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-1920720BDTZQW-TH5H
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
Patrick	Mark	Tank

*This specification is subject to change without notice.

RECORD OF REVISION

Revision Date	Page	Contents	Editor
2022/07/29	--	New Release	Tank

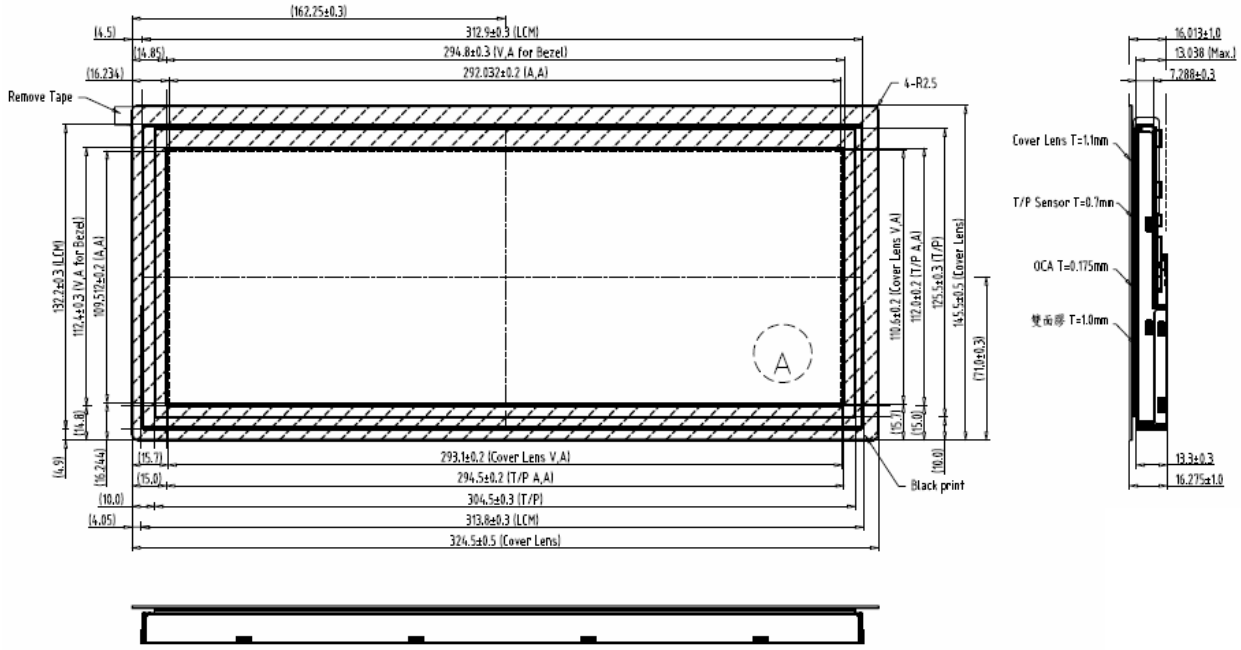
1. INTRODUCTION

12.3” color TFT-LCD (Thin Film Transistor Liquid Crystal Display) module composed of LCD panel, driver circuit, Projected Capacitive Touch Screen and LED backlight. By applying 1920X720 images are displayed on the 12.3” diagonal screen. Display 16.7M colors by R.G.B signal input.

- 12.3” inch configuration
- Two channel LVDS interface
- 16.7M colors by R.G.B signal input
- RoHS Compliance
- Projective Capacitive Touch
  (a) Interface : USB
  (b) Touch controller : EXC80W46
  (c) Cover Lens :
    (i) Toughened glass: T=1.1 with border printing Pantone Black.
- LVDS Board 40Pin w/ LED Driver 4Pin
- HDMI Board w/ Cable

2. PHYSICAL SPECIFICATIONS

Item	Specifications	Remark
LCD size	12.3 inch(Diagonal)	
Active area	292.032 (W) x 109.512 (H) mm	
Number of Pixels	1920(H) × 3 (RGB) × 720(V)	
Color arrangement	R.G.B-stripe	
Display mode	Normally Black	
Number of Colors	16.7M	
Interface	LVDS	
NTSC	70(Typ.)	



3. ABSOLUTE MAX. RATINGS

The following are maximum values which, if exceeded, may cause faulty operation or damage to the unit.

Item	Symbol	Min.	Max.	Unit	Note
Supply voltage range	VCC	-0.3	3.6	V	
Operating Temperature	Top	-30	80	℃	
Storage Temperature	Tstg	-30	80	℃	

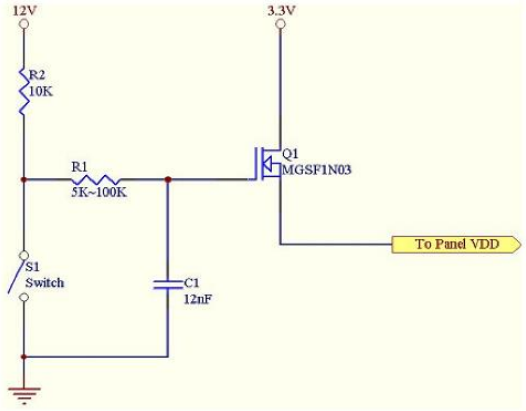
Note : All voltage values are with respect to the GND terminals unless otherwise noted.

4. ELECTRICAL CHARACTERISTICS

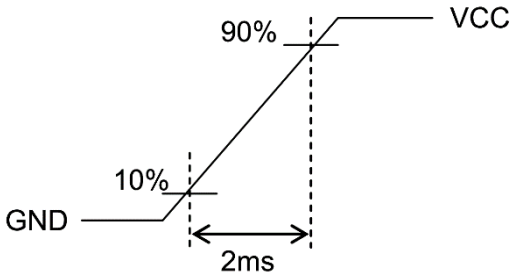
4.1. Power Specification

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Supply Voltage	VCC	3.0	3.3	3.6	V	
Input Signal Voltage	VIH	VCC*0.7	-	VCC	V	
	VIL	0	-	VCC*0.3	V	
VCC Current	ICC	--	--	500	mA	VCC =3.3V Note 2
Inrush Current	I_{RUSH}	--	--	2.0	A	Note 1
LVDS RECEIVER DC SPECIFICATIONS						
Differential Input High Threshold	VTH	100	--	300	mV	V_{CM}=1.2V
Differential Input Low Threshold	VTL	-300	--	-100	mV	
Input Current	I_{IN}	-10	--	+10	uA	
Differential input Voltage	$\lvert V_{ID} \rvert$	0.2	--	0.6	V	
Common Mode Voltage Offset	V_{CM}	1	1.2	$1.7-\frac{\lvert V_{ID} \rvert}{2}$	V	

Note 1: Inrush current test circuit and rising time setting (power on)



Test circuit



Rising time

Note 2: Ta=25℃ , Display pattern :

Typical :256 fray pattern

256 gray pattern

Maximum: White Pattern

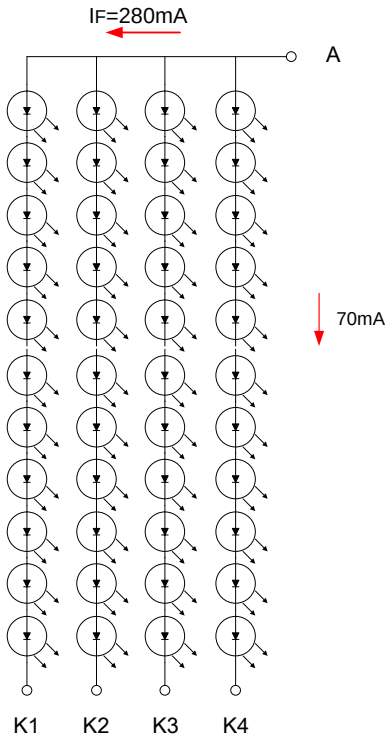
White Patter

4.2. LED BACKLIGHT DRIVER UNIT

Item	Symbol	Min.	Typ.	Max.	Unit	Note
LED Forward Current	IF	--	280	--	mA	Ta=25℃
LED Forward Voltage	VF	--	--	37.4	V	IF=280mA, Ta=25℃
LED Lifetime	--	30000	--	--	Hr	IF=280mA, Ta=25℃
LED Driver voltage	VLED	--	12	--	V	--
Power Supply Current For LED Driver	ILED	--	1.1	--	A	VLED=12V Duty=100%
ADJ Input Voltage	ADJ_H	2.4	3.3	5	V	
	ADJ_L	0	--	0.7	V	
ADJ Dimming Freq.	FADJ	0.2	--	30	KHz	--

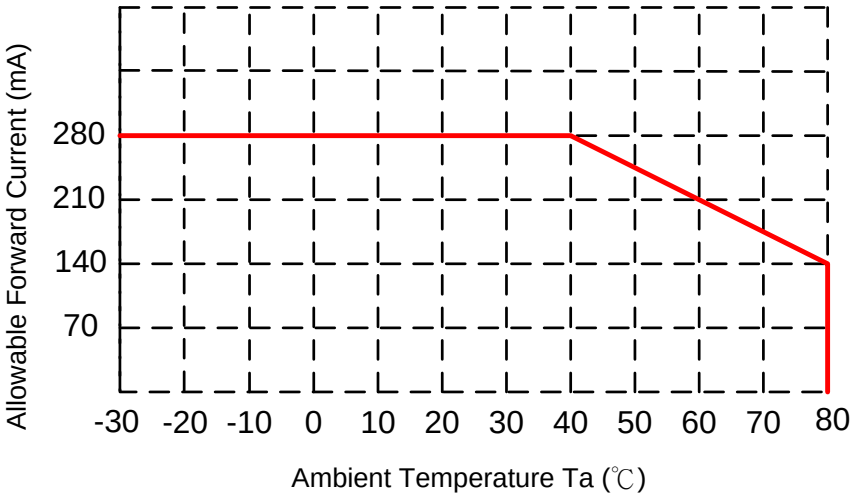
Note(1) Ta means ambient temperature of TFT-LCD module.

Note(2) The structure of LED B/L shows as below.



Note(3) Using the constant current control to avoid the leakage light and brightness quality issue.

Note(4) Definition of Led lifetime：Luminance < Initial luminance 50%.



