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-1024768Q5TMQW-T52H
APPROVED BY	
DATE	

☐ Approved For Specifications
☐ Approved For Specifications & Sample

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APPROVED BY	CHECKED BY	ORGANIZED BY

RECORD OF REVISION

Revision Date	Page	Contents	Editor
2019/07/01	-	New Release	Mantle

1. FEATURES

The TFT is a color active matrix TFT LCD module using amorphous silicon TFT's (Thin Film Transistors) as an active switching device. This module is composed of a TFT LCD panel, a driving circuit and a back light system. This TFT LCD has a 15.0 inch diagonally measured active display area with (1024 x 768 pixel) resolution.

(1) 15.0 inch configuration
(2) One channel LVDS interface
(3) 16.2M color by 8 bit R.G.B signal input
(4) RoHS Compliance
(5) Viewing Direction: 6 o'clock (Gray Inversion)
(6) Projective Capacitive Touch Panel with USB Interface
(7)HDMI Board (LCM connect to J1 connector).

2. PHYSICAL SPECIFICATIONS

Item	Specifications	Unit	Note
LCD size	15.0" (Diagonal)	inch	
Active area	304.128 (H) ×228.096 (V)	mm	
Number of pixels	1024(H) ×768(V)	pixels	
Pixel pitch	0.297(H) × 0.297(V)	mm	
Pixel arrangement	RGB Vertical stripe		
Display colors	16.2M	colors	
Display mode	Normally white		
Back-light	Single LED (Side-Light type)		
Gray Inversion	6 o'clock	-	

3. ABSOLUTE MAX. RATINGS

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

Item	Symbol	Values		UNIT	Note
		Min.	Max.		
LED Power Supply Voltage	V_{LED}	-0.3	15.0	V	GND=0
Logic Supply Voltage	V_{DD}	-0.3	5.0	V	
Operating Temperature	T_{OPA}	-20	70	^{o}C	
Storage Temperature	T_{STG}	-30	80	^{o}C	

4. ELECTRICAL CHARACTERISTICS

4.1 TFT LCD Module

Item	Symbol	Values			UNIT	Note
		Min.	Typ.	Max.		
Power voltage	VDD	3.0	3.3	3.6	V	Note1
Current of power supply	IDD	-	0.3	-	A	**VDD=3.3V Black pattern**
Power voltage for LED driver	VLED	-	12	-	V	
LED driver current of power supply	ILED	-	1.2		A	**VLED=12V ADJ=100%**

Note 1: **VDD-dip condition :**

when 2.7V≦VDD<3.0V，td≦10ms.

VDD＞3.0V ，VDD-dip condition should be same as VDD-turn-con condition.

4.2 Signal Electrical Characteristics

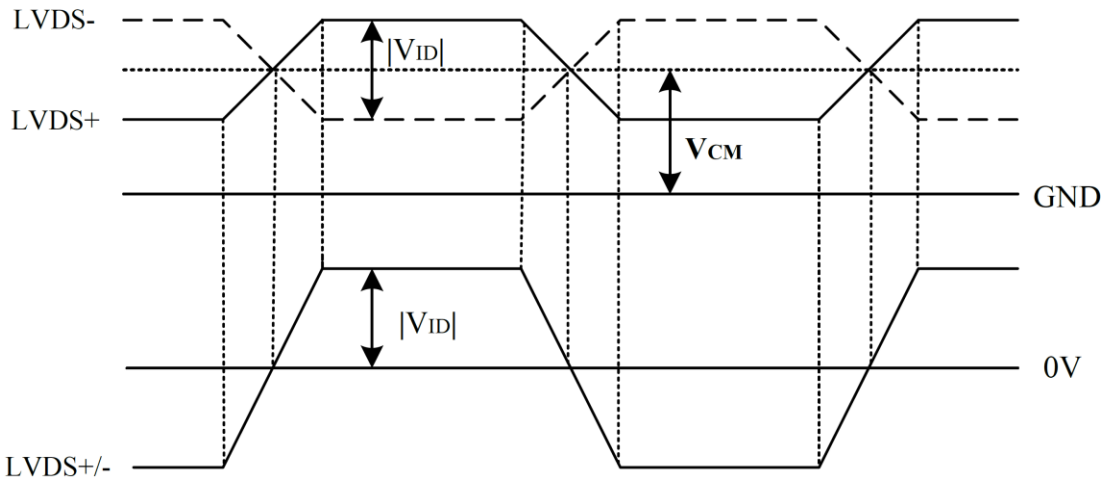
4.2.1 Signal Electrical Characteristics For LVDS Receiver

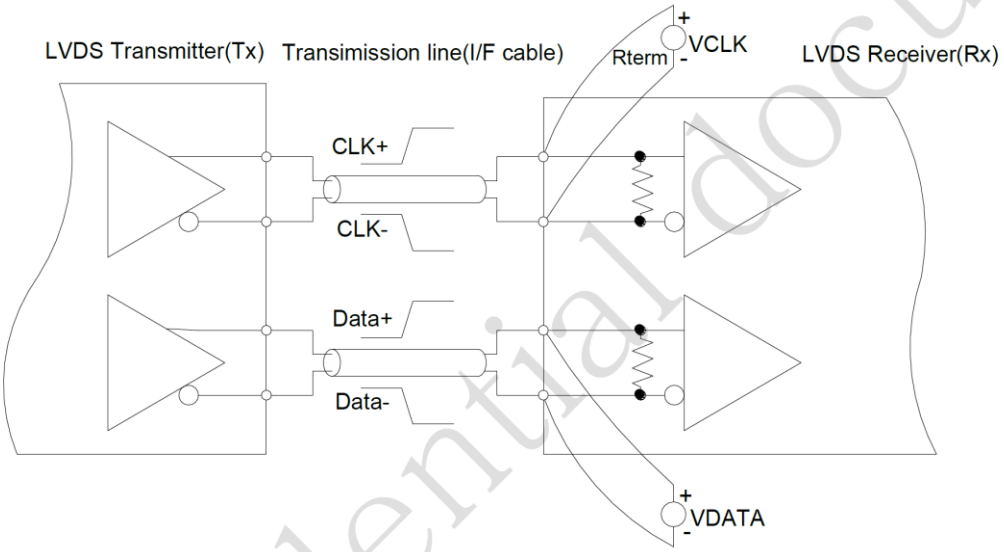
The built-in LVDS receiver is compatible with (ANSI/TIA/TIA-644) standard.

Item	Symbol	Values			UNIT	Note
		Min.	Typ.	Max.		
Differential Input High Threshold	Vth	-	-	+100	mV	V_{CM}=+1.2V
Differential Input Low Threshold	Vtl	-100	-	-	mV	V_{CM}=+1.2V
Magnitude Differential Input Voltage	|VID|	200	-	600	mV	-
Common Mode Voltage	V_{CM}	-	1.2	1.85-|VID|/2	V	-
Input Leakage Current	/	-10	-	10	mA	V_{CM}=+1.2V

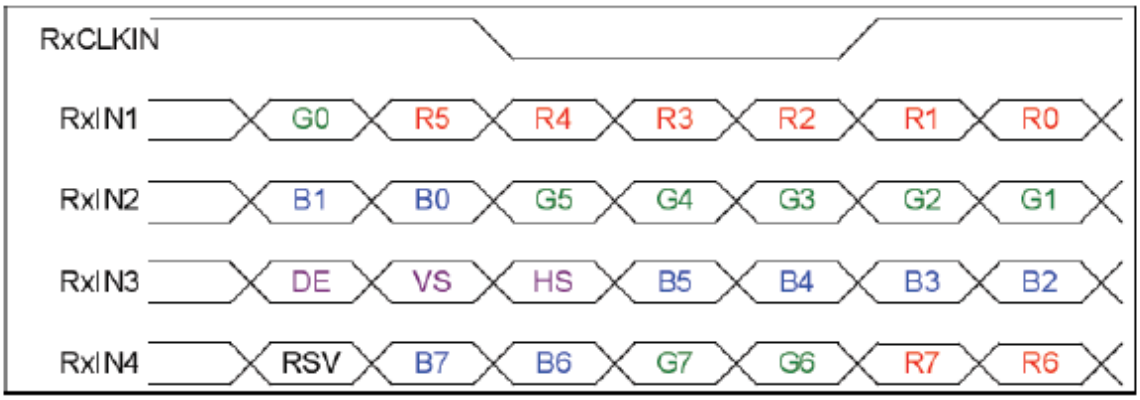
Note (1) Input signals shall be low or Hi- resistance state when VDD is off.

Note (2) All electrical characteristics for LVDS signal are defined and shall be measured at the interface connector of LCD.





