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-1024768QATZQW-40H-A**
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	Kokai	Jessica

This Specification is subject to change without notice.

RECORD OF REVISION

| Revision Date	Page	Contents	Editor
2023/07/26	-	New Release	Jessica
2023/10/30	15	Update LED driver board	Jessica

1. Features

The TFT is a Color Active Matrix Liquid Crystal Display with a back light system. The matrix uses a-Si Thin Film Transistor as a switching device. This TFT LCD has a 15 inch diagonally measured active display area with XGA resolution (1,024 horizontal by 768 vertical pixels array).

(1) 15.0 inch configuration
(2) One channel LVDS interface
(3) 16.2M color by 8 bit R.G.B signal input
(4) High Durability Anti-Glare Automotive polarizer.
(5) Standalone LED driver board.
(6) RoHS Compliance

2. Physical Specifications

Item	Specifications	Unit	Note
LCD size	15.0" (Diagonal)	inch	
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 Black		
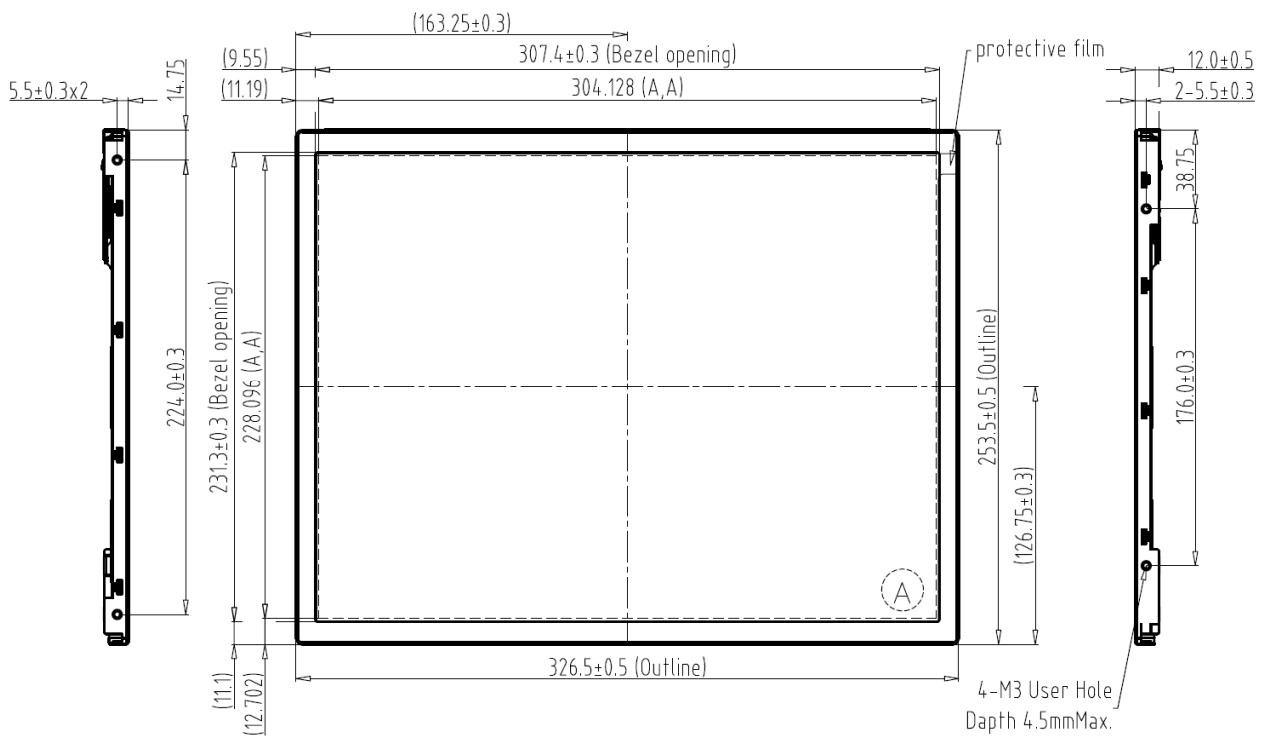
3. Absolute Max. Ratings

Item	Symbol	Values		UNIT	Note
		Min.	Max.		
Logic Supply Voltage	VDD	-0.3	3.6	V	
Operating Temperature	TOPA	**-30**	**85**	°C	(1)(2)(3)(4)
Storage Temperature	TSTG	**-30**	**85**	°C	

Note(1) All the parameters specified in the table are absolute maximum rating values that may cause faulty operation or unrecoverable damage, if exceeded. It is recommended to follow the typical value.

