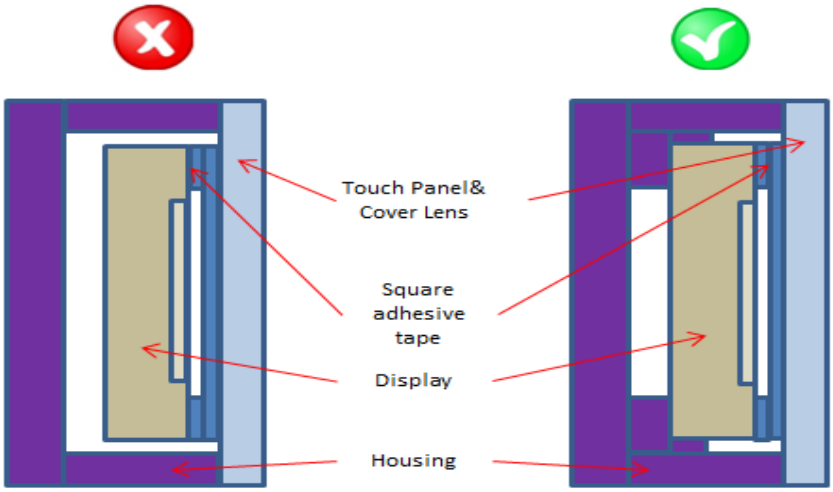
(5) When cleaning the adhesives, please use absorbent cotton wetted with a little petroleum benzene or other adequate solvent.

9.7 Mechanism (if the LCM using air bonding)

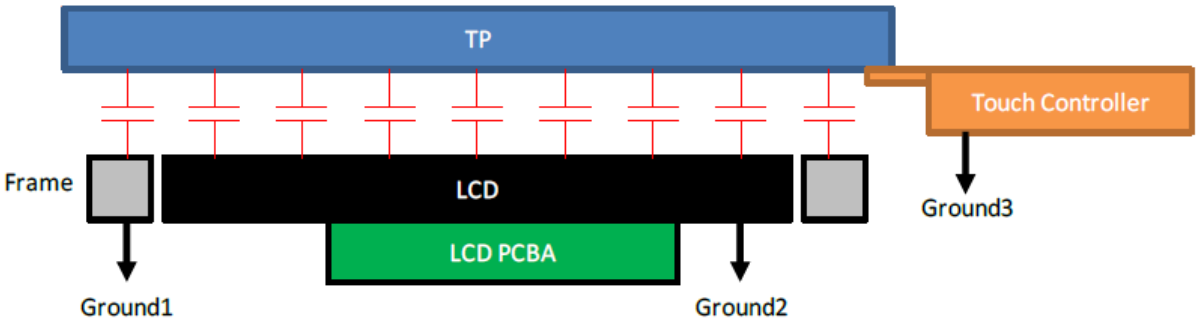
(1) Please mount LCD module by using mounting holes arranged in four corners tightly.

(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

9.8 Static Electricity

(1) Protection film must remove very slowly from the surface of LCD module to prevent from electrostatic occurrence.

(2) Because LCD modules use CMOS-IC on circuit board and TFT-LCD panel, it is very weak to electrostatic discharge. Please be careful with electrostatic discharge. Persons who handle the module should be grounded through adequate methods.

9.9 Strong Light Exposure

The module shall not be exposed under strong light such as direct sunlight. Otherwise, display characteristics may be changed.