4.3 LVDS Input Data Mapping



4.4 Timing characteristics of input signals

Synchronization Method : DE only

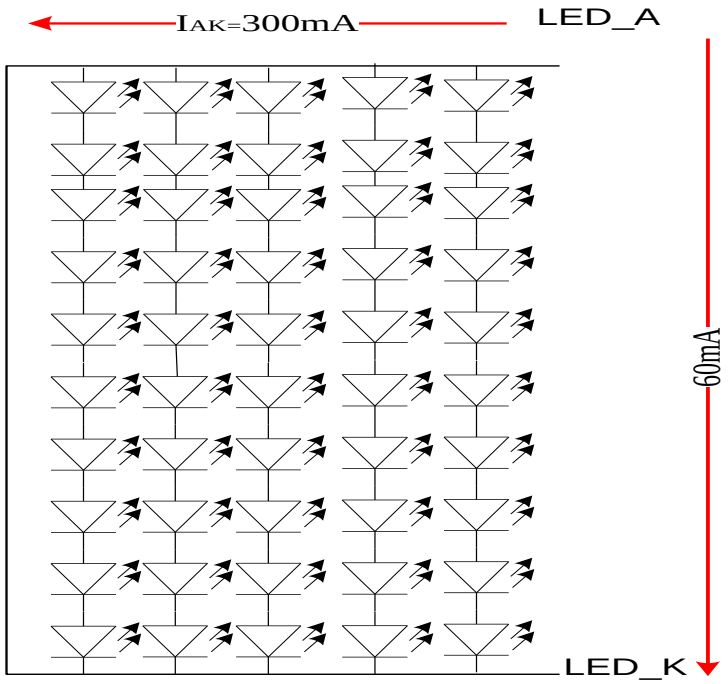
Parameter	Symbol	Unit	Min.	Typ.	Max.
LVDS Clock Frequency <single >	fdck	MHz	50	65	80
H Total Time	Thp	clocks	1056	1344	1720
H Active Time	HA	clocks	1024	1024	1024
H Front Porch	Thfp	clocks	-	48	-
H Sync Pulse Width	HSPW	clocks	-	32	-
H Back Porch	Thbp	clocks	-	240	-
H Frequency	fh	kHz	46.32	48.36	59.40
V Total Time	Tvp	lines	772	806	990
V Active Time	VA	lines	768	768	768
V Front Porch	Tvfp	lines	-	3	-
V Sync Pulse Width	VSPW	lines	-	12	-
V Back Porch	Tvbp	lines	-	23	-
V Frequency	fv	Hz		60	

Note: H Blank area and V Blank area can not be changed at every frame

4.5 Backlight Driving Conditions

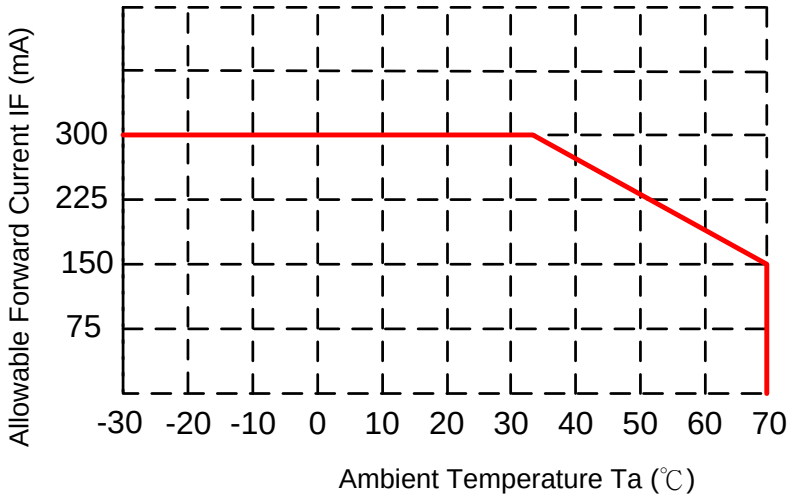
Item	Symbol	Values			Unit	Note
		Min.	Typ.	Max.		
LED Driver voltage	VLED	-	12	-	V	
Power Supply Current For LED Driver	ILED	-	1.2	-	A	VLED=12V VADJ=5V (duty 100%)
ADJ Input Voltage	V_{ADJ}	3.3	5	VLED	V	duty=100%
ADJ Dimming Freq.	F_{ADJ}	0.1		30	kHz	
LED voltage	VAK	--	35	--	V	I_{AK} =300mA Ta=25℃
LED current	I_{AK}	--	300	--	mA	Ta=25℃
		--	225	--	mA	Ta=60℃
LED Life Time	-	--	50K	--	Hour	Note (2)

Note (1) The constant current source is needed for white LED back-light driving.
When LCM is operated at 60 deg.C ambient temperature, the I_L of the LED back-light should be adjusted to 225mA max



Note (2) : Condition: Ta=25℃, continuous lighting

Life time is estimated data. Definitions of failure:
1. LCM brightness becomes half of the minimum value.
2. LED doesn't light normally.
When LCM is operated over 40℃ ambient temperature, the I_{LED} should follow :



5. OPTICAL SPECIFICATION

5.1 Optical specification

Item	Symbol	Condition	Values			Unit	Note
			Min.	Typ.	Max.		
Viewing angle	θ L	(CR≧10)	70	80	--	degree	Note1 Note2
	θ R		70	80	--		
	θ U		70	80	--		
	θ D		60	80	--		
Response time	TR	Normal θ =Φ=0°	--	5	--	msec	Note3
	TF		--	20	--	msec	
Contrast ratio	CR		450	800	--	--	Note2
Color chromaticity	WX		0.27	0.32	0.37	--	Note1 Note4
	WY		0.29	0.34	0.39	--	
	RX		0.57	0.62	0.67	--	
	RY		0.30	0.35	0.4	--	
	GX		0.27	0.32	0.37	--	
	GY		0.58	0.63	0.68	--	
	BX		0.1	0.15	0.2	--	
	BY		0.02	0.07	0.12.	--	
Luminance	L		680	850	--	cd/m^2	Note4
Luminance uniformity	YU		70	75	--	%	Note5

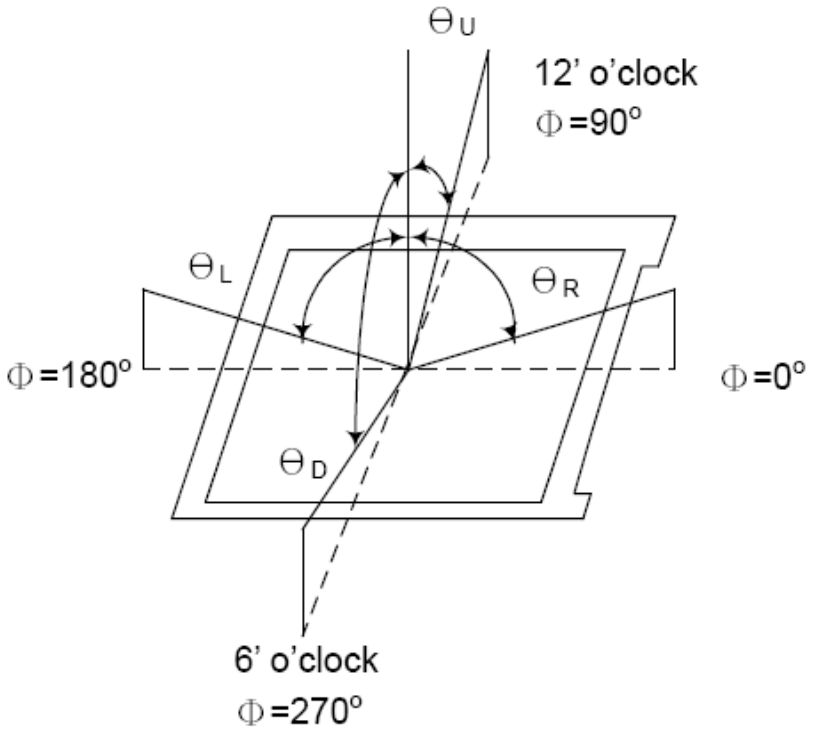
5.2 Measuring Condition

- Measuring surrounding : dark room
- Ambient temperature : 25±2℃
- 15min. warm-up time

5.3 Measuring Equipment

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 of view : 1° / Height : 120mm.)

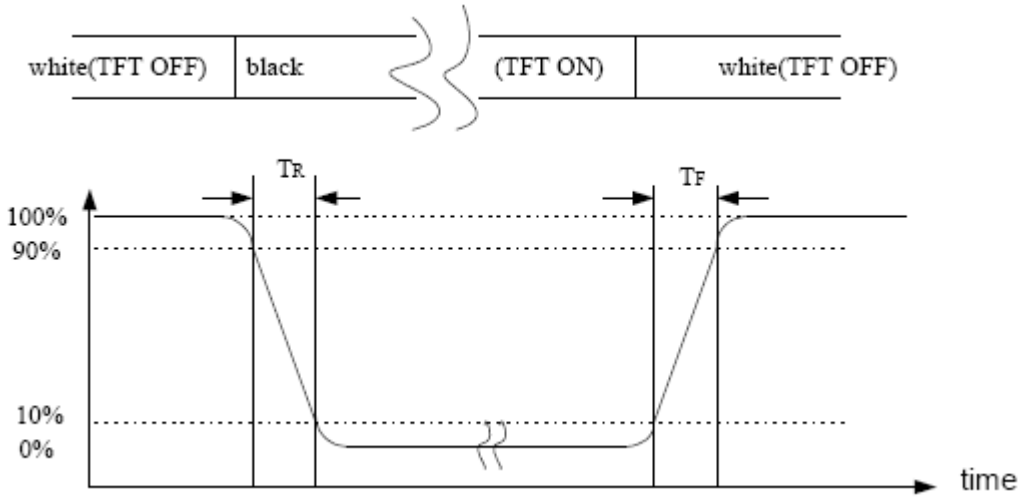
Note 1 : Definition of viewing angle range



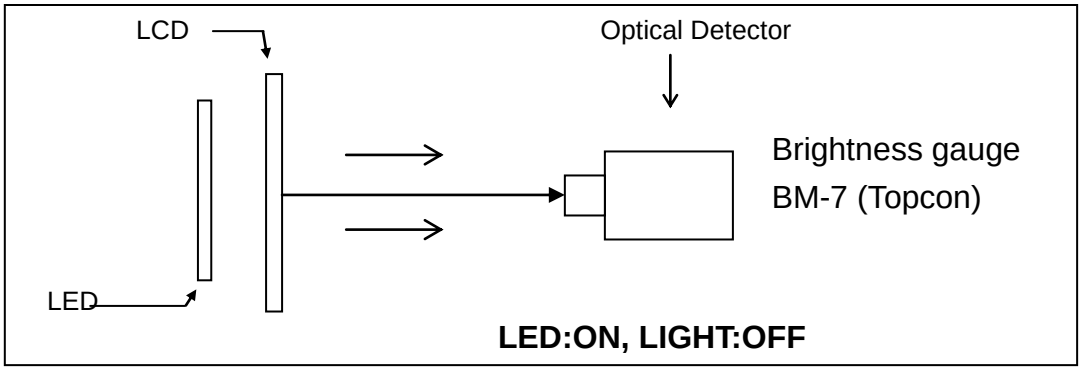
Note 2 : Definition of Contrast Ratio (CR) :
measured at the center point of panel