Note(2) All the contents of electro-optical specifications and display fineness are guaranteed under

Note(3) Normal conditions. All the display fineness should be inspected under normal conditions. Normal conditions are defined as follow: Temperature: 25℃, Humidity: 55± 10%RH.

Note(4) Unpredictable results may occur when it was used in extreme conditions. Ta= Ambient

Note(5) Temperature, Tgs= Glass Surface Temperature. All the display fineness should be inspected under normal conditions.

Note(6) Temperature and relative humidity range are shown in the figure below. Wet bulb temperature should be lower than 47℃, and no condensation of water. Besides, protect the module from static electricity

4. Electrical Characteristics

4.1 Signal Electrical Characteristics

Signal Electrical Characteristics for LVDS Receiver

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

Table 7 LVDS Receiver Electrical Characteristics

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Differential Input High Threshold	Vth	-	-	(+150)	mV	VCM=1.2V
Differential Input Low Threshold	Vtl	(-150)	-	-	mV	VCM=1.2V
Magnitude Differential Input Voltage	|VID|	(150)	-	(600)	mV	
Common Mode Voltage	VCM	-	(1.2)	-	V	
Input Leakage Current	/	(-10)	-	(10)	uA	

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.
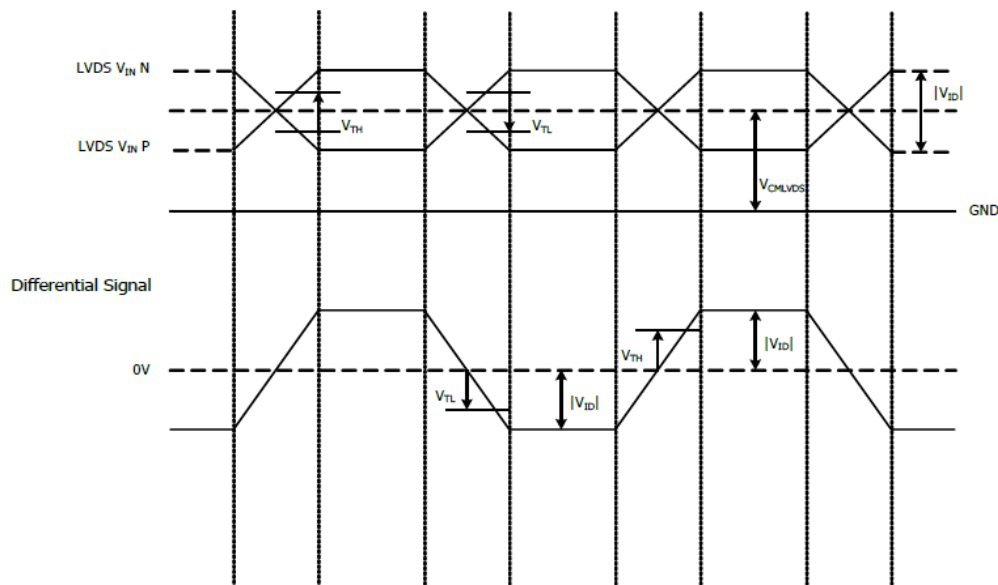