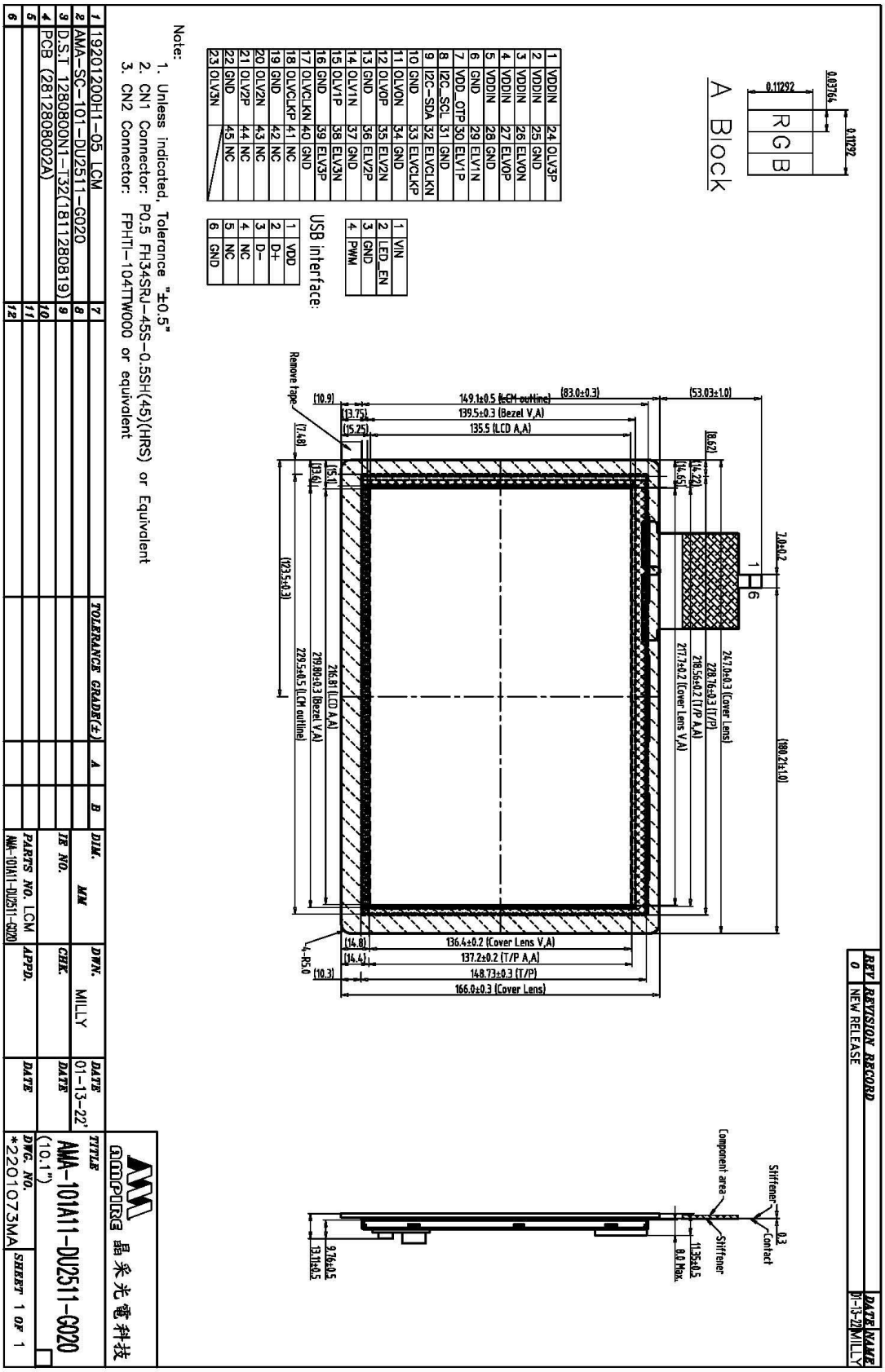
9.10 Disposal

When disposing LCD module, obey the local environmental regulations.

9.11 Others

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



REV	REVISION RECORD	DATE	NAME
0	NEW RELEASE	01-13-22	MILLY

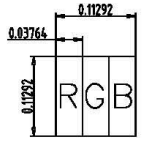
1	1920120OH1-05 LCM	7		TOLERANCE GRADE(±)	A	B	DIM.	DWN.	DATE	AMPIRE 晶采光電科技	
2	AMA-SG-101-DU2511-G020	8					MM	MILLY	01-13-22'	TITLE	
3	D.S.T 1280800N1-T32(1811280819)	9					IE NO.	CHK.	DATE	AMA-101A11-DU2511-G020 (10.1")	
4	PCB (2812808002A)	10									
5		11					PARTS NO. LCM	APPD.	DATE	DWG. NO.	SHEET 1 OF 1
6		12					AMA-101A11-DU2511-G020			*2201073MA	