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

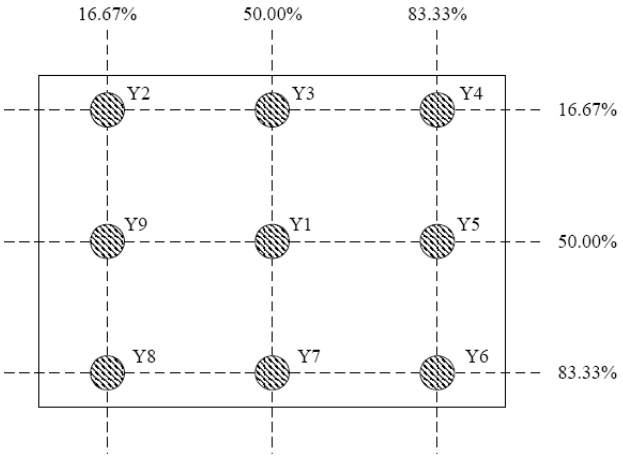
Note 3 : Definition of Response time : Sum of T_R and T



Note 4 : Definition of optical measurement setup



Note 5 : Definition of brightness uniformity



$$\text{Luminance uniformity} = \frac{\text{(Min Luminance of 9 points)}}{\text{(Max Luminance of 9 points)}} \times 100\%$$

Note 6 : Rubbing Direction (The different Rubbing Direction will cause the different optima view direction

Note 7 : Condition: Ta=25℃, Life time is estimated data.

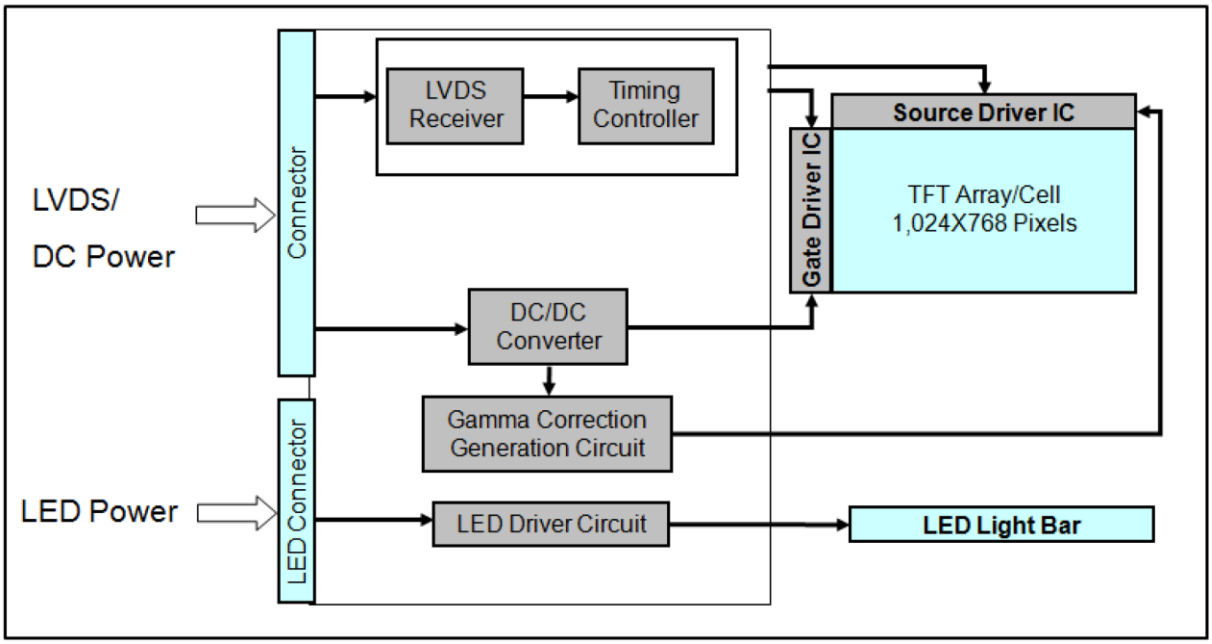
Definitions of failure:

i. LCM brightness becomes half of the minimum value.

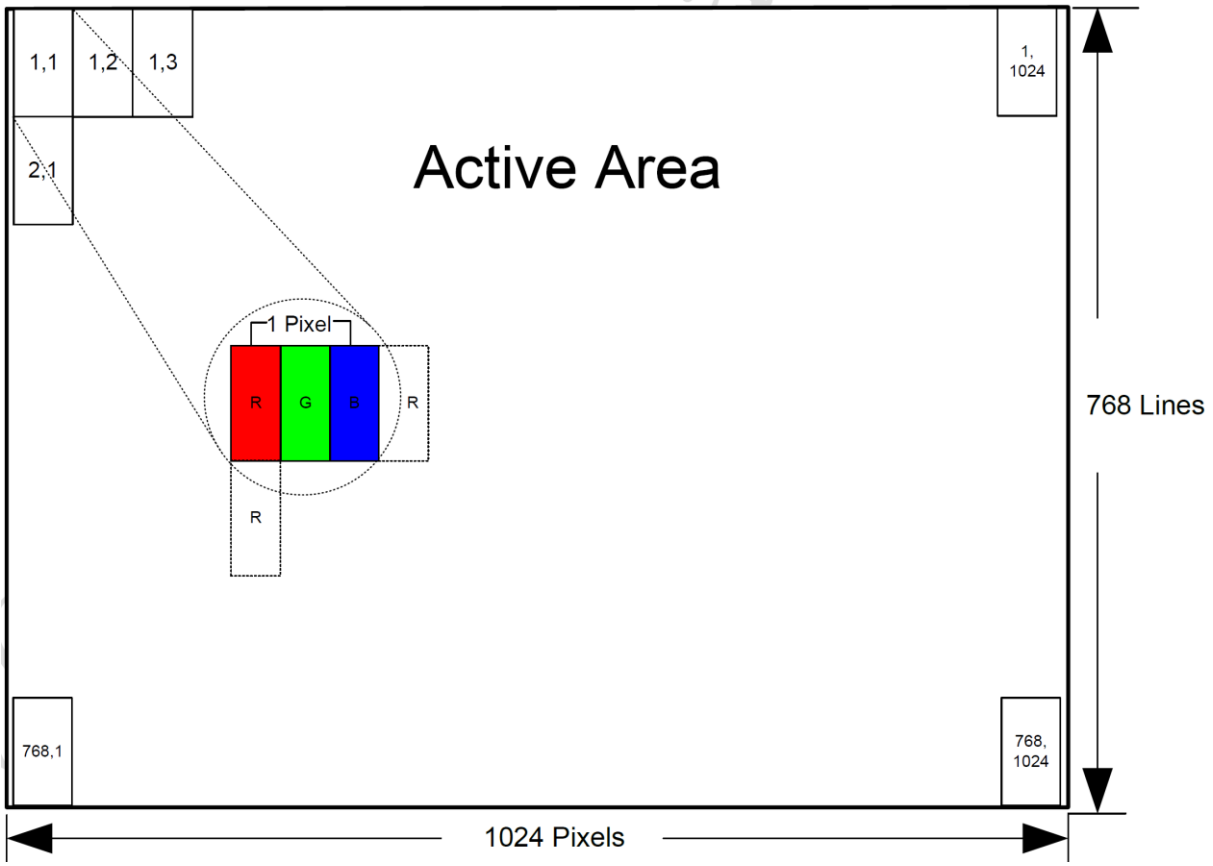
ii. LED doesn't light normally.

6. BLOCK DIAGRAM

6.1 TFTLCD Module



6.2 Pixel format



7.INTERFACE

7.1 Electrical Interface Connection

CN1(Input signal): MSB240420HD

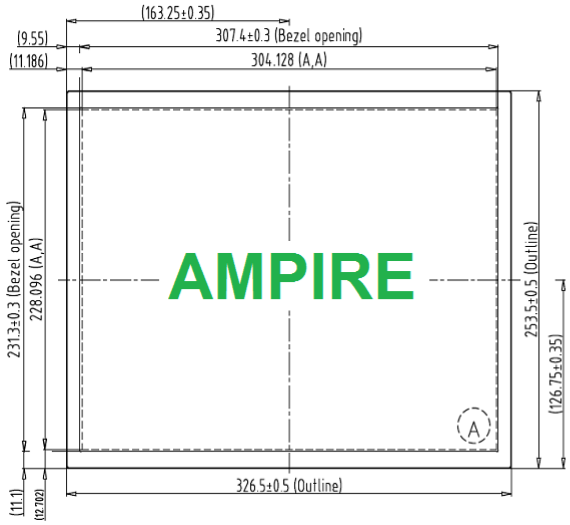
Pin No.	Symbol	Description	Note
1	VDD	3.3V Power	
2	VDD	3.3V Power	
3	VSS	Ground	
4	REV	Reverse Scan selection	Note1*
5	Rin1-	LVDS Data Signal - Rin1-	
6	Rin1+	LVDS Data Signal+ Rin1+	
7	VSS	Ground	
8	Rin2-	LVDS Data Signal – Rin2-	
9	Rin2+	LVDS Data Signal+ Rin2+	
10	VSS	Ground	
11	Rin3-	LVDS Data Signal – Rin3-	
12	Rin3+	LVDS Data Signal+ Rin3+	
13	VSS	Ground	
14	CIKIN-	LVDS Clock Signal - CIKIN-	
15	CIKIN+	LVDS Clock Signal+ CIKIN+	
16	GND	Ground	
17	Rin4-	LVDS Data Signal – Rin4-	
18	Rin4+	LVDS Data Signal+ Rin4+	
19	VSS	Ground	
20	NC	Not connect	