Figure 8 Voltage Definitions

Table 8 LVDS AC Electrical Characteristics

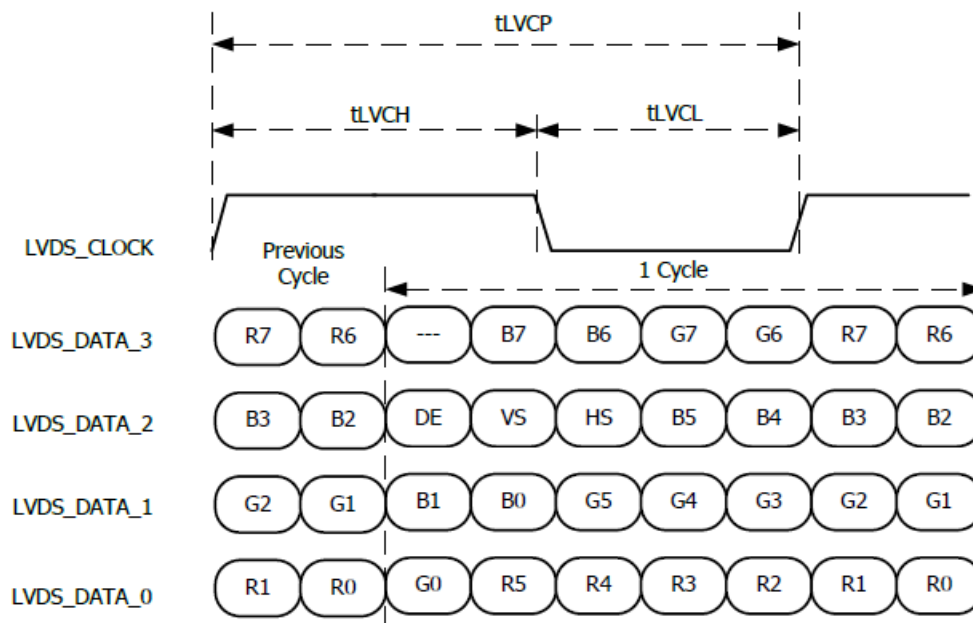| Parameter	Symbol	Min.	Typ.	Max.	Unit
Clock Period	TLVCP	-	(T)	-	ns
Clock High Time	TLVCH	-	(4T/7)	-	ns
Clock Low Time	TLVCL	-	(3T/7)	-	ns

Note(1) T=1/Fclk

Figure 9 Data Mapping

4.2 LVDS Receiver Internal Circuit

Figure 11 shows the internal block diagram of the LVDS receiver. This LCD module equips termination resistors for LVDS link.
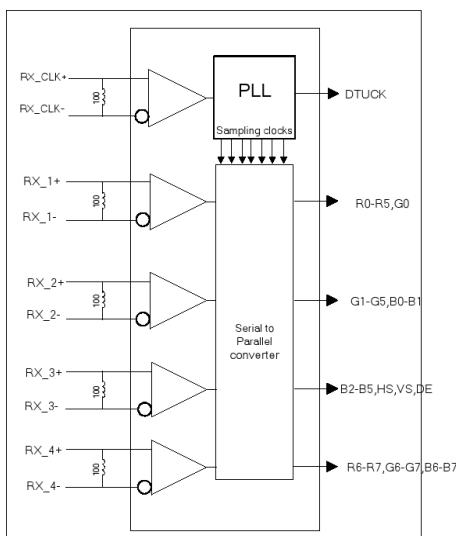

Figure 10 LVDS Receiver Internal Circuit

4.3 Interface Timings

Table 9 Interface Timings

Parameter	Symbol	Min.	Typ.	Max.	Unit
LVDS Clock Frequency	Fclk	(50)	(65)	(80)	MHz
H Total Time	HT	(1224)	(1,344)	(1720)	Clocks
H Active Time	HA		1,024		
V Total Time	VT	(783)	(806)	(968)	Lines
V Active Time	VA		768		
Frame Rate	FV	(55)	(60)	(65)	Hz

Note(1)   Synchronization Method: DE only

Note(2)   H Blank area and V Blank area cannot be changed at every frame.

4.4 Input Power Specifications

Table 3 Input Power Specifications

Parameter		Symbol	Min.	Typ.	Max.	Unit	Note
System Power Supply							
LCD Drive Voltage (Logic)		V_{CC}	(3.0)	(3.3)	(3.6)	V	(1), (2)
VCC Current	Black Pattern	I_{CC}	-	-	(0.394)	A	(1),(2),(3)
VCC Power Consumption	Black Pattern	P_{CC}	-	-	(1.3)	W	
Rush Current		I_{Rush}	-	-	(1.5)	A	(1), (4)
Allowable Logic/LCD Drive Ripple Voltage		V_{VCC-RP}	-	-	(200)	mV	(1)

Note(1)   All of the specifications are guaranteed under normal conditions. Normal conditions are defined as follow: Temperature: 25℃, Humidity: 55± 10%RH.