5. Optical Specifications

6. Item		Symbol	Condition	Values			Unit	Remark
				Min.	Typ.	Max.		
Viewing angle (CR≥ 10)		θL	θ=180° (9 o'clock)	80	85	-	degree	Note(1) Note(4) Color chromaticity (CIE1931) (CF Under C-Light)
		θR	θ=0° (3 o'clock)	80	85	-		
		θT	θ=90° (12 o'clock)	80	85	-		
		θB	θ=270° (6 o'clock)	80	85	-		
Response time	25℃	TR + TF	Normal θ=Φ=0° Point-5	--	--	30	msec	Note(1) Note(3) LCM Luminance 900nits
	0℃			--	--	100		
	-20℃			--	--	250		
	-30℃			--	--	500		
Contrast ratio		CR		--	1000	--	-	Note(1) Note(2)
Color chromaticity		WX		-0.05	0.303	+0.05	-	Note(1) Note(4) Note(5) Color chromaticity (CIE1931) (CF Under C-Light)
		WY			0.323			
		RX			0.654			
		RY			0.319			
		GX			0.259			
		GY			0.574			
		BX			0.140			
		BY			0.084			
Luminance		WY		**570**	**720**		cd/m^2	
Luminance uniformity		YU		70	80	-	%	Note(6)

5.1 Measuring Condition

Measuring surrounding：Dark room

LED current IF：280mA

Ambient temperature：25±2℃

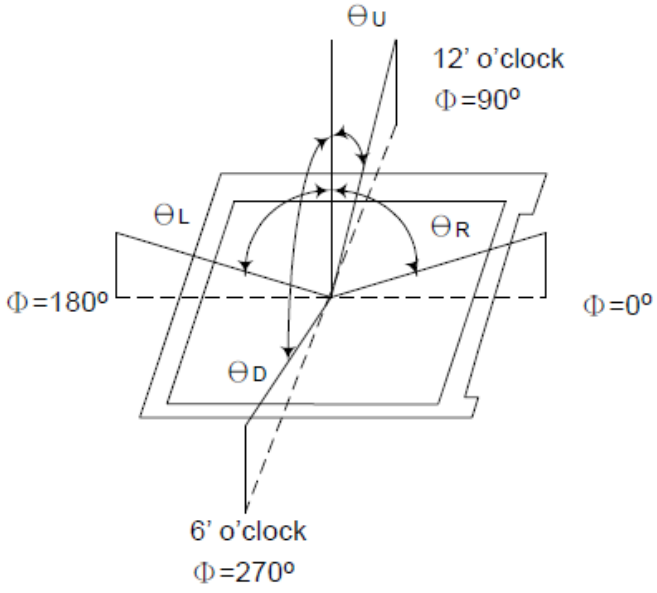
15min. warm-up time

5.2 Measuring Equipment

FPM520 of Westar Display technologies, INC., which utilized SR-3 for Chromaticity and BM-5A (or BM-7) for other optical characteristics.

Measuring spot size：20 ~ 21 mm

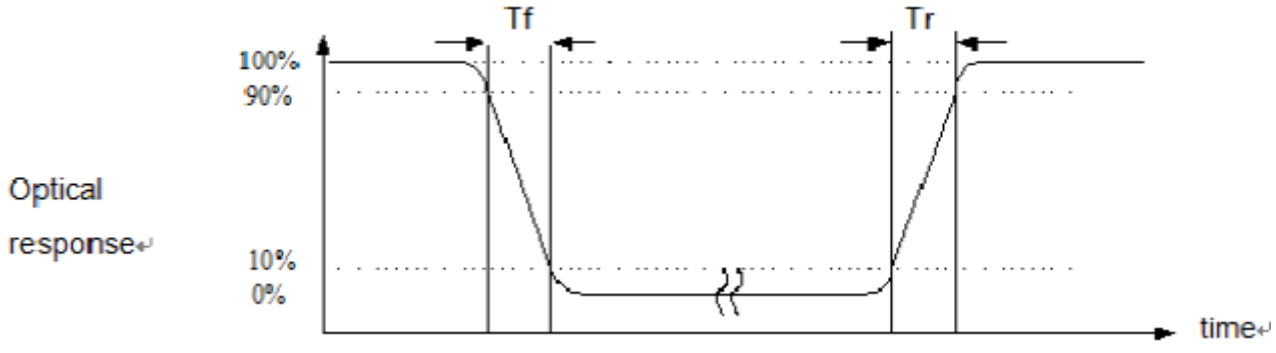
Note(1) Definition of Viewing Angle



Note(2) Definition of Contrast Ratio (CR): measured at the center point of panel.

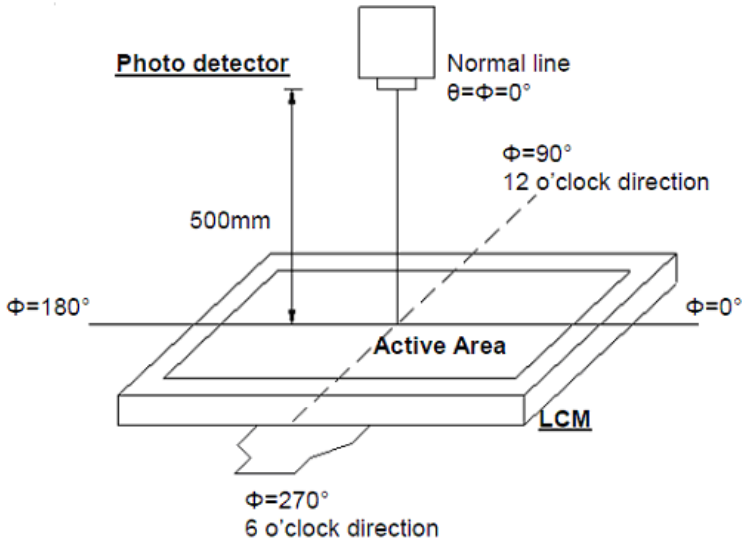
$$CR = \frac{\text{Luminance with all pixels white}}{\text{Luminance with all pixels black}}$$

Note(3) Definition of Response Time : Sum of TR and TF



Note(4) Definition of optical measurement setup

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. (Viewing angle is measured by ELDIM-EZ contrast/Height: 1.2mm, Response time is measured by Photo detector TOPCON BM-7, other items are measured by BM-5A/ Field of view: 1° /Height: 500mm.)

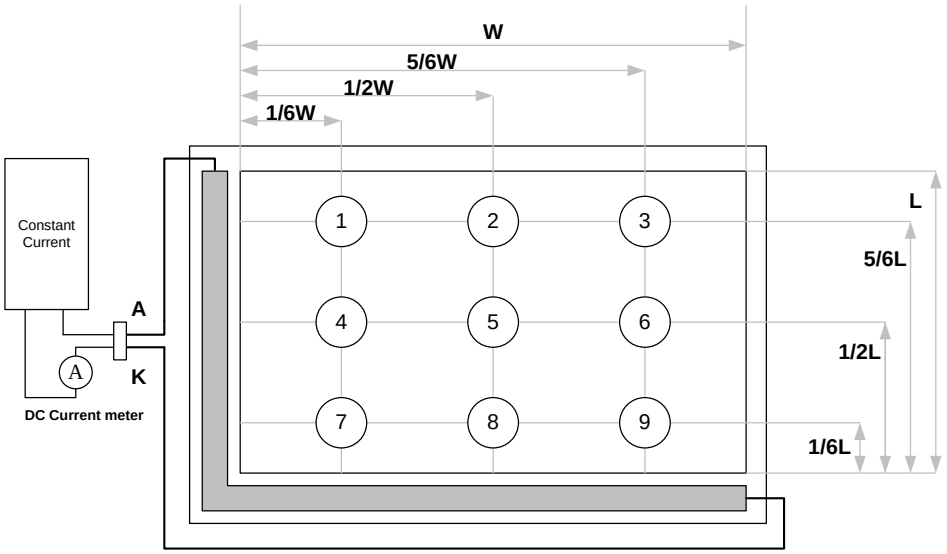


Note(5) Definition of color chromaticity (CIE1931)

Color coordinates measured at center point of LCD.

Note(6) Definition of Luminance Uniformity

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

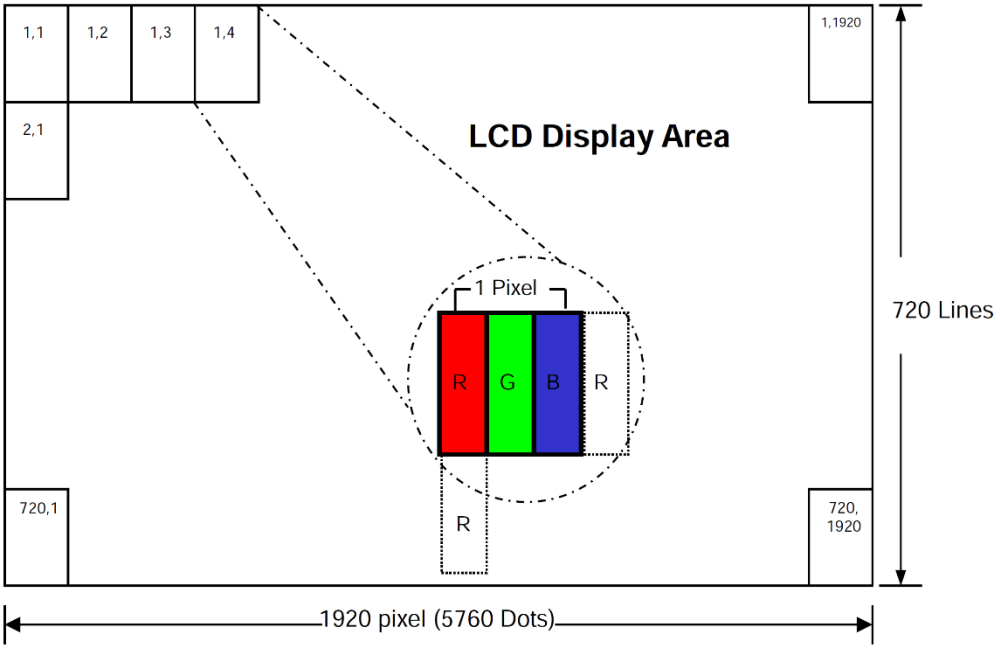


B_{max}: The measured maximum luminance of all measurement position.

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

6 BLOCK DIAGRAM

6.1 Pixel Format:



6.2 Relationship Between Displayed Color and Input:

	Display	MSB R7	R6	R5	R4	R3	R2	R1	LSB R0	MSB G7	G6	G5	G4	G3	G2	G1	LSB G0	MSB B7	B6	B5	B4	B3	B2	B1	LSB B0	Gray scale Level
Basic color	Black	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	-
	Blue	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	H	H	H	H	H	H	H	-
	Green	L	L	L	L	L	L	L	L	H	H	H	H	H	H	H	H	L	L	L	L	L	L	L	L	-
	Light Blue	L	L	L	L	L	L	L	L	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	-
	Red	H	H	H	H	H	H	H	H	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	-
	Purple	H	H	H	H	H	H	H	H	L	L	L	L	L	L	L	L	H	H	H	H	H	H	H	H	-
	Yellow	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	L	L	L	L	L	L	L	L	-
	White	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	-
Gray scale of Red	Black	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L0
	Dark ↑ ↓ Light	L	L	L	L	L	L	L	H	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L1
		L	L	L	L	L	L	H	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L2
		:								:								:								L3…L251
		H	H	H	H	H	H	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L252
		H	H	H	H	H	H	L	H	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L253
		H	H	H	H	H	H	H	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L254
	Red	H	H	H	H	H	H	H	H	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	Red L255
Gray scale of Green	Black	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L0
	Dark ↑ ↓ Light	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	L	L	L	L	L	L	L	L	L1
		L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	L	L	L	L	L	L	L	L	L	L2
		:								:								:								L3…L251
		L	L	L	L	L	L	L	L	H	H	H	H	H	H	L	L	L	L	L	L	L	L	L	L	L252
		L	L	L	L	L	L	L	L	H	H	H	H	H	H	L	H	L	L	L	L	L	L	L	L	L253
		L	L	L	L	L	L	L	L	H	H	H	H	H	H	H	L	L	L	L	L	L	L	L	L	L254
	Green	L	L	L	L	L	L	L	L	H	H	H	H	H	H	H	H	L	L	L	L	L	L	L	L	Green L255
Gray scale of Blue	Black	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L0
	Dark ↑ ↓ Light	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	L1
		L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	L	L2
		:								:								:								L3…L251
		L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	H	H	H	H	H	L	L	L252
		L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	H	H	H	H	H	L	H	L253
		L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	H	H	H	H	H	H	L	L254
	Blue	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	H	H	H	H	H	H	H	Blue L255
Gray scale of White & Black	Black	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L0
	Dark ↑ ↓ Light	L	L	L	L	L	L	L	H	L	L	L	L	L	L	L	H	L	L	L	L	L	L	L	H	L1
		L	L	L	L	L	L	H	L	L	L	L	L	L	L	H	L	L	L	L	L	L	L	H	L	L2
		:								:								:								L3…L251
		H	H	H	H	H	H	L	L	H	H	H	H	H	H	L	L	H	H	H	H	H	H	L	L	L252
		H	H	H	H	H	H	L	H	H	H	H	H	H	H	L	H	H	H	H	H	H	H	L	H	L253
		H	H	H	H	H	H	H	L	H	H	H	H	H	H	H	L	H	H	H	H	H	H	H	L	L254
	White	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	White L255