Note1* :

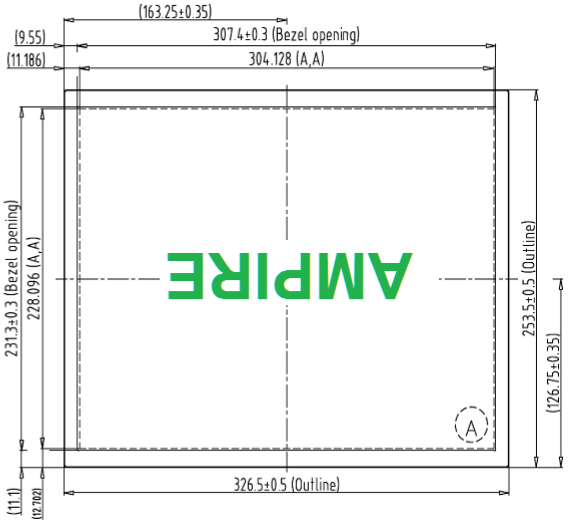
(REV=Low)(The display image is from Top to Bottom and Left to Right)

(REV=High)(The display image is from Bottom to Top and Right to Left)

(REV=Low)



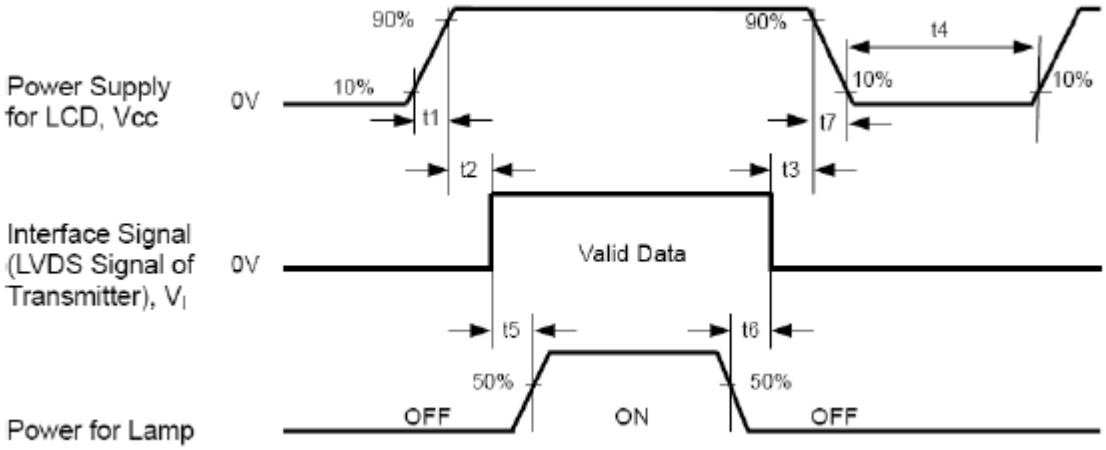
(REV=High)



CN4(Input signal): FPHTI-104TTW000

Pin No.	Symbol	Description	Note
1	VIN	12V Power	
2	LED_EN	Function selection:5V-Backlight ON , GND-Backlight OFF	
3	GND	Ground	
4	PWN	Adjust for LED brightness	

8. Power On/Off Sequence



Parameter	Symbol	Unit	min	typ	max
VDD Rise Time	T1	ms	0.5	-	10
VDD Good to Signal Valid	T2	ms	0	-	20
Signal Disable to Power Down	T3	ms	0	-	1000
Power Off	T4	ms	1000	-	
Signal Valid to Backlight On	T5	ms	300	-	
Backlight Off to Signal Disable	T6	ms	200	-	
VDD Fall Time	T7	ms	0	-	100

9. Projected Capacitive Touch Controller

ITEM	SPECIFICATION
Type	Projective Capacitive Touch Panel
Activation	Multi-touch
X/Y Position Reporting	Absolute Position
Touch Force	No contact pressure required
Calibration	No need for calibration
Report Rate	TBD
Interface	USB
Control IC	ILI2510
Conductive susceptibility IEC/EN61000-4-6	10Vrms
Radiated Susceptibility IEC/EN61000-4-3	30V/m
Cover Glass	1.8mm 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	USB VDD	4.75	5.0	5.25	V	
Power Consumption	I_{VDD}		T.B.D		mA	

Pin definition of TP FPC:

CN6		
Pin No.	**Symbol**	**Function**
1	USB VDD	5V Regulated
2	USB D+	USB data.
3	USB D-	
4	NC	No connection
5	NC	No connection
6	GND	POWER GND

10. RELIABILITY TEST CONDITIONS

Test Item	Test Conditions	Note
High Temperature Operation	70±3°C , Dry t=240 hrs	
Low Temperature Operation	-20±3°C , Dry t=240 hrs	
High Temperature Storage	80±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) ~ 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.

11. General Precautions

11-1 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.

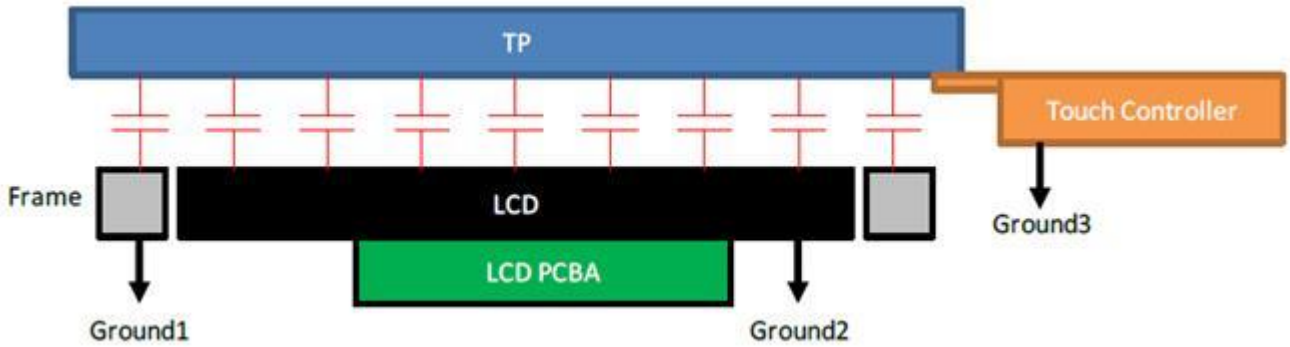
11-2 Handling

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.

11-3 Static Electricity

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

(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

11-4 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.

11-5 Cleaning

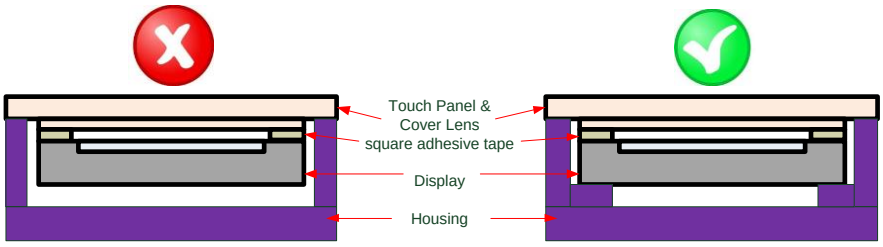
1. Do not wipe the polarizer with dry cloth. It might cause scratch.
2. Only use a soft sloth with IPA to wipe the polarizer, other chemicals might permanent damage to the polarizer.

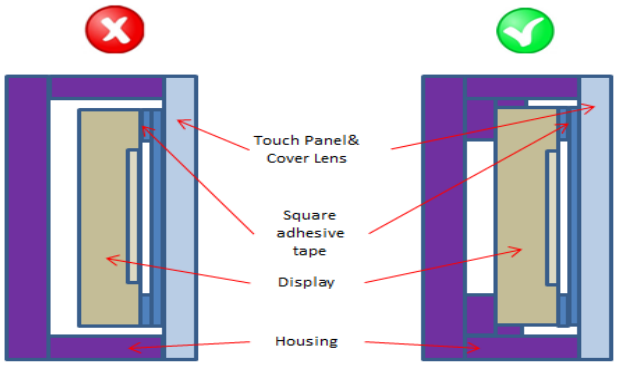
11-6 Mechanism

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

(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.