Note(2)   All of the absolute maximum ratings specified in the table, if exceeded, may cause faulty operation or unrecoverable damage. It is recommended to follow the typical value.

Note(3)   The specified VDD current and power consumption are measured under the VDD = 3.3 V, FV= 60 Hz condition and Black Pattern.

Note(4)   The figure below is the measuring condition of VDD. Rush current can be measured when TRUSH is 0.5 ms.
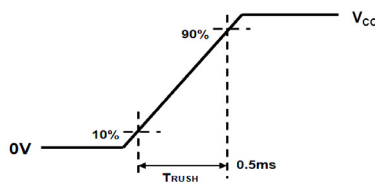
Figure 11 V_CC Rising Time

Note(5) The power consumption of LED Driver are under the VLED = 12.0V, Dimming of Max luminance.

Note(6) Although acceptable range as defined, the dimming ratio is not effective at all conditions.

Note(7) The PWM frequency should be fixed and stable for more consistent luminance control at any specific level desired.

Note(8) The operation of LED Driver below minimum dimming ratio may cause flickering or reliability issue.

Note(9) The life time is determined as the sum of the lighting time till the luminance of LCD at the typical LED current reducing to 50% of the minimum value under normal operating condition.

5. Optical Specification

5.1 Optical specification

Item	Symbol	Condition	Values Min.	Values Typ.	Values Max.	Unit	Note
Viewing angle	θL	(CR≧10)	80	85	--	degree	(1)(2)(3)(4)(8)
	θR		80	85	--		
	θU		80	85	--		
	θD		80	85	--		
Response time	TF+ TR		--	--	25	msec / msec	(1)(2)(5)(8)
Contrast ratio	CR		450	800	--	--	(1)(2)(4)(8)
Color chromaticity	WX	Normal θ=Φ=0°	Typ. -0.05	0.313	Typ. +0.05	--	(1)(2)(3)(8)
	WY			0.329		--	
	RX			0.636		--	
	RY			0.346		--	
	GX			0.322		--	
	GY			0.622		--	
	BX			0.153		--	
	BY			0.063		--	
Luminance	L		800	1000	--	cd/m^2	Note4
Luminance uniformity	YU		75	80	--	%	Note5

Note(1) Measurement Setup:

The LCD module should be stabilized at given temperature(25℃) for 30 minutes to avoid abrupt temperature changing during measuring. In order to stabilize the luminance, the measurement should be executed after lighting backlight for 30 minutes in a windless room.
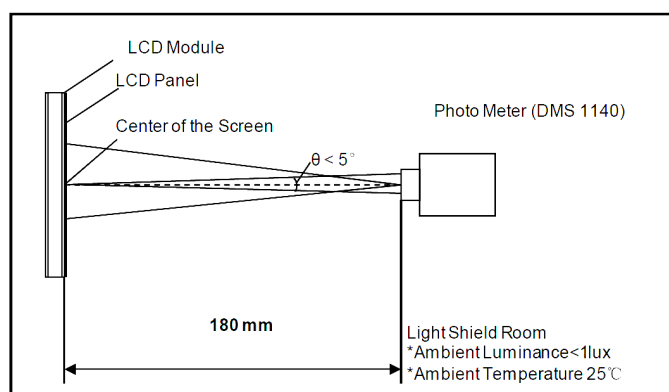