7. INTERFACE

Pin No.	Symbol	Description	Note
1	GND	Power ground	
2	NC	No connect	
3	VCC	Digital Power	
4	VCC	Digital Power	
5	GND	Power ground	
6	GND	Power ground	
7	NC	No connect	
8	NC	No connect	
9	GND	Power ground	
10	ORXIN0-	Odd pixel positive LVDS differential clock inputs	
11	ORXIN0+	Odd pixel positive LVDS differential clock inputs	
12	ORXIN1-	Odd pixel positive LVDS differential clock inputs	
13	ORXIN1+	Odd pixel positive LVDS differential clock inputs	
14	ORXIN2-	Odd pixel positive LVDS differential clock inputs	
15	ORXIN2+	Odd pixel positive LVDS differential clock inputs	
16	ORXCLKIN-	Odd pixel positive LVDS differential clock inputs	
17	ORXCLKIN+	Odd pixel positive LVDS differential clock inputs	
18	ORXIN3-	Odd pixel positive LVDS differential clock inputs	
19	ORXIN3+	Odd pixel positive LVDS differential clock inputs	
20	ERXIN0-	Even pixel positive LVDS differential clock inputs	
21	ERXIN0+	Even pixel positive LVDS differential clock inputs	
22	ERXIN1-	Even pixel positive LVDS differential clock inputs	
23	ERXIN1+	Even pixel positive LVDS differential clock inputs	
24	ERXIN2-	Even pixel positive LVDS differential clock inputs	
25	ERXIN2+	Even pixel positive LVDS differential clock inputs	
26	ERXCLKIN-	Even pixel positive LVDS differential clock inputs	
27	ERXCLKIN+	Even pixel positive LVDS differential clock inputs	
28	ERXIN3-	Even pixel positive LVDS differential clock inputs	
29	ERXIN3+	Even pixel positive LVDS differential clock inputs	
30	GND	Power ground	

31	NC	No connect	
32	NC	No connect	
33	NC	No connect	
34	NC	No connect	
35	NC	No connect	
36	NC	No connect	
37	NC	No connect	
38	GND	Power ground	
39	GND	Power ground	
40	GND	Power ground	

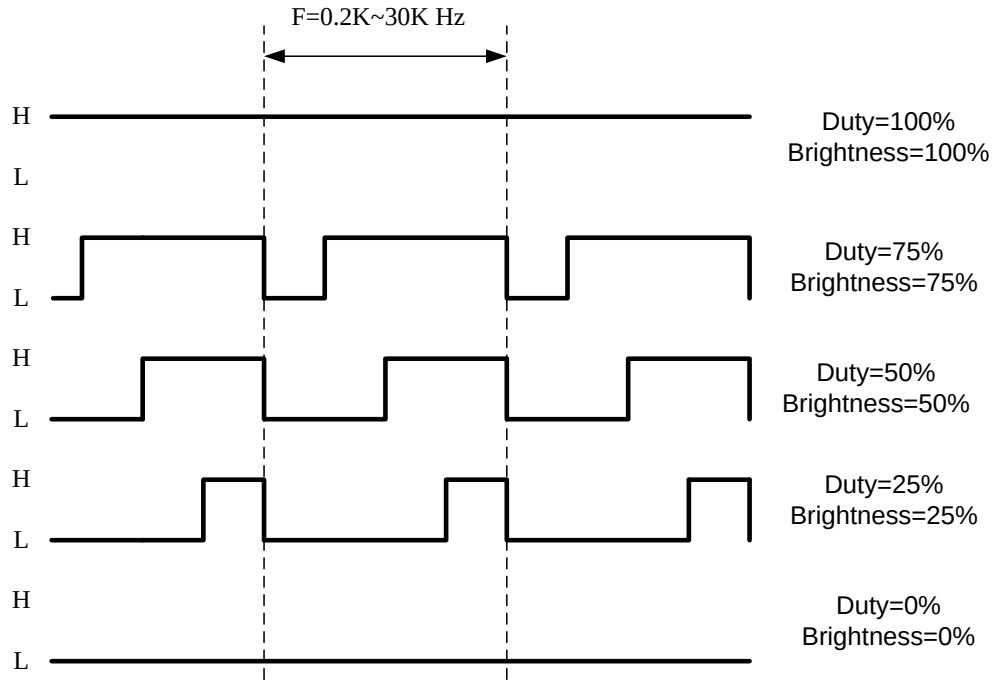
Connector: I-PEX 20455-040E-76 or Equivalent.

Mating Connector: I-PEX 20453-040T-03 or Equivalent.

7.2 LED DRIVER BOARD INTERFACE

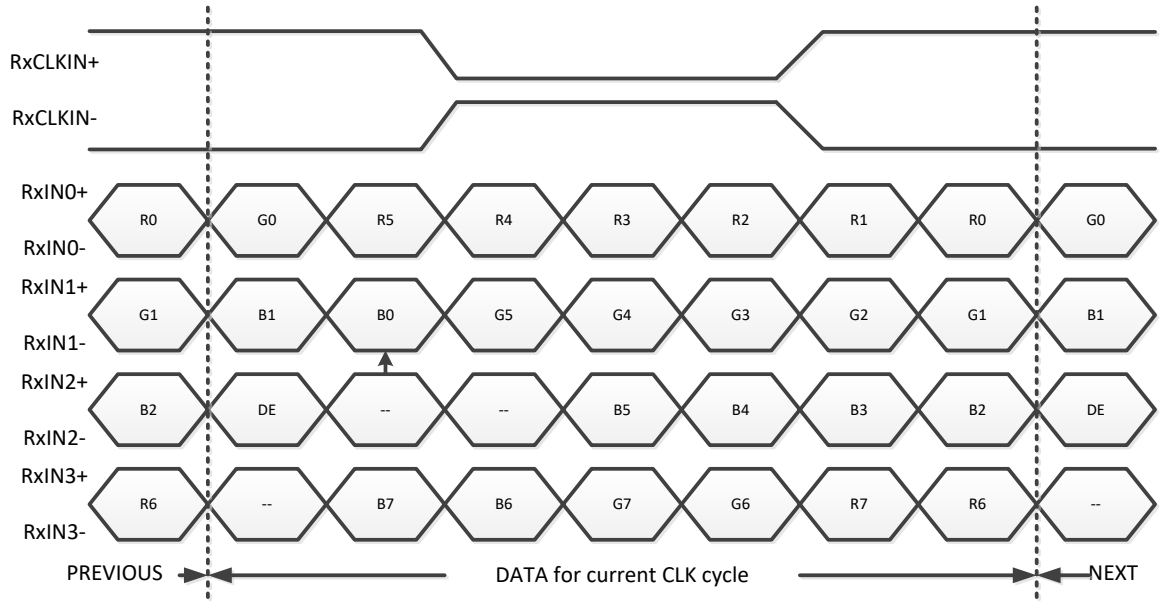
CN4: JST SM04B-SRSS-TB (LF) (SN)

Pin No.	Symbol	I/O	Description	Note
1	VLED	P	Voltage for LED circuit	12V
2	LED_EN	I	LED BLU ON/OFF. High level: ON; Low level: OFF.	3.3V
3	GND	I	Power ground	
4	ADJ	P	Adjust the LED brightness by PWM	3.3V



8. Bit LVDS Input

8.1. 8 Bit LVDS Input



Note : R/G/B data 7 : MSB, R/G/B data 0 : LSB

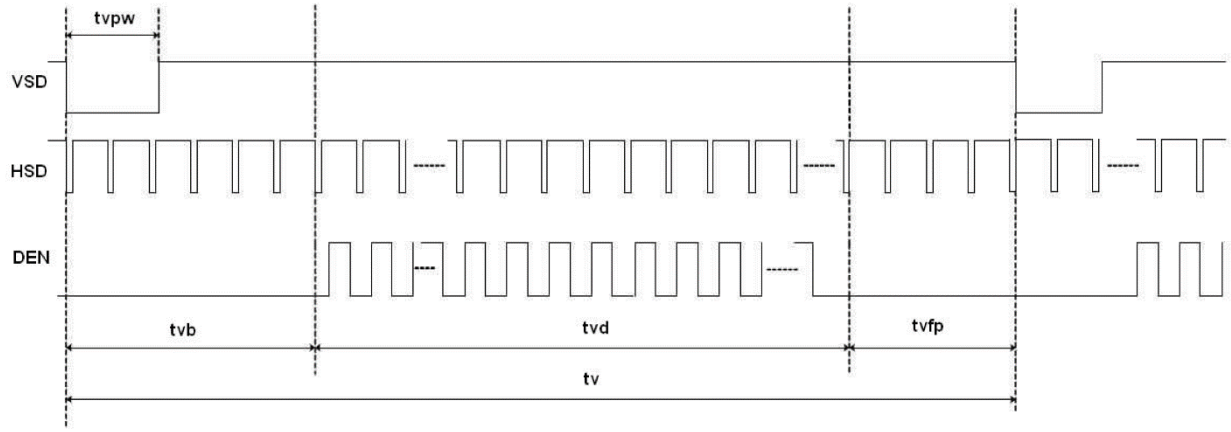
Signal Name	Description	Remark
R7 R6 R5 R4 R3 R2 R1 R0	Red Data 7 (MSB) Red Data 6 Red Data 5 Red Data 4 Red Data 3 Red Data 2 Red Data 1 Red Data 0 (LSB)	Red-pixel Data Each red pixel's brightness data consists of these 8 bits pixel data.
G7 G6 G5 G4 G3 G2 G1 G0	Green Date 7 (MSB) Green Date 6 Green Date 5 Green Date 4 Green Date 3 Green Date 2 Green Date 1 Green Date 0 (LSB)	Green-pixel Data Each green pixel's brightness data consists of these 8 bits pixel data.
B7 B6 B5 B4 B3 B2 B1 B0	Blue Data 7 (MSB) Blue Data 6 Blue Data 5 Blue Data 4 Blue Data 3 Blue Data 2 Blue Data 1 Blue Data 0 (LSB)	Blue-pixel Data Each blue pixel's brightness data consists of these 8 bits pixel data.
RxCLKIN+ RxCLKIN-	LVDS Clock Input	
DE	Display Enable	
VS	Vertical Sync	
HS	Horizontal Sync	