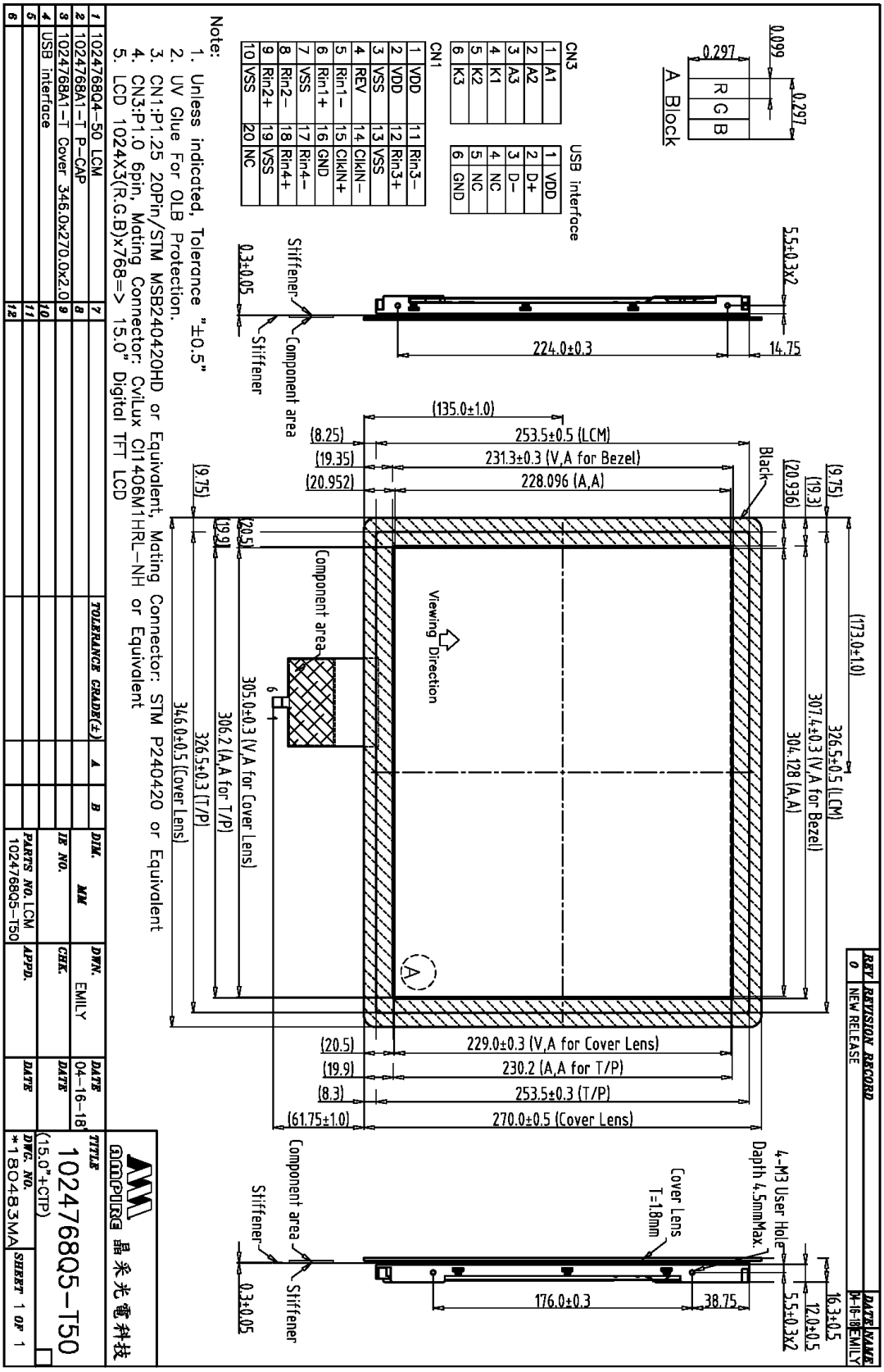




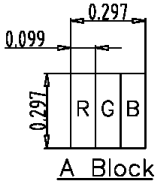
11-7 Others

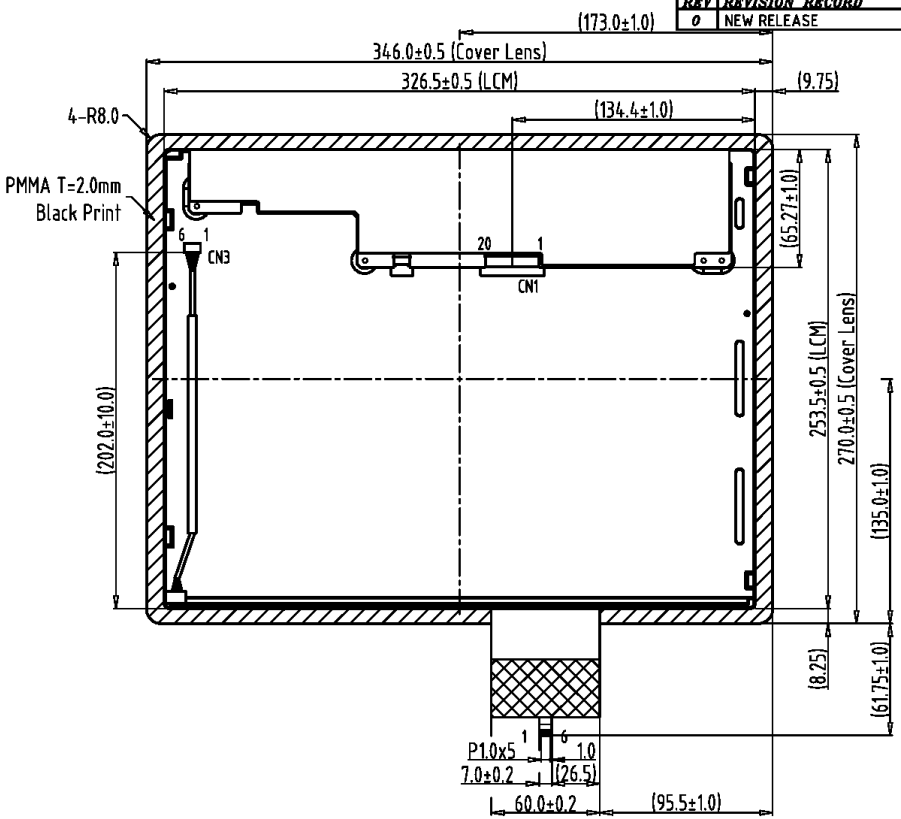
1. AMIPRE will provide one year warrantee for all products and three months warrantee for all repairing products.
2. Do not keep the LCD at the same display pattern continually. The residual image will happen and it will damage the LCD. Please use screen saver

12. OUTLINE DIMENSION



REV	REVISION RECORD	DATE	NAME
0	NEW RELEASE	04-16-18	EMILY





Back view

CN3

1	A1
2	A2
3	A3
4	K1
5	K2
6	K3

USB interface

1	VDD
2	D+
3	D−
4	NC
5	NC
6	GND

CN1

1	VDD	11	Rin3−
2	VDD	12	Rin3+
3	VSS	13	VSS
4	REV	14	ClkIN−
5	Rin1−	15	ClkIN+
6	Rin1+	16	GND
7	VSS	17	Rin4−
8	Rin2−	18	Rin4+
9	Rin2+	19	VSS
10	VSS	20	NC

Note:
1. Unless indicated, Tolerance "±0.5"
2. UV Glue For OLB Protection.
3. CN1:P1.25 20Pin/STM MSB240420HD or Equivalent, Mating Connector: STM P240420 or Equivalent
4. CN3:P1.0 6pin, Mating Connector: CviLux CI1406M1HRL−NH or Equivalent
5. LCD 1024X3(R.G.B)x768=> 15.0" Digital TFT LCD

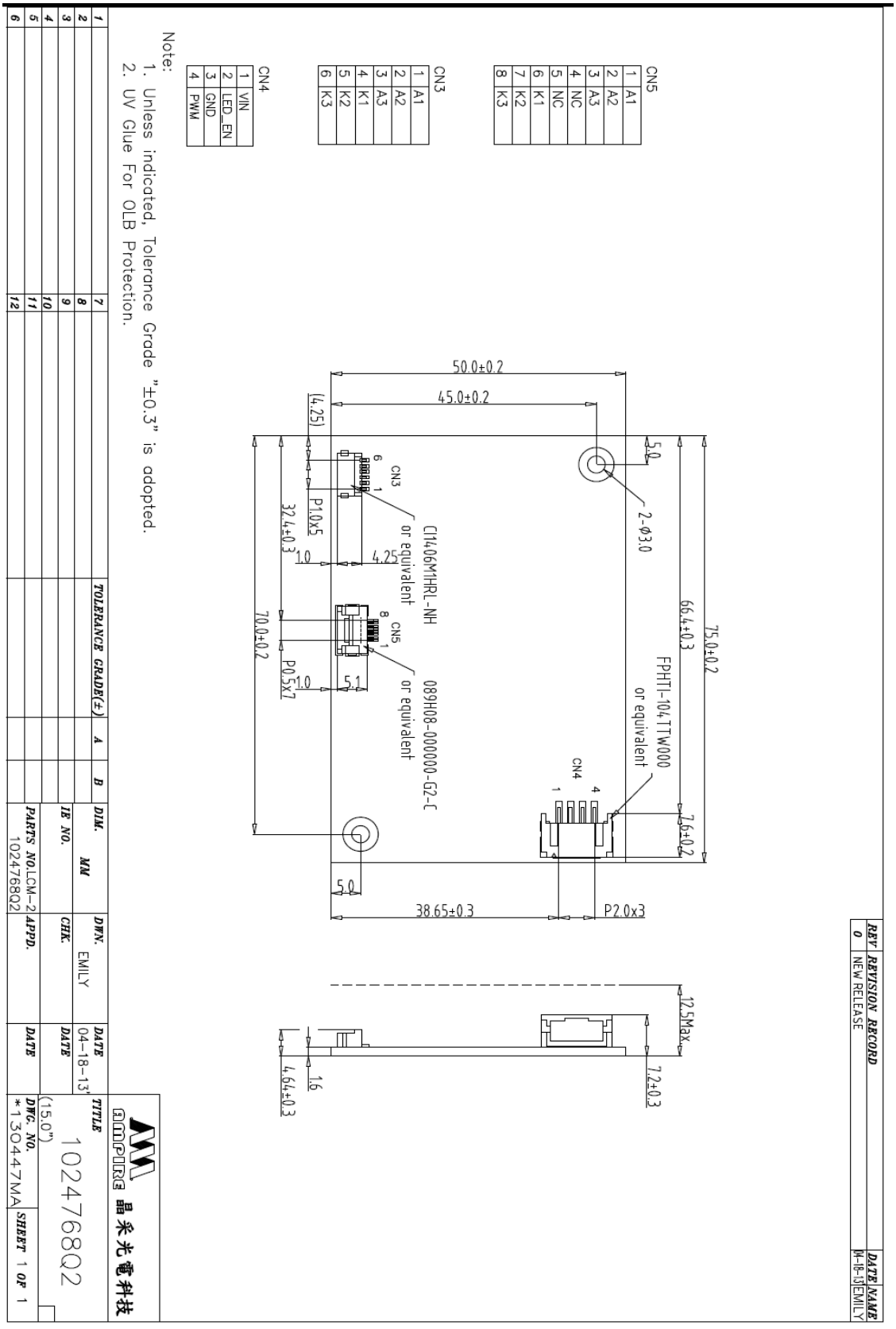
				TOLERANCE GRADE(±)	A	B	DIM. MM	DWN. EMILY	DATE 04-16-18	TITLE 102476Q5−T50 (15.0"+CTP)
1	1024768Q4−50 LCM	7					IE NO.	CHK.	DATE	
2	1024768A1−T P−CAP	8								
3	1024768A1−T Cover 346.0x270.0x2.0	9					PARTS NO. LCM−1 102476Q5−T50	APPD.	DATE	DWG. NO. *180484MA SHEET 1 OF 1
4	USB interface	10								
5		11								
6		12								

AMPIRE 晶采光電科技

AMPIRE CO., LTD.