Figure 4 Measurement Setup

Note(2) The LED input parameter setting as: IF=480mA @ VF around 39V
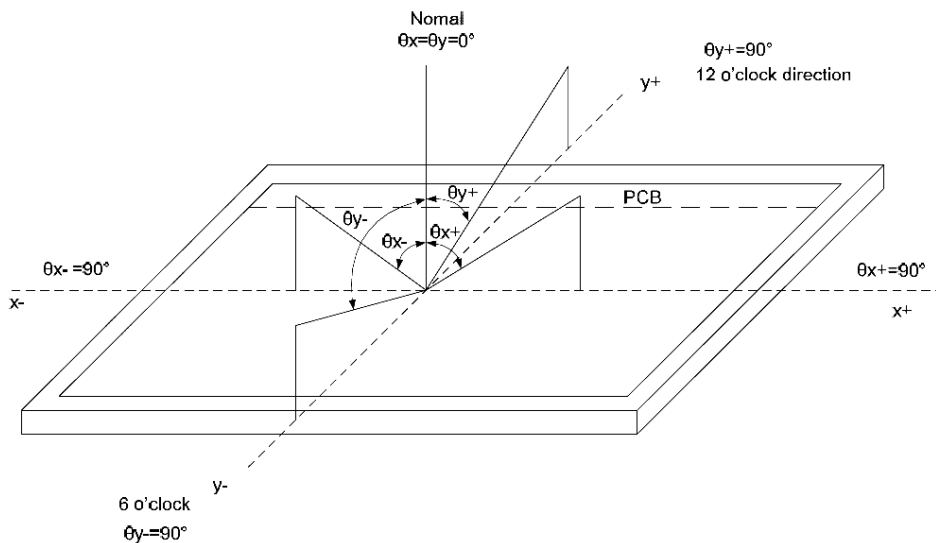
Note(3) Definition of Viewing Angle

Figure 5 Definition of Viewing Angle

Note(4) Definition of Contrast Ratio (CR)

The contrast ratio can be calculated by the following expression:

Contrast Ratio (CR) = the luminance of White pattern/ The luminance of Black pattern

Note(5) Definition of Response Time (TR, TF)
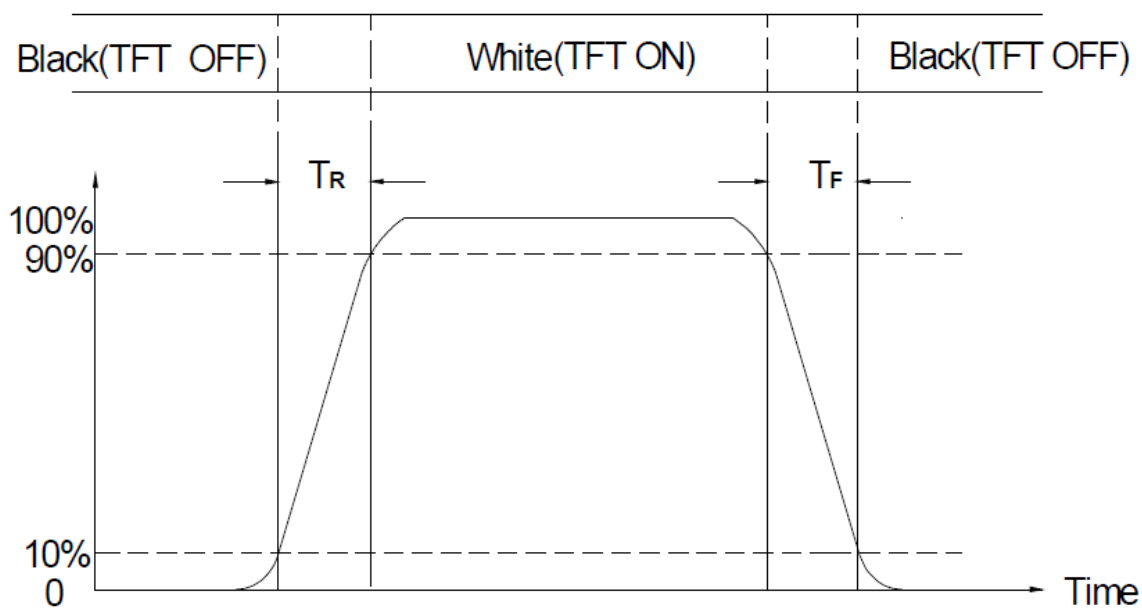
Figure 6 Definition of Response Time

Note(6) Definition of Luminance of White

Measure the luminance of White pattern (Ref.: Active Area)

Display Luminance=L1（center point）

H—Active Area Width, V—Active Area Height, L—Luminance

Note(7) Definition of Luminance Uniformity (Ref.: Active Area)

Measure the luminance of White pattern at 9 points.

Luminance Uniformity= Min.(L1, L2, ... LX) / Max.(L1, L2, ... LX)

H—Active Area Width, V—Active Area Height, L—Luminance

Figure 7 Measurement Locations of 9 Points

Note(8) All optical data are based on IVO given system & nominal parameter & testing machine in this document.

6. Block Diagram

6.1 TFTLCD Module

6.2 Pixel format