8.2 Interface Timing (DE mode)

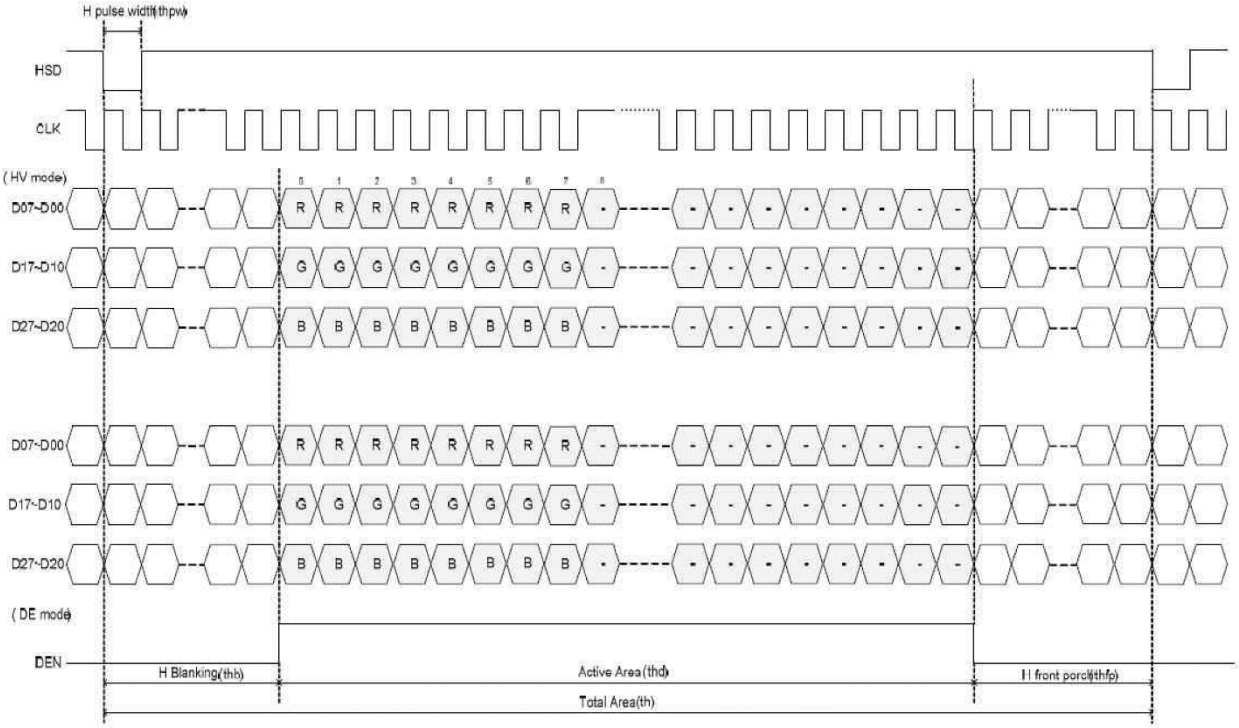
Interface Timing (DE mode) Two Port LVDS Timing (1920 x RGB x 720)					
Item	**Symbol**	**Min.**	**Typ.**	**Max.**	**Unit**
Frame Rate	fclk	55	60	65	Hz
Frame Period	T_V	730	792	864	Line
Vertical Display Time	T_{vd}		720		Line
Vertical Blanking Time	T_{vb}	10	72	144	Line
1 line Scanning Time	T_h	984	992	1104	DCLK
Horizontal Display Time	T_{hd}		960		DCLK
Horizontal Blanking Time	T_{hb}	24	32	144	DCLK
Clock rate	F_{DCLK}	45	47.5	50	MHz

Timing Diagram of Interface Signal (DE only mode)

1) Vertical Input timing

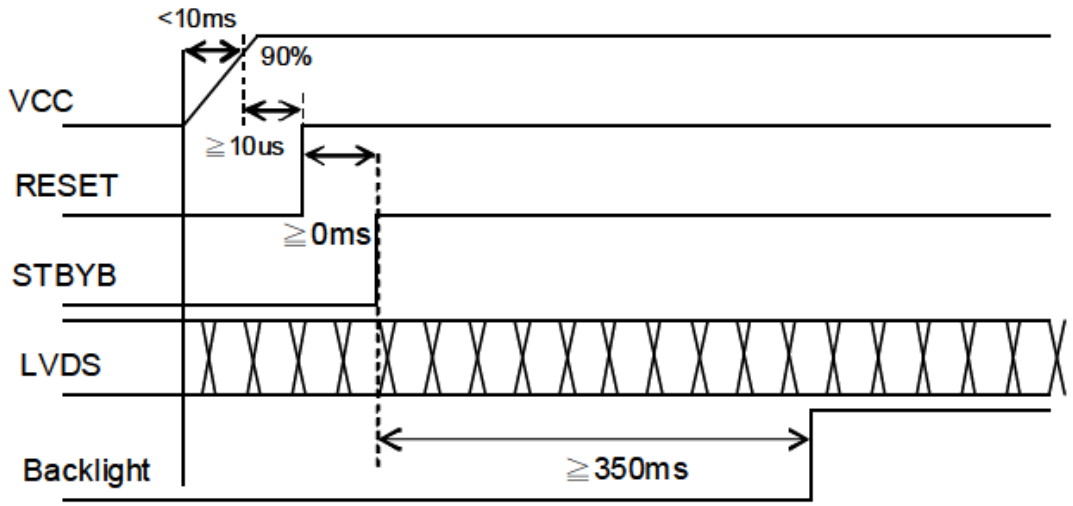


2) Horizontal Vertical Input timing

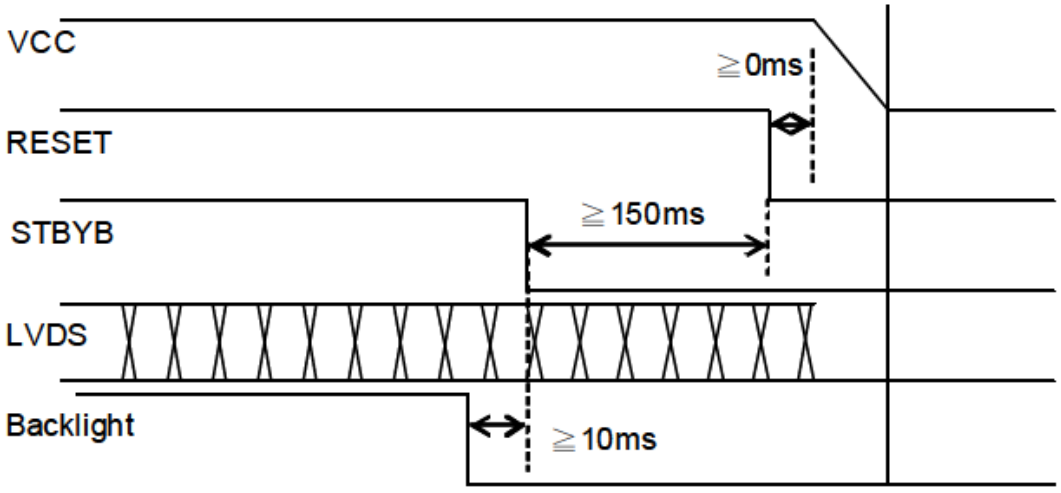


8.3 Power On / Off Sequence

Power ON



Power OFF



9. Projected capacitive-type TOUCH PANEL ELECTRICAL

9.1 Basic Characteristic

ITEM	SPECIFICATION
Type	Projective Capacitive Touch Panel
Activation	Max 10-fingers or Signal-finger
X/Y Position Reporting	Absolute Position
Touch Force	No contact pressure required
Calibration	No need for calibration
Report Rate	Approx. 80 points/sec
Interface	USB
Control IC	EXC80W46

9.2 Electrical Characteristic

Item	Symbol	Min.	Typ.	Max.	Unit
Power Supply Voltage	VIN	4.75	5.0	5.25	V

9.3 Interface

Pin No.	Symbol	Function
1	GND	Ground
2	DA-	USB Data-
3	DA+	USB Data+
4	VIN	Power Supply for TP controller
5	N/A	No connection
6	N/A	No connection

10. RELIABILITY TEST CONDITIONS

The reliability test items and its conditions are shown below.

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	60°C, 90% RH , 240 hrs	1,2
Thermal Shock Test	-30°C (15min) ~ 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 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.

11. USE PRECAUTIONS

11.1Handling precautions

1) The polarizing plate may break easily so be careful when handling it. Do not touch, press or rub it with a hard-material tool like tweezers.
2) Do not touch the polarizing plate surface with bare hands so as not to make it dirty. If the surface or other related part of the polarizing plate is dirty, soak a soft cotton cloth or chamois leather in benzine and wipe off with it. Do not use chemical liquids such as acetone, toluene and isopropyl alcohol. Failure to do so may bring chemical reaction phenomena and deteriorations.
3) Remove any spit or water immediately. If it is left for hours, the suffered part may deform or decolorize.
4) If the LCD element breaks and any LC stuff leaks, do not suck or lick it. Also if LC stuff is stuck on your skin or clothing, wash thoroughly with soap and water immediately.

11.2 Installing precautions

1) The PCB has many ICs that may be damaged easily by static electricity. To prevent breaking by static electricity from the human body and clothing, earth the human body properly using the high resistance and discharge static electricity during the operation. In this case, however, the resistance value should be approx. 1MΩ and the resistance should be placed near the human body rather than the ground surface. When the indoor space is dry, static electricity may occur easily so be careful. We recommend the indoor space should be kept with humidity of 60% or more. When a soldering iron or other similar tool is used for assembly, be sure to earth it.
2) When installing the module and ICs, do not bend or twist them. Failure to do so may crack LC element and cause circuit failure.
3) To protect LC element, especially polarizing plate, use a transparent protective plate (e.g., acrylic plate, glass etc) for the product case.
4) Do not use an adhesive like a both-side adhesive tape to make LCD surface (polarizing plate) and product case stick together. Failure to do so may cause the polarizing plate to peel off.

11.3 Storage precautions

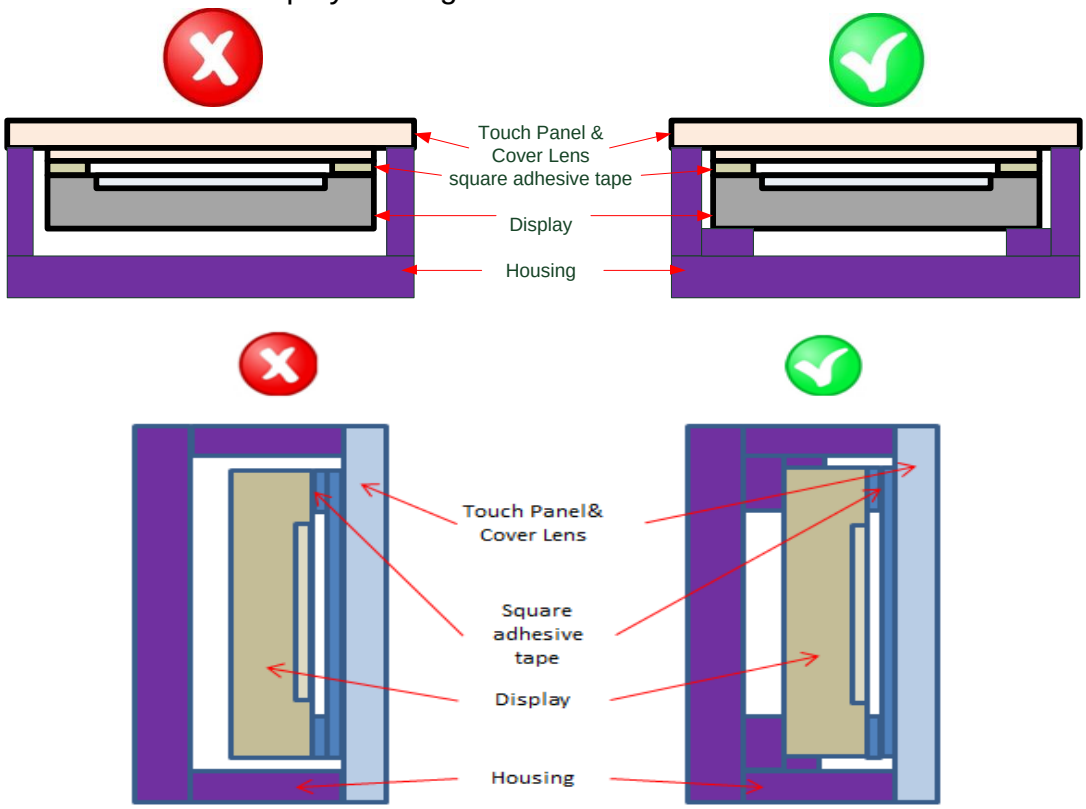
1) Avoid a high temperature and humidity area. Keep the temperature between 0°C and 35°C and also the humidity under 60%.
2) Choose the dark spaces where the product is not exposed to direct sunlight or fluorescent light.
3) Store the products as they are put in the boxes provided from us or in the same conditions as we recommend.