Date : 2019/07/01

13. LED DRIVER BOARD



晶采光電科技股份有限公司
AMPIRE CO., LTD.

Auxiliary

AMPIRE HDMI Board

REV.D

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新北市汐止區新台五路一段 116 號 4 樓(東方科學園區 A 棟)
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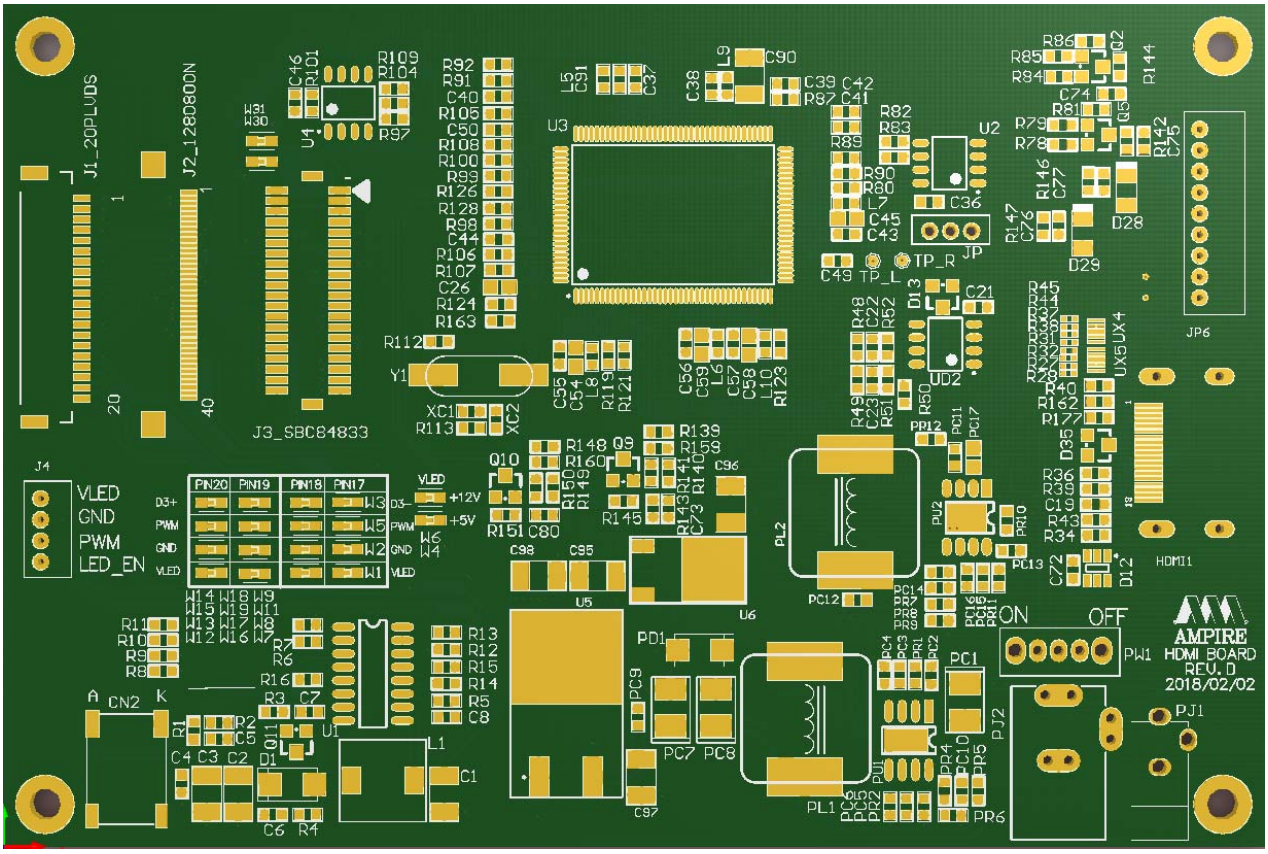
RECORD OF REVISION

Revision Date	Page	Contents	Editor
2018/06/19	-	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.



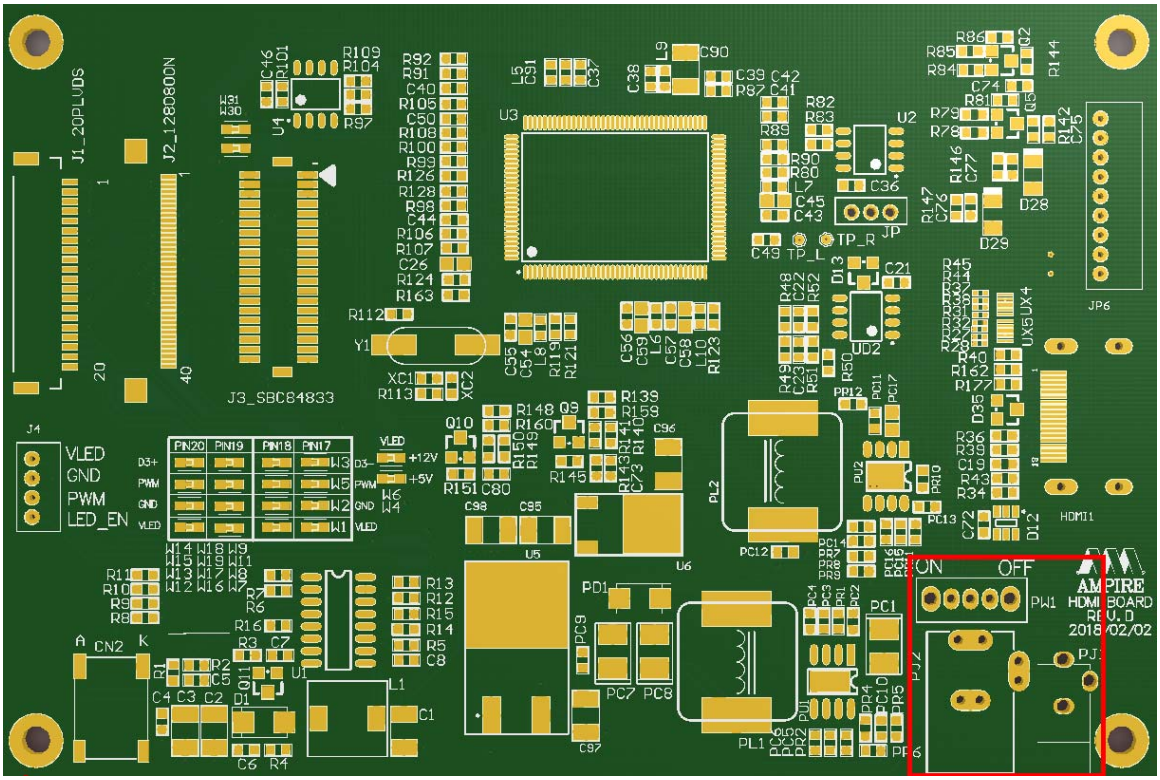
2. Support input video format :

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

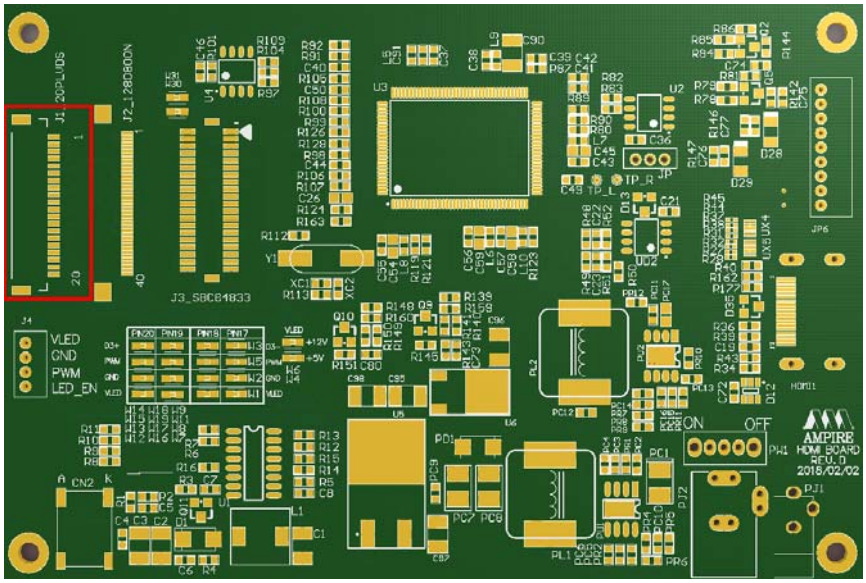
3.1 POWER CONNECTOR (PJ1、PJ2)