1	VDDIN	24	OLV3P
2	VDDIN	25	GND
3	VDDIN	26	ELVON
4	VDDIN	27	ELVOP
5	VDDIN	28	GND
6	GND	29	ELV1N
7	VDD_OTP	30	ELV1P
8	I2C_SCL	31	GND
9	I2C_SDA	32	ELVCLKN
10	GND	33	ELVCLKP
11	OLVON	34	GND
12	OLVOP	35	ELV2N
13	GND	36	ELV2P
14	OLV1N	37	GND
15	OLV1P	38	ELV3N
16	GND	39	ELV3P
17	OLVCLKN	40	GND
18	OLVCLKP	41	NC
19	GND	42	NC
20	OLV2N	43	NC
21	OLV2P	44	NC
22	GND	45	NC
23	OLV3N		

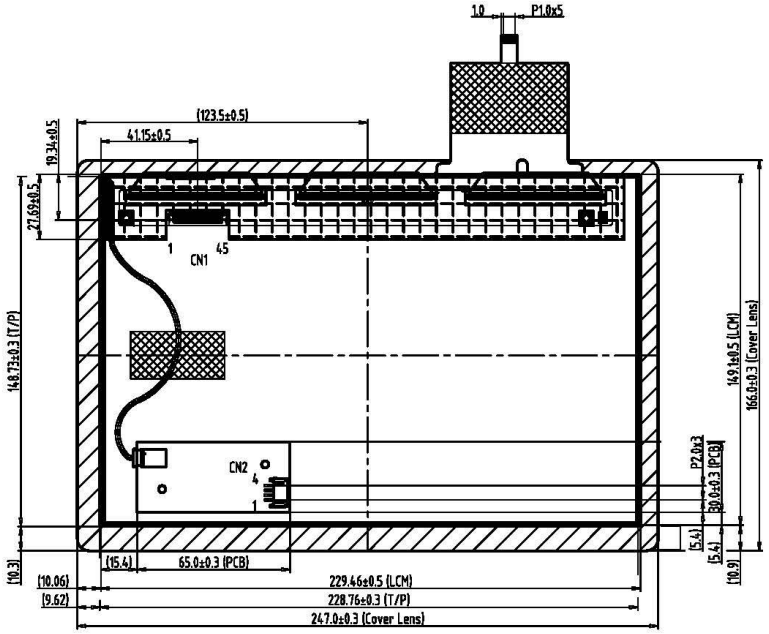
1	VIN
2	LED_EN
3	GND
4	PWM

1	VDD
2	D+
3	D-
4	NC
5	NC
6	GND

REV	REVISION RECORD	DATE	NAME
0	NEW RELEASE	01-13-22	MILLY



A Block



Back view

1	VDDIN	24	OLV3P
2	VDDIN	25	GND
3	VDDIN	26	ELVON
4	VDDIN	27	ELVOP
5	VDDIN	28	GND
6	GND	29	ELV1N
7	VDD_OTP	30	ELV1P
8	I2C_SCL	31	GND
9	I2C-SDA	32	ELVCLKN
10	GND	33	ELVCLKP
11	OLV0N	34	GND
12	OLV0P	35	ELV2N
13	GND	36	ELV2P
14	OLV1N	37	GND
15	OLV1P	38	ELV3N
16	GND	39	ELV3P
17	OLVCLKN	40	GND
18	OLVCLKP	41	NC
19	GND	42	NC
20	OLV2N	43	NC
21	OLV2P	44	NC
22	GND	45	NC
23	OLV3N		

1	VIN
2	LED_EN
3	GND
4	PWM

USB interface:

1	VDD
2	D+
3	D-
4	NC
5	NC
6	GND

Note:
1. Unless indicated, Tolerance "±0.5"
2. CN1 Connector: P0.5 FH34SRJ-45S-0.5SH(45)(HRS) or Equivalent
3. CN2 Connector: FPHTI-104TTW000 or equivalent

1	19201200H1-05 LCM	7		TOLERANCE GRADE(±)	A	B	DIM. MM	DWN. MILLY	DATE 01-13-22'	TITLE AMA-101A11-DU2511-G020 (10.1")	
2	AMA-SC-101-DU2511-G020	8					IE NO.	CHK.	DATE		
3	D.S.T 1280800N1-T32(1811280819)	9					PARTS NO. LCM-1 AMA-101A11-DU2511-G020	APPD.	DATE	DWG. NO. *2201074MA	SHEET 1 OF 1
4	PCB (2812808002A)	10									
5		11									
6		12									

AMPIRE 晶采光電科技