11.4 Operating precautions

1) Do not boost the applied drive voltage abnormally. Failure to do so may break ICs. When applying power voltage, check the electrical features beforehand and be careful. Always turn off the power to the LC module controller before removing or inserting the LC module input connector. If the input connector is removed or inserted while the power is turned on, the LC module internal circuit may break.
2) The display response may be late if the operating temperature is under the normal standard, and the display may be out of order if it is above the normal standard. But this is not a failure; this will be restored if it is within the normal standard.
3) The LCD contrast varies depending on the visual angle, ambient temperature, power voltage etc. Obtain the optimum contrast by adjusting the LC dive voltage.
4) When carrying out the test, do not take the module out of the low-temperature space suddenly. Failure to do so will cause the module condensing, leading to malfunctions.
5) Make certain that each signal noise level is within the standard (L level: 0.2Vcc or less and H level: 0.8Vcc or more) even if the module has functioned properly. If it is beyond the standard, the module may often malfunction. In addition, always connect the module when making noise level measurements.
6) The CMOS ICs are incorporated in the module and the pull-up and pull-down function is not adopted for the input so avoid putting the input signal open while the power is ON.
7) The characteristic of the semiconductor element changes when it is exposed to light emissions, therefore ICs on the LCD may malfunction if they receive light emissions. To prevent these malfunctions, design and assemble ICs so that they are shielded from light emissions.
8) Crosstalk occurs because of characteristics of the LCD. In general, crosstalk occurs when the regularized display is maintained. Also, crosstalk is affected by the LC drive voltage. Design the contents of the display, considering crosstalk.

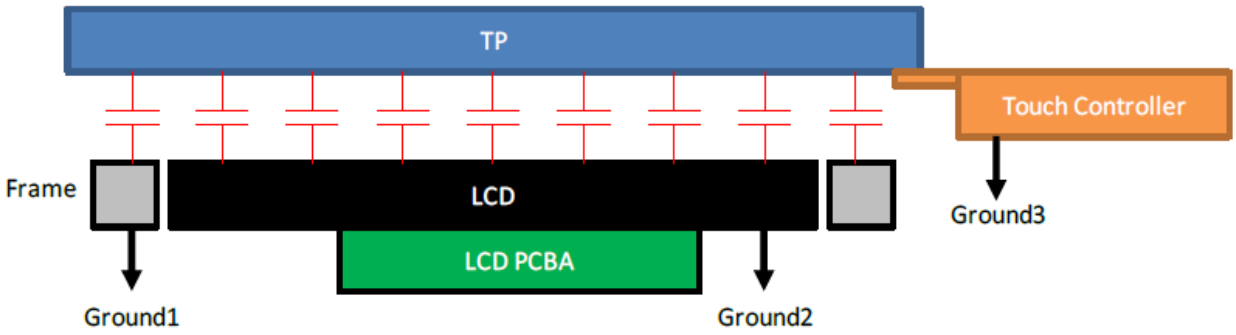
11.5 Mechanism

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.



11.6 Other

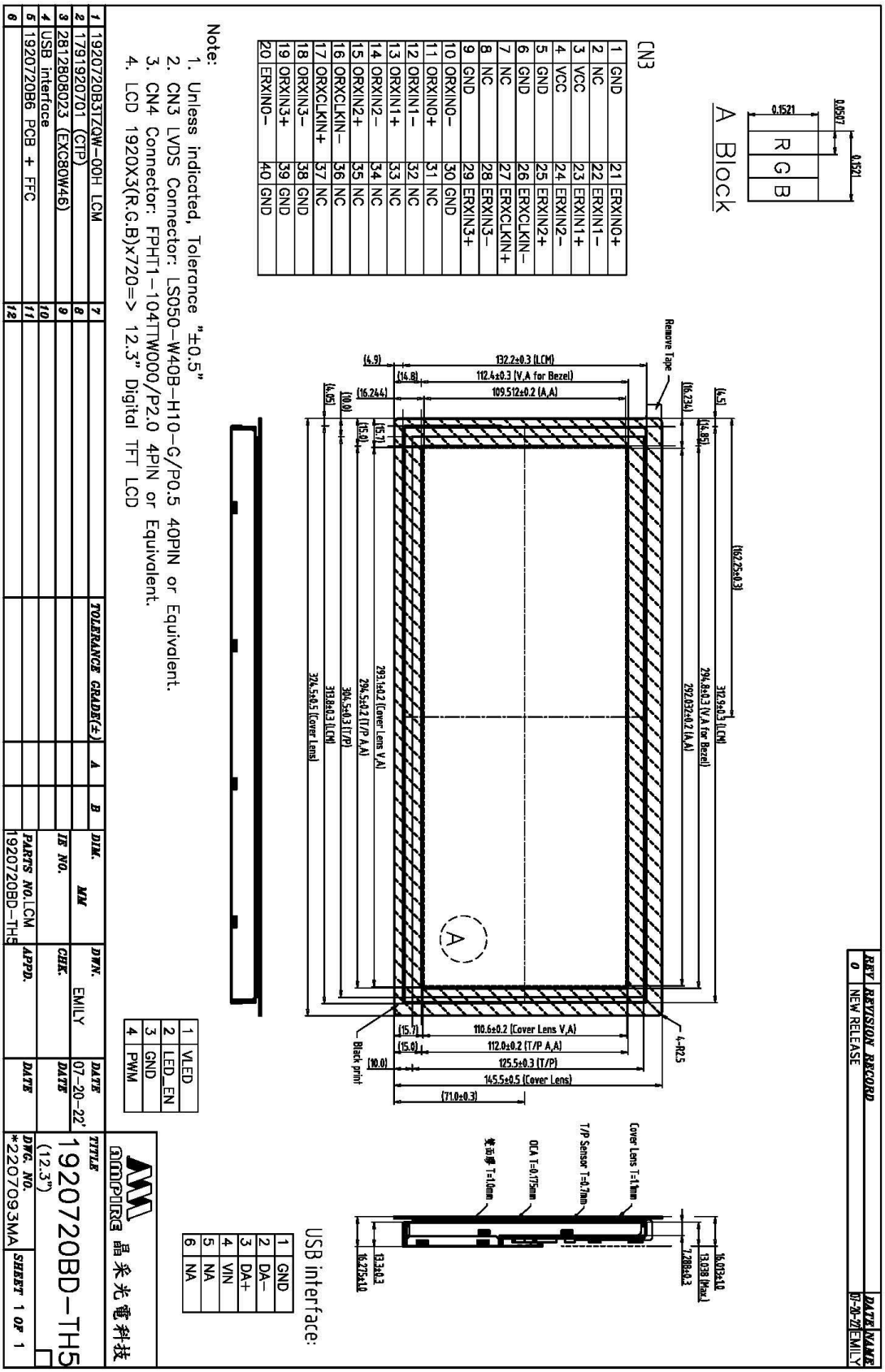
1) Do not disassemble or take the LC module into pieces. The LC modules once disassembled or taken into pieces are not the guarantee articles.
2) TP needs to work in environment with stable stray capacitance. In order to minimize the variation in stray capacitance, all conductive mechanical parts must 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.



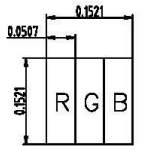
GND1, GND2 and GND3 should be connected together to have the same ground

3) 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.
4) AMIPRE will provide one year warrantee for all products and three months warrantee for all repairing products.

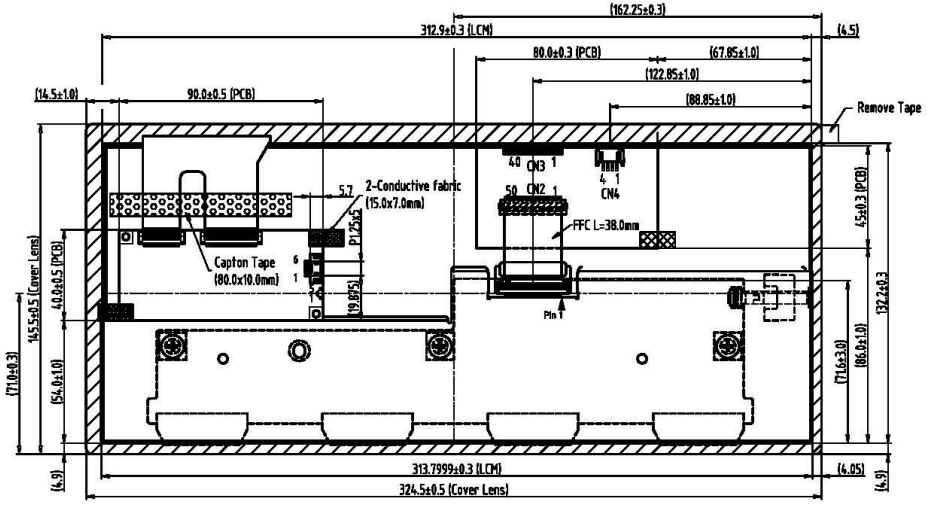
12 OUTLINE DIMENSION



REV	REVISION RECORD	DATE	NAME
0	NEW RELEASE	07-20-22	EMILY



A Block



Back View

CN3

1	GND	21	ERXIN0+
2	NC	22	ERXIN1−
3	VCC	23	ERXIN1+
4	VCC	24	ERXIN2−
5	GND	25	ERXIN2+
6	GND	26	ERXCLKIN−
7	NC	27	ERXCLKIN+
8	NC	28	ERXIN3−
9	GND	29	ERXIN3+
10	ORXIN0−	30	GND
11	ORXIN0+	31	NC
12	ORXIN1−	32	NC
13	ORXIN1+	33	NC
14	ORXIN2−	34	NC
15	ORXIN2+	35	NC
16	ORXCLKIN−	36	NC
17	ORXCLKIN+	37	NC
18	ORXIN3−	38	GND
19	ORXIN3+	39	GND
20	ERXIN0−	40	GND

1	VLED
2	LED_EN
3	GND
4	PWM

USB interface:

1	GND
2	DA−
3	DA+
4	VIN
5	NA
6	NA

Note:
1. Unless indicated, Tolerance "±0.5"
2. CN3 LVDS Connector: LS050−W40B−H10−G/P0.5 40PIN or Equivalent.
3. CN4 Connector: FPHT1−104TTW000/P2.0 4PIN or Equivalent.
4. LCD 1920X3(R.G.B)x720=> 12.3" Digital TFT LCD

1	1920720B3TZQW−00H LCM	7		TOLERANCE GRADE(±)	A	B	DIM. MM	DWN. EMILY	DATE 07−20−22'	TITLE 1920720BD−TH5 (12.3")
2	1791920701 (CTP)	8					IE NO.	CHK.	DATE	
3	2812808023 (EXC80W46)	9								
4	USB interface	10								
5	1920720B6 PCB + FFC	11					PARTS NO. LCM−1 1920720BD−TH5	APPD.	DATE	DWG. NO. *2207094MA / SHEET 1 OF 1
6		12								

AMPIRE 晶采光電科技

晶采光電科技股份有限公司
AMPIRE CO., LTD.