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



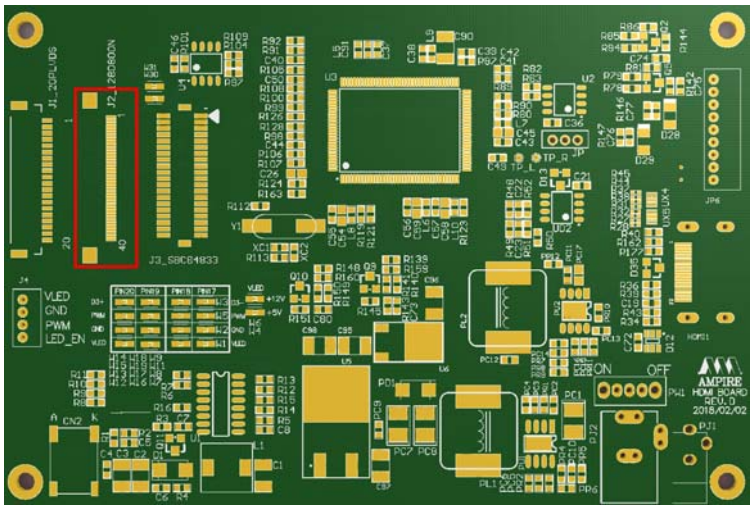
3.2 J1_20PIN LVDS

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	GND	Power Ground
20	JUMP	JUMP



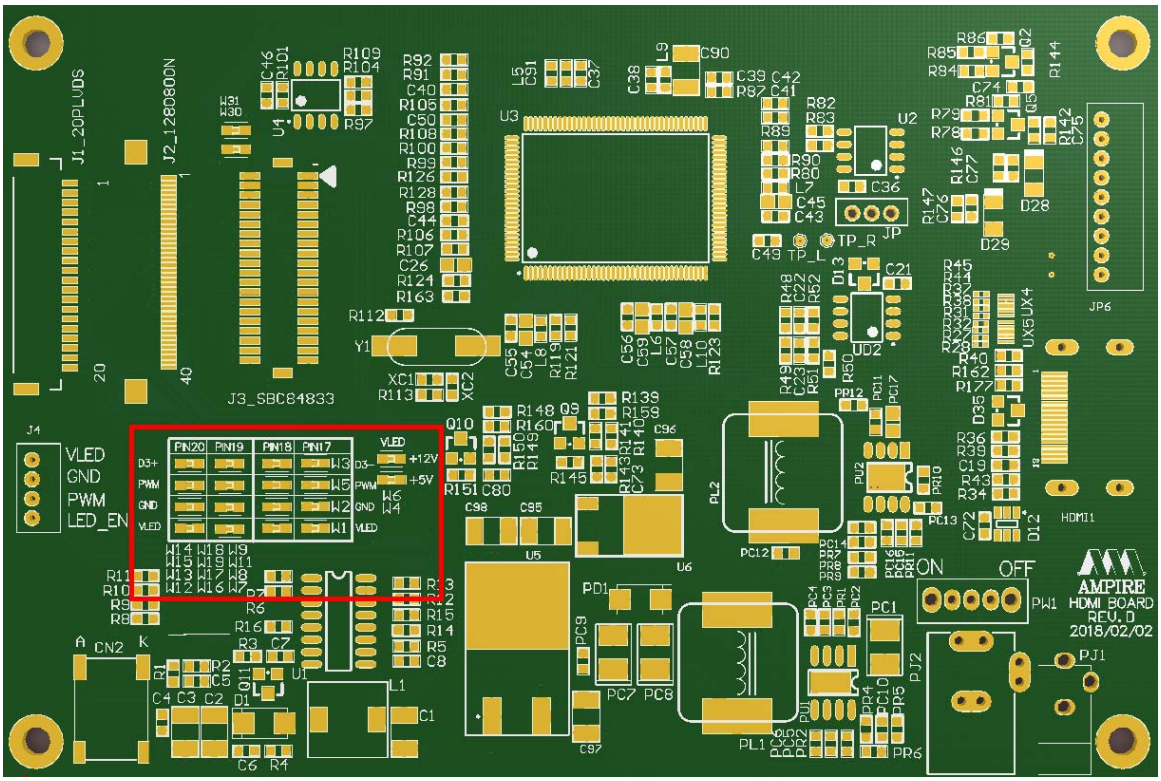
3.3 J2_40PIN LVDS

Pin #	Singnal 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	
36-40	NC	Not Connect	



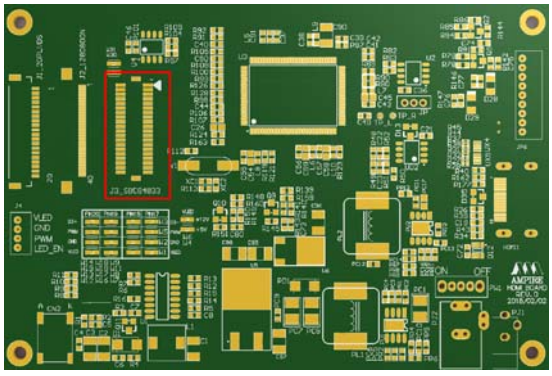
JUMP FOR PIN17 to PIN20 and VLED

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



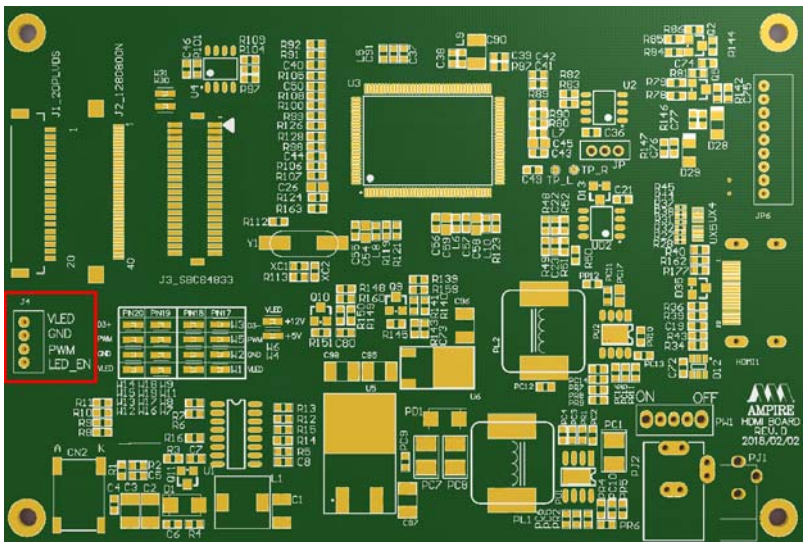
3.4 J3 40PIN LVDS

Pin #	Singnal 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 Contrller Connector

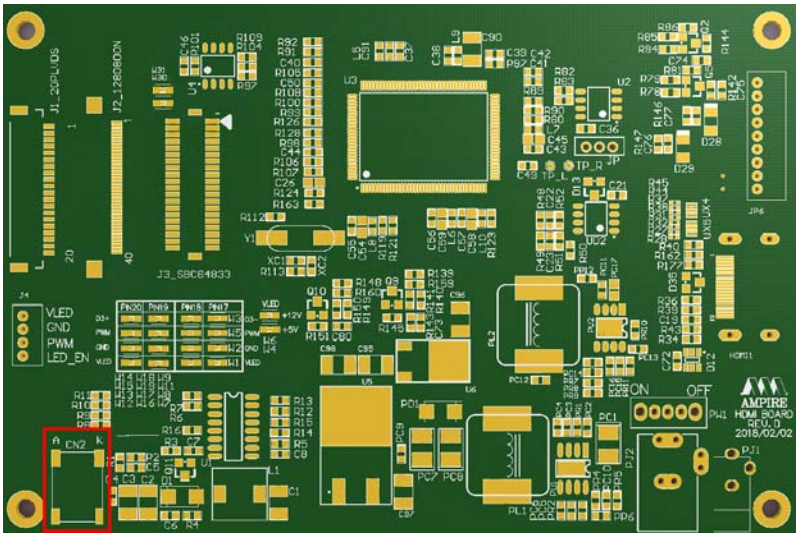
Pin No.	Symbol	I/O	Description	Note
1	VLED	P	Voltage for LED circuit (5.0V or 12V)	
2	GND	I	Power ground	
3	ADJ	P	Adjust the LED brightness by PWM	
4	LED_EN	I	LED BLU ON/OFF. High level: ON; Low level: OFF.	



3.6 BackLight A,K Connector

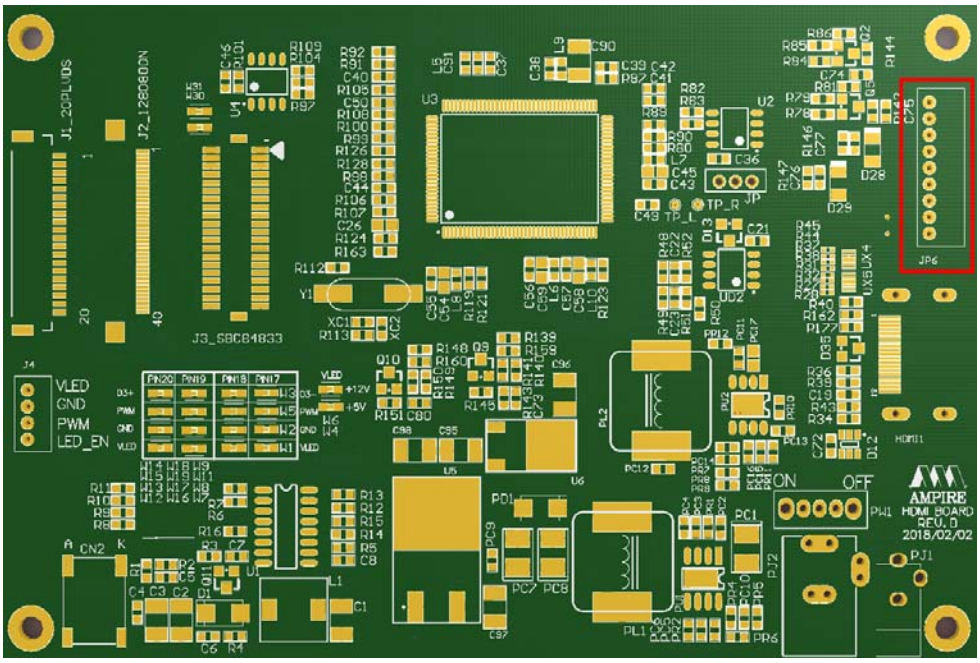
- **Only for external backlight connector**