Auxiliary

AMPIRE HDMI Board

REV.E

AMPIRE CO., LTD.
Building A., 4F., No.116, Sec. 1, Sintai 5th Rd., Xizhi Dist,
New Taipei City 221, 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

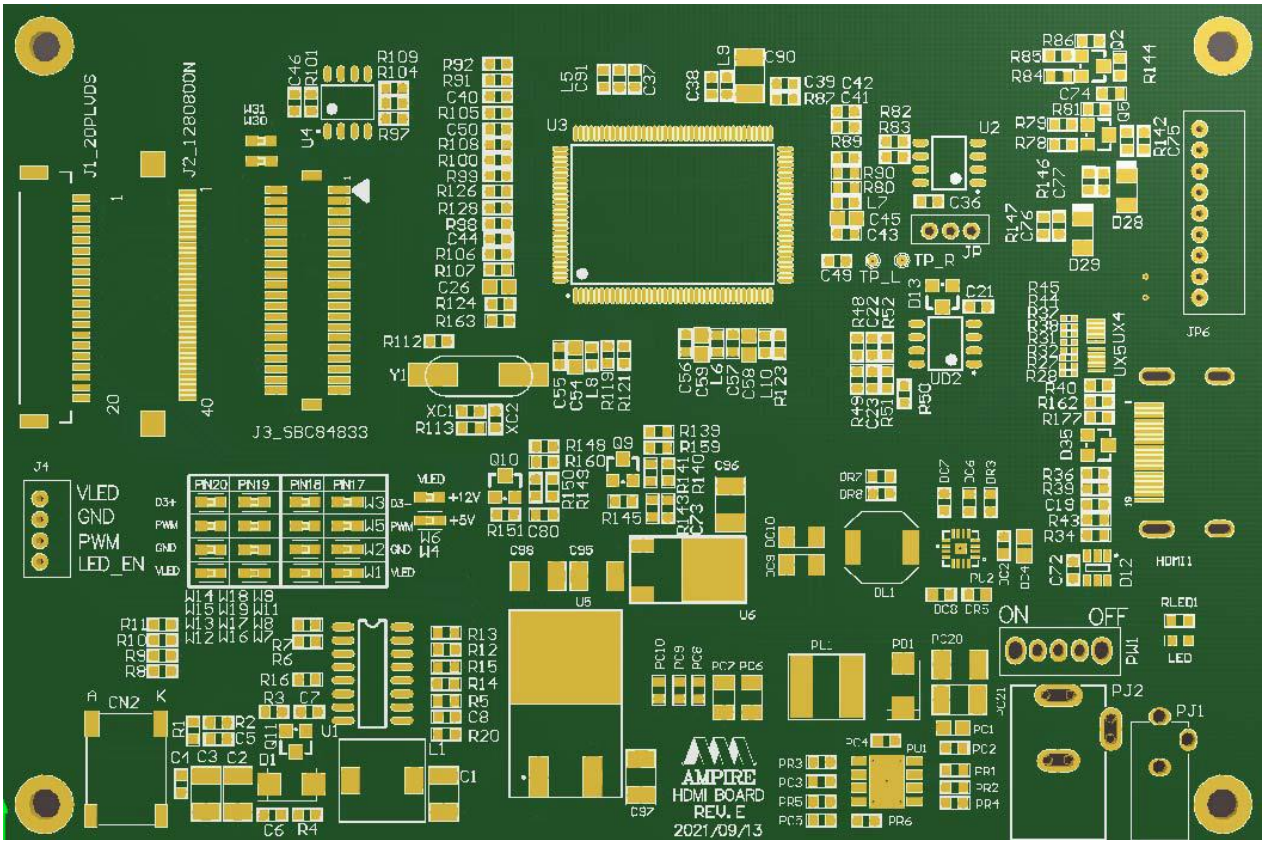
RECORD OF REVISION

Revision Date	Page	Contents	Editor
2021/10/12	-	New Release	Mark

1. Features

HDMI to LCD interface board

- Single Power input: 12V / 2A power input. (Connector: PJ1 or PJ2).
- LCD LVDS output: 24 BIT Single LVDS
- HDMI Digital input : (Connector: HDMI1)
  - HDMI 1.4a Compliant
  - Single-link (Type A HDMI) on-chip TMDS receiver up to 225MHz. Support long cable.
  - Do not support HDCP.



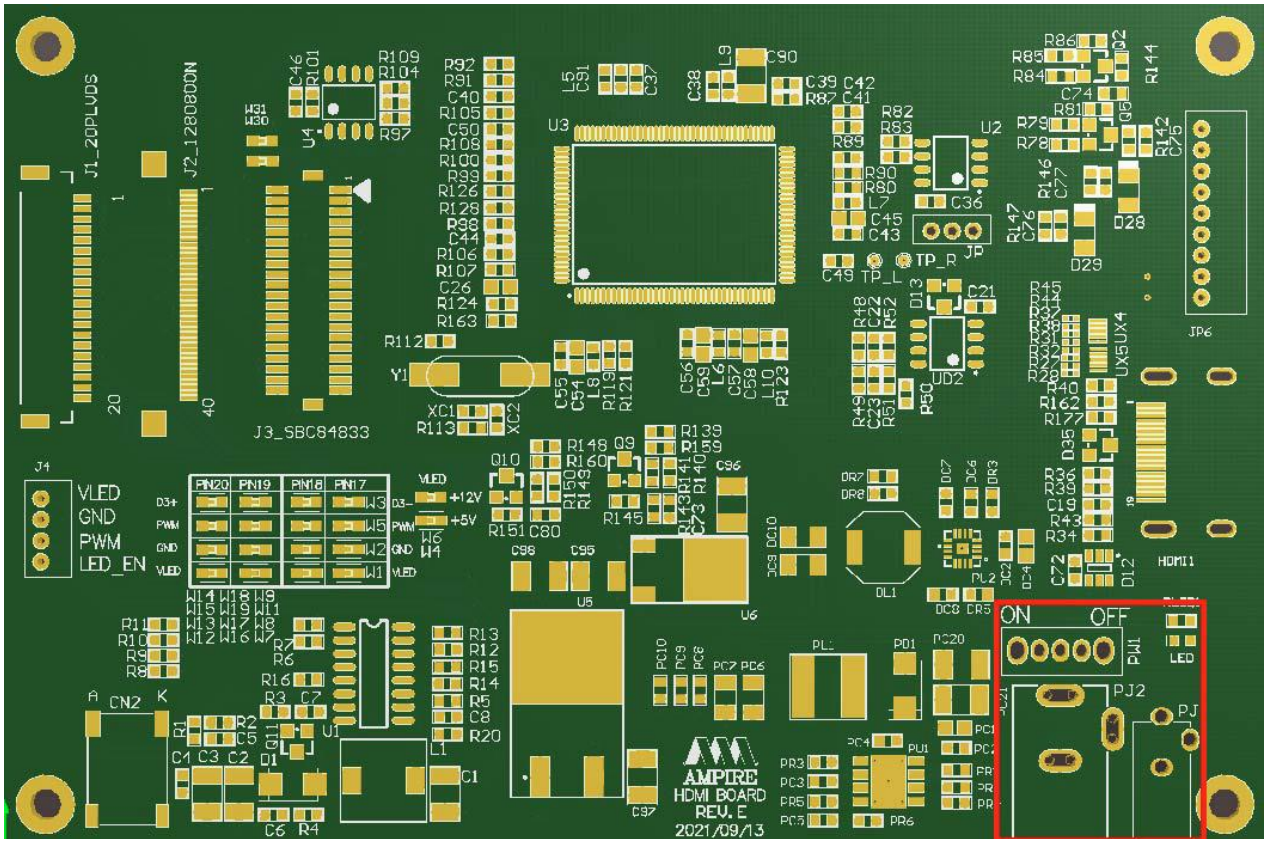
2. Support input video format :

Resolution	V Sync	Resolution	V Sync
640x480	60	1280x800	60
640x480	72	1280x800	75
640x480	75	1280x960	60
800x600	56	1280x1024	60
800x600	60	1280x1024	75
800x600	72	1360x768	60
800x600	75	1366x768	60
848x480	60	1400x1050	60
1024x768	60	1400x1050	75
1024x768	70	1440x900	60
1024x768	75	1440x900	75
1152x864	75	1600x900	60
1280x720	60	1680x1050	60
1280x768	60	1680x1050	75
1280x768	75	1920x1080	60

3. CONNECTOR

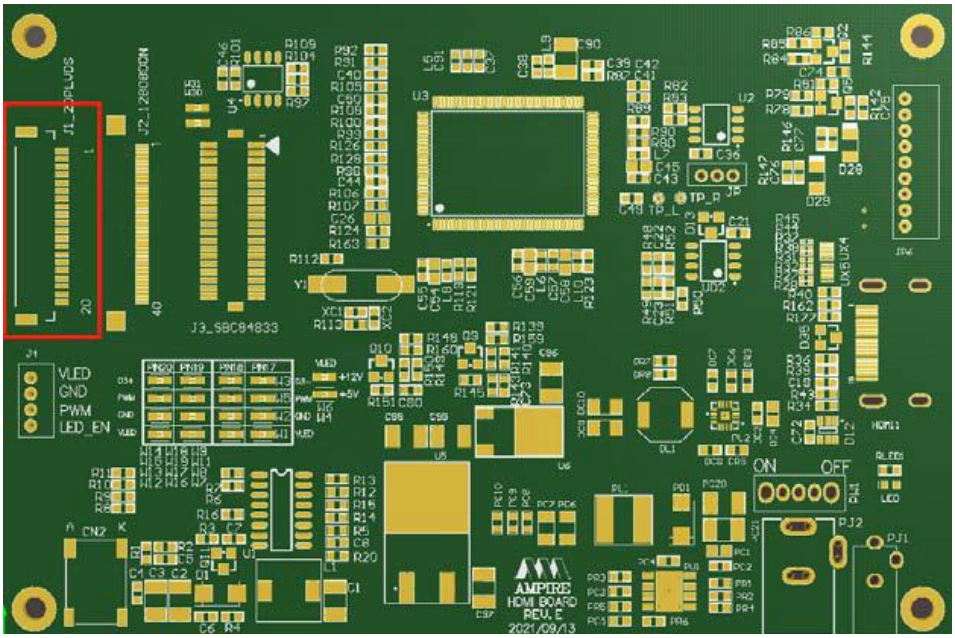
3.1 POWER CONNECTOR (PJ1、PJ2)

PIN	Symbol	Description
1	+12V	POWER SUPPLY +12V
3	GND	POWER SUPPLY GROUND



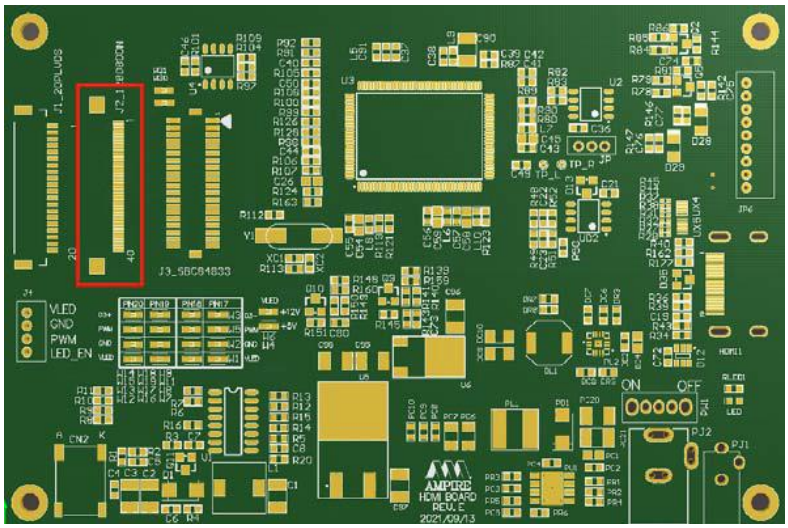
3.2 J1_20PIN LVDS

Pin No.	Symbol	Function
1	VDD	POWER SUPPLY:3.3V
2	VDD	POWER SUPPLY:3.3V
3	GND	Power Ground
4	GND	Power Ground
5	IN0-	Transmission Data of Pixels
6	IN0+	Transmission Data of Pixels
7	GND	Power Ground
8	IN1-	Transmission Data of Pixels 1
9	IN1+	Transmission Data of Pixels 1
10	GND	Power Ground
11	IN2-	Transmission Data of Pixels 2
12	IN2+	Transmission Data of Pixels 2
13	GND	Power Ground
14	CLK-	Sampling Clock
15	CLK+	Sampling Clock
16	GND	Power Ground
17	JUMP	JUMP
18	JUMP	JUMP
19	JUMP	JUMP
20	JUMP	JUMP



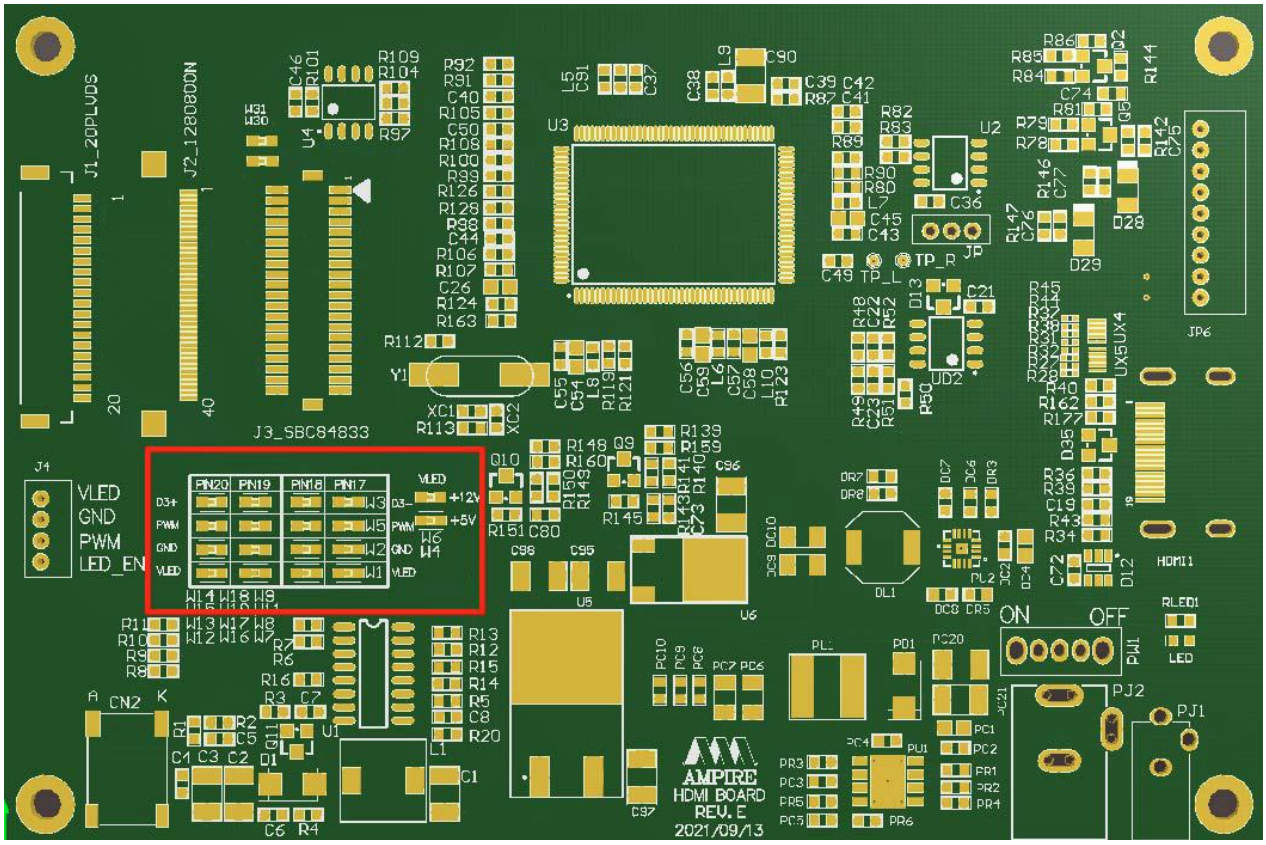
3.3 J2_40PIN LVDS

Pin #	Signal Name	Description	Remarks
1	NC	Not Connect	-
2	VDD	Power Supply, 3.3V (typical)	-
3	VDD	Power Supply, 3.3V (typical)	
4	NC	Not Connect	
5	NC	Not Connect	
6	NC	Not Connect	
7	NC	Not Connect	
8	LV0N	-LVDS differential data input	
9	LV0P	+LVDS differential data input	
10	GND	Ground	
11	LV1N	-LVDS differential data input	
12	LV1P	+LVDS differential data input	
13	GND	Ground	
14	LV2N	-LVDS differential data input	
15	LV2P	+LVDS differential data input	
16	GND	Ground	
17	LVCLKN	-LVDS differential data input	
18	LVCLKP	+LVDS differential data input	
19	GND	Ground	
20	LV3N	-LVDS differential data input	
21	LV3P	+LVDS differential data input	
22	GND	Ground	
23	LED_GND	Ground for LED Driving	
24	LED_GND	Ground for LED Driving	
25	LED_GND	Ground for LED Driving	
26	NC	Not Connect	
27	LED_PWM	PWM Input signal for LED driver	
28	LED_EN	LED Enable Pin	
29	Not Connect	NC	
30	NC	Not Connect	
31	LED_VCC	Power Supply for LED Driver	
32	LED_VCC	Power Supply for LED Driver	
33	LED_VCC	Power Supply for LED Driver	
34	NC	Not Connect	
35	BIST	BIST pin. (Keep NC or GND if not use.)	
36-40	NC	Not Connect	



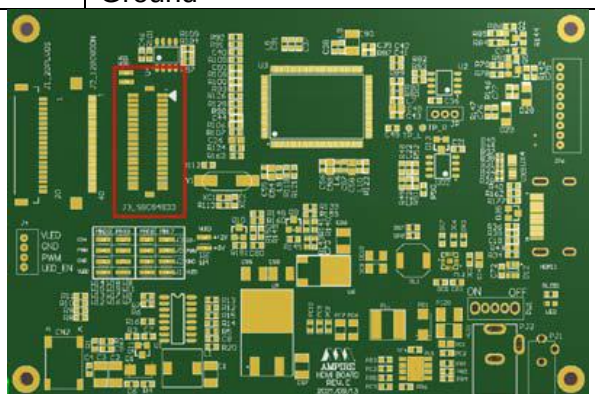
JUMP FOR PIN17,18,19 and VLED

- **These jump only for J1_20PLVDS**
- **For Design reference only. These supply voltage and signals do not need to input by end user.**



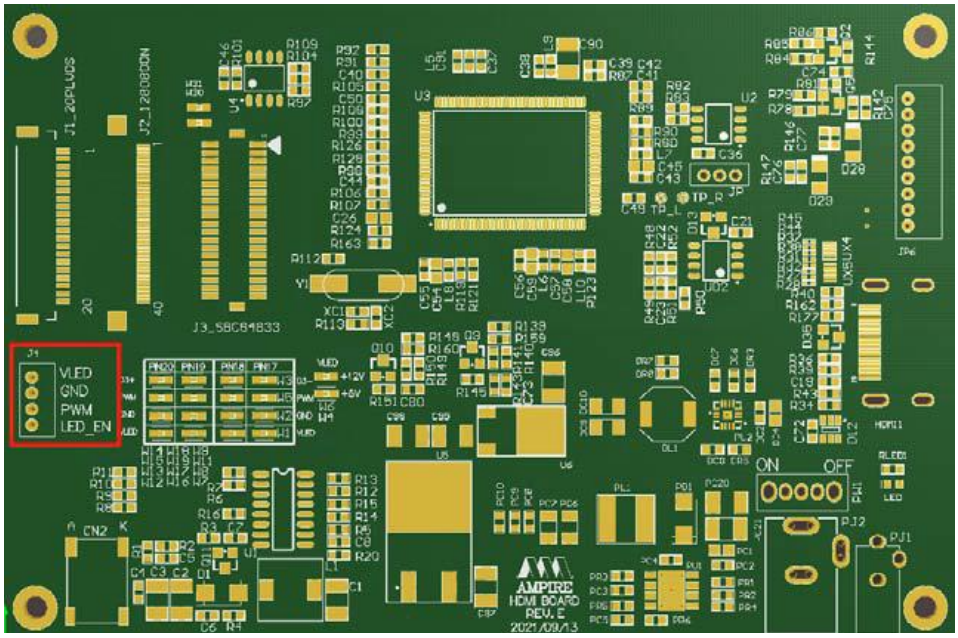
3.4 J3_40PIN LVDS

Pin #	Signal Name	Description	Remarks
1	VDD	Power Supply, 3.3V (typical)	-
2	VDD	Power Supply, 3.3V (typical)	-
3	VDD	Power Supply, 3.3V (typical)	
4	VDD	Power Supply, 3.3V (typical)	
5	VDD	Power Supply, 3.3V (typical)	
6	VDD	Power Supply, 3.3V (typical)	
7	NC	Not Connect	
8	NC	Not Connect	
9	GND	Ground	
10	GND	Ground	
11	LV8N	-LVDS differential data input	
12	LV5N	-LVDS differential data input	
13	LV8P	+LVDS differential data input	
14	LV5P	+LVDS differential data input	
15	GND	Ground	
16	GND	Ground	
17	LVCLK1N	-LVDS differential data input	
18	LV6N	-LVDS differential data input	
19	LVCLK1P	+LVDS differential data input	
20	LV6P	+LVDS differential data input	
21	GND	Ground	
22	GND	Ground	
23	LV0N	-LVDS differential data input	
24	LV7N	-LVDS differential data input	
25	LV0P	+LVDS differential data input	
26	LV7P	+LVDS differential data input	
27	GND	Ground	
28	GND	Ground	
29	LV1N	-LVDS differential data input	
30	LV3N	-LVDS differential data input	
31	LV3P	+LVDS differential data input	
32	LV7P	+LVDS differential data input	
33	GND	Ground	
34	GND	Ground	
35	LV2N	-LVDS differential data input	
36	LVCLK0N	-LVDS differential data input	
37	LV2P	+LVDS differential data input	
38	LVCLK0P	+LVDS differential data input	
39	GND	Ground	
40	GND	Ground	



3.5 J4_Backlight_Controller_Connector

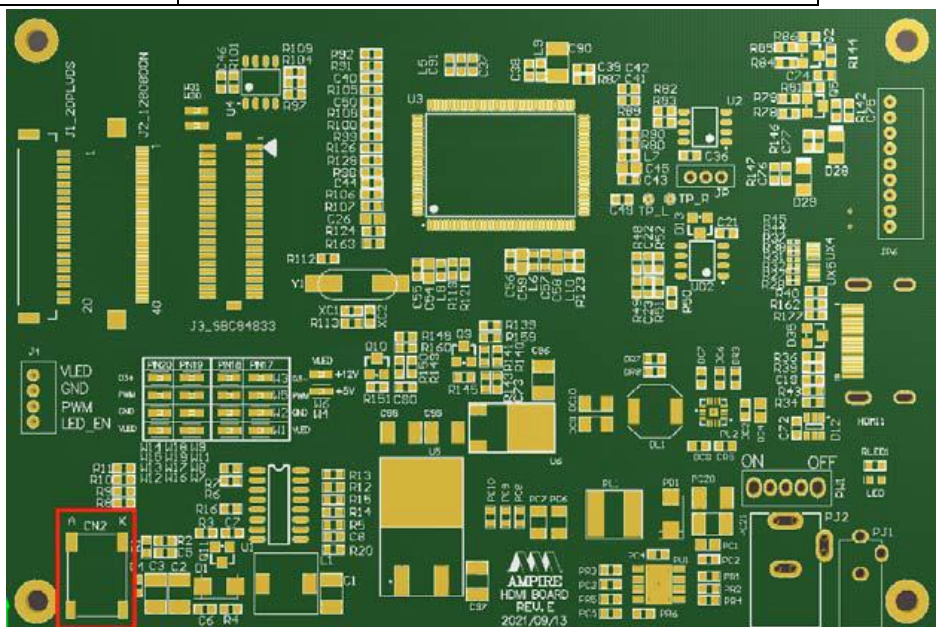
Pin No.	Symbol	I/O	Description	Note
1	VLED	P	Voltage for LED circuit (5.0V or 12V)	
2	GND	I	Power ground	
3	ADJ	P	Adjust the LED brightness by PWM	
4	LED_EN	I	LED BLU ON/OFF. High level: ON; Low level: OFF.	



3.6 Backlight _A,K Connector

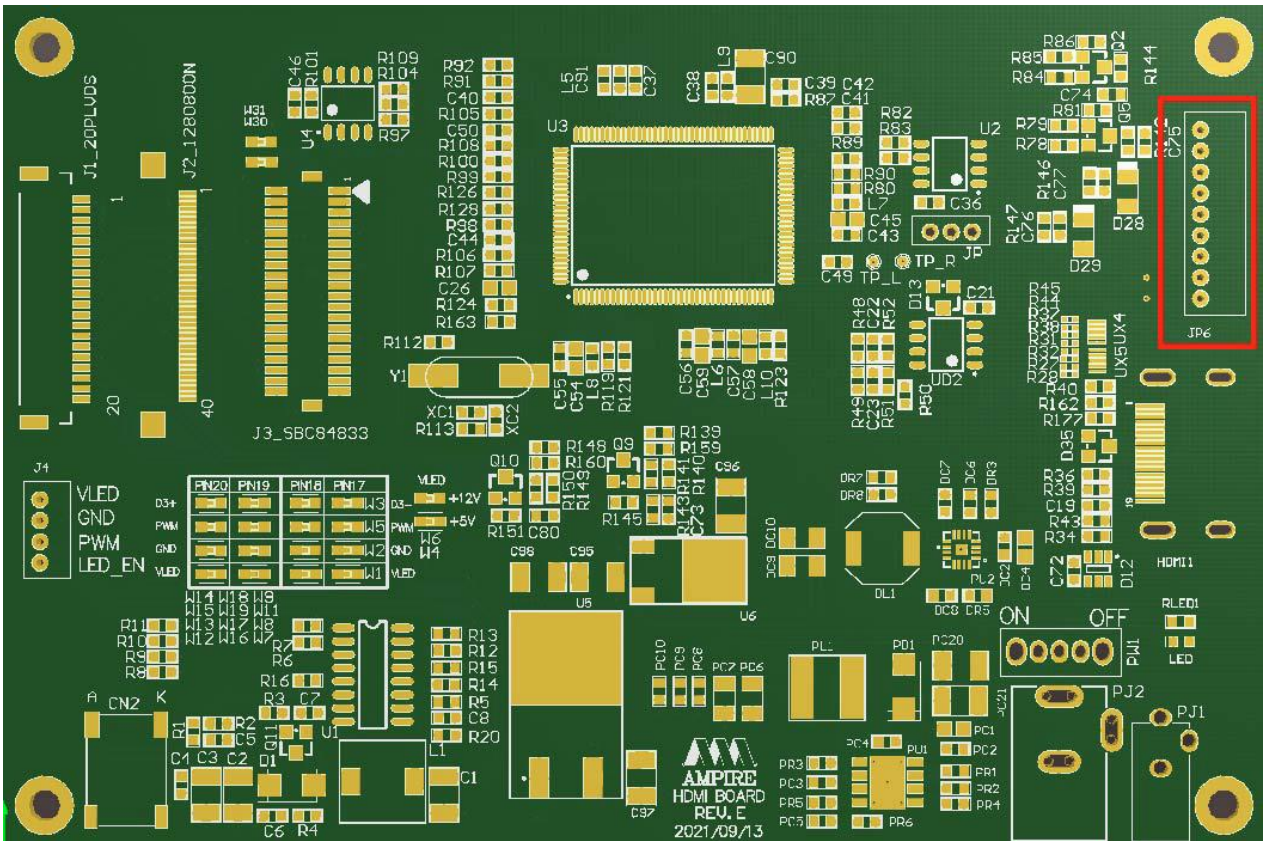
- **Only for external backlight connector**

Pin No.	Symbol	Description
1	A	Anode
2	K	Cathode



3.7 JP6 Keypad connector for HDMI Board

- **Optional item**
- **If customer need, please check with Ampire sales for new part no. and sample.**

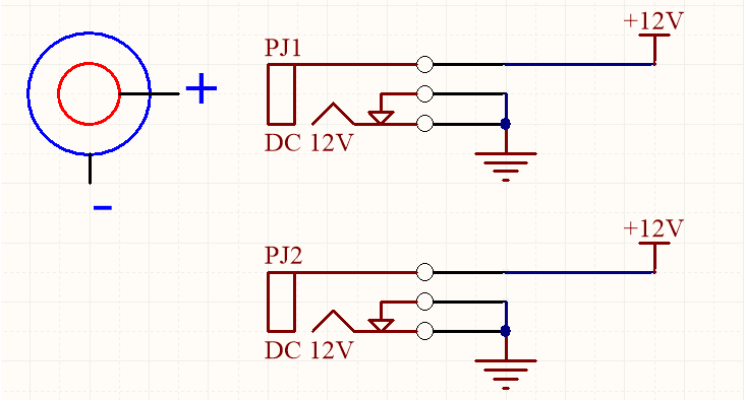


4. INTERFACE PIN CONNECTION

INTERFACE (HDMI Interface Board)

- **PJ1 & PJ2 Power Supply Power Jack:**

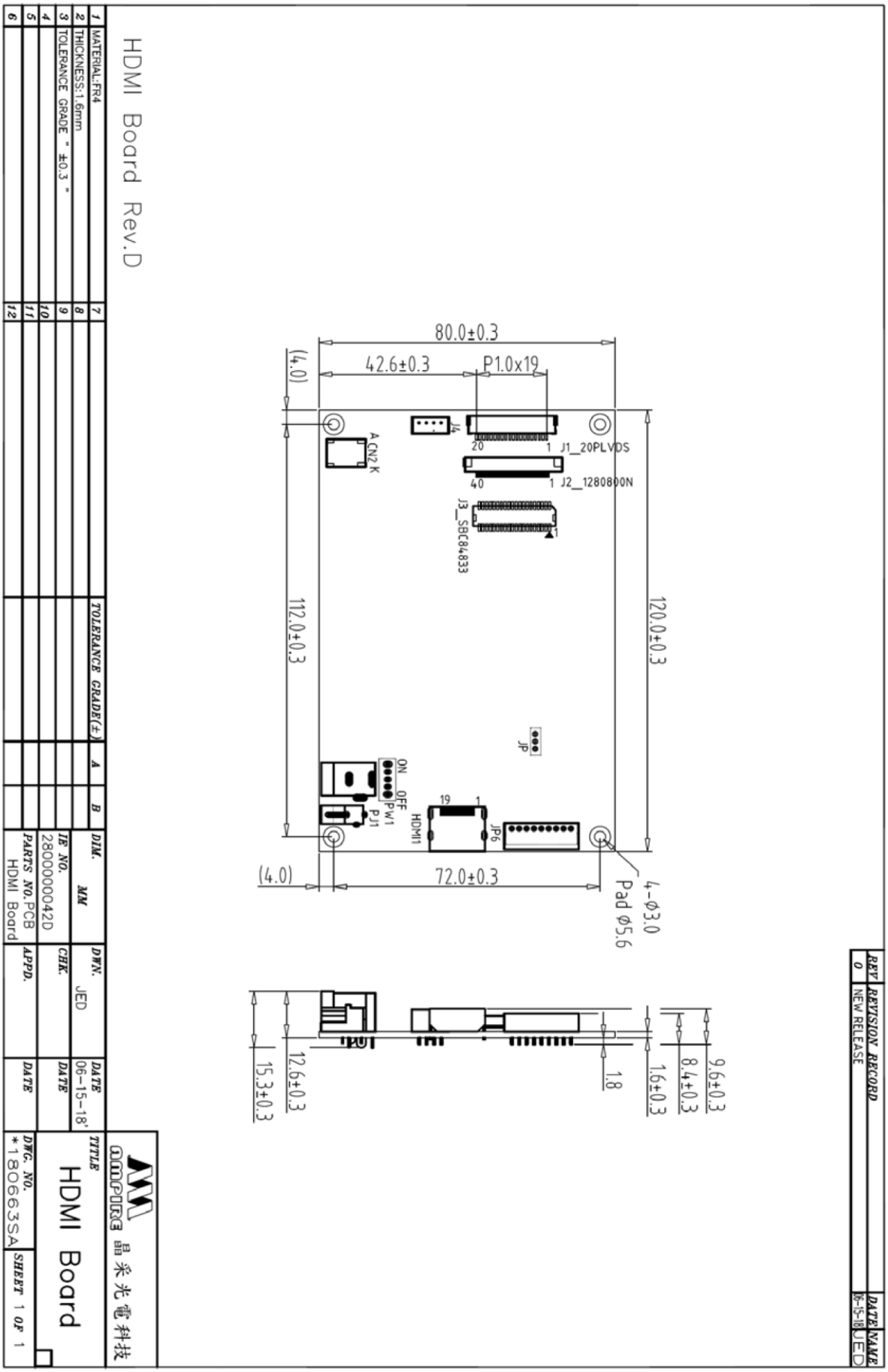
  Inner terminal is positive. Outer terminal is GND



- **HDMI1: HDMI Type A Connector**

HDMI			
			
PIN	**SIGNAL**	**PIN**	**SIGNAL**
1	**TMDS Data2+**	**11**	**TMDS Clock Shield (Ground)**
2	**TMDS Data2 Shield (Ground)**	**12**	**TMDS Clock-**
3	**TMDS Data2-**	**13**	**CEC (not used)**
4	**TMDS Data1+**	**14**	**Reserved (No Connection)**
5	**TMDS Data1 Shield (Ground)**	**15**	**SCL**
6	**TMDS Data1-**	**16**	**SDA**
7	**TMDS Data0+**	**17**	**DDC/CED (Ground)**
8	**TMDS Data0 Shield (Ground)**	**18**	**+5V input**
9	**TMDS Data0-**	**19**	**Hot Plug Detect**
10	**TMDS Clock+**		

5. Outline Dimension



6. Photo