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.**

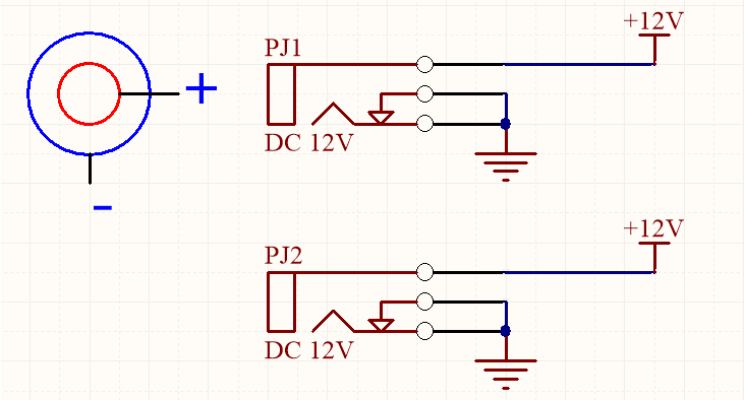


4. INTERFACE PIN CONNECTION

INTERFACE (HDMI Interface Board)

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

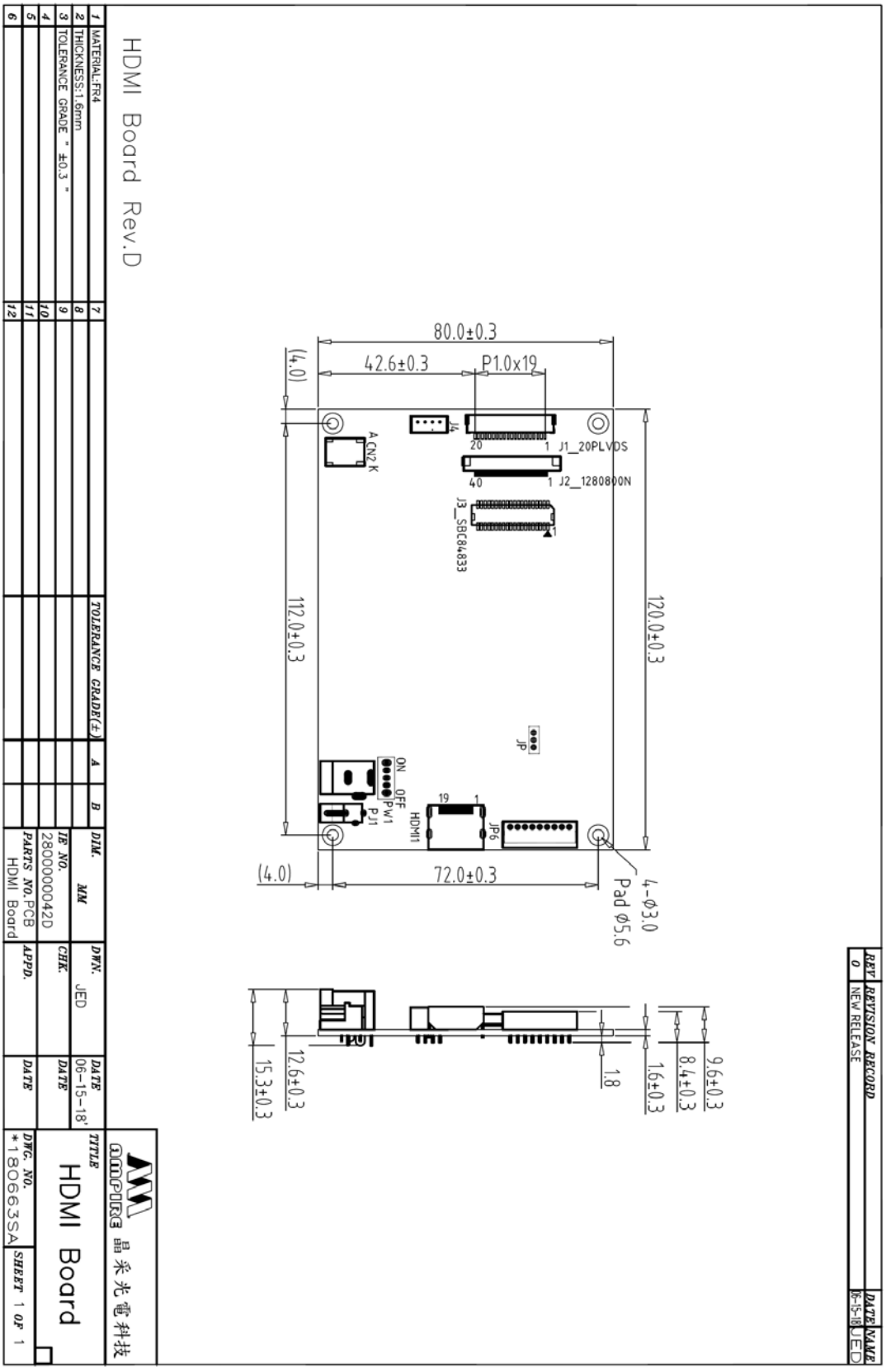
  Inner terminal is positive. Outer terminal is GND



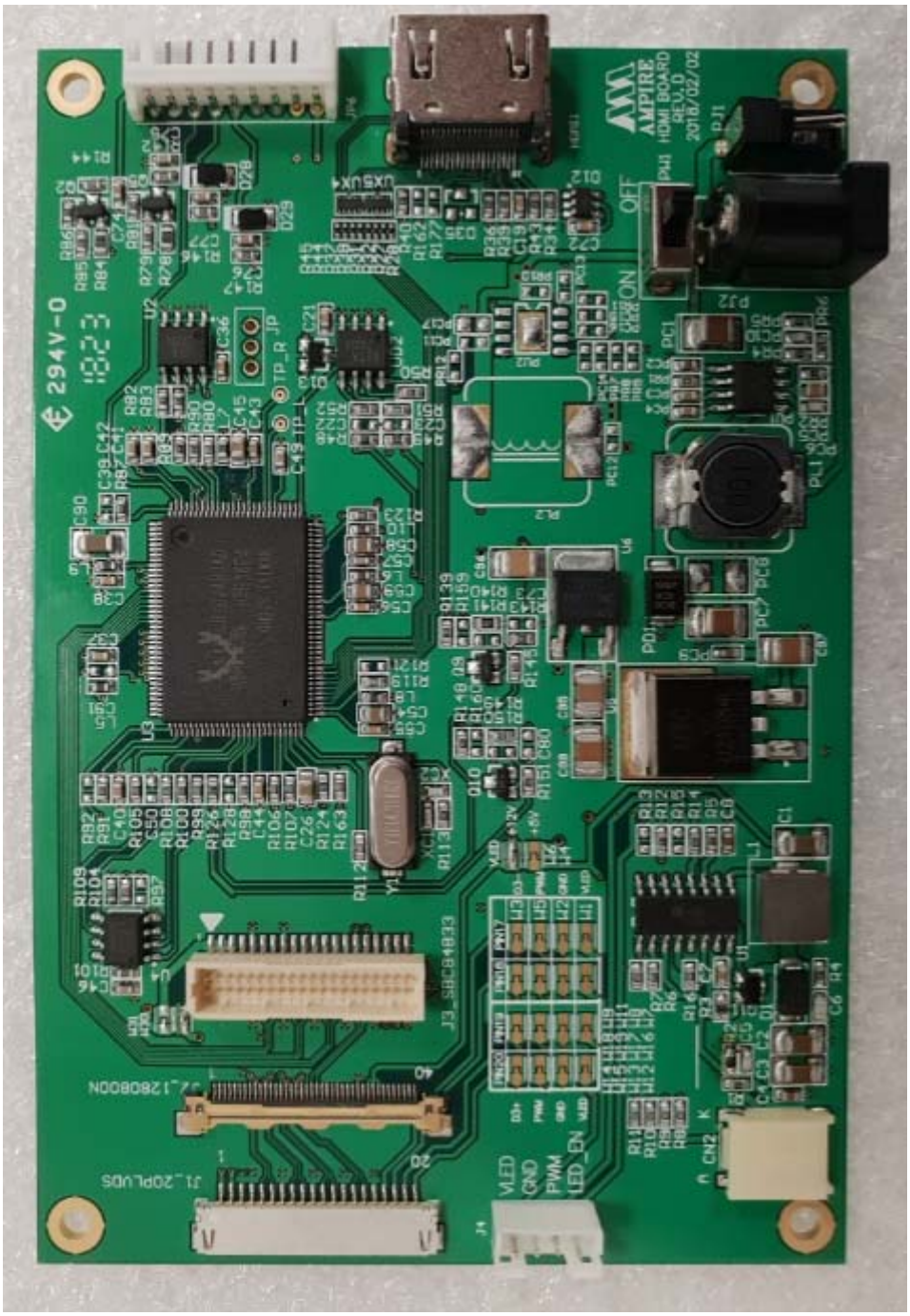
- **HDMI1: HDMI Type A Connector**

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


AMPIRE
HDMI BOARD
REV_D
2018/02/02
ON
OFF
294V-0
TP_R JP
TP_L
J1_20PLVDS
VLED
GND
PWM
LED_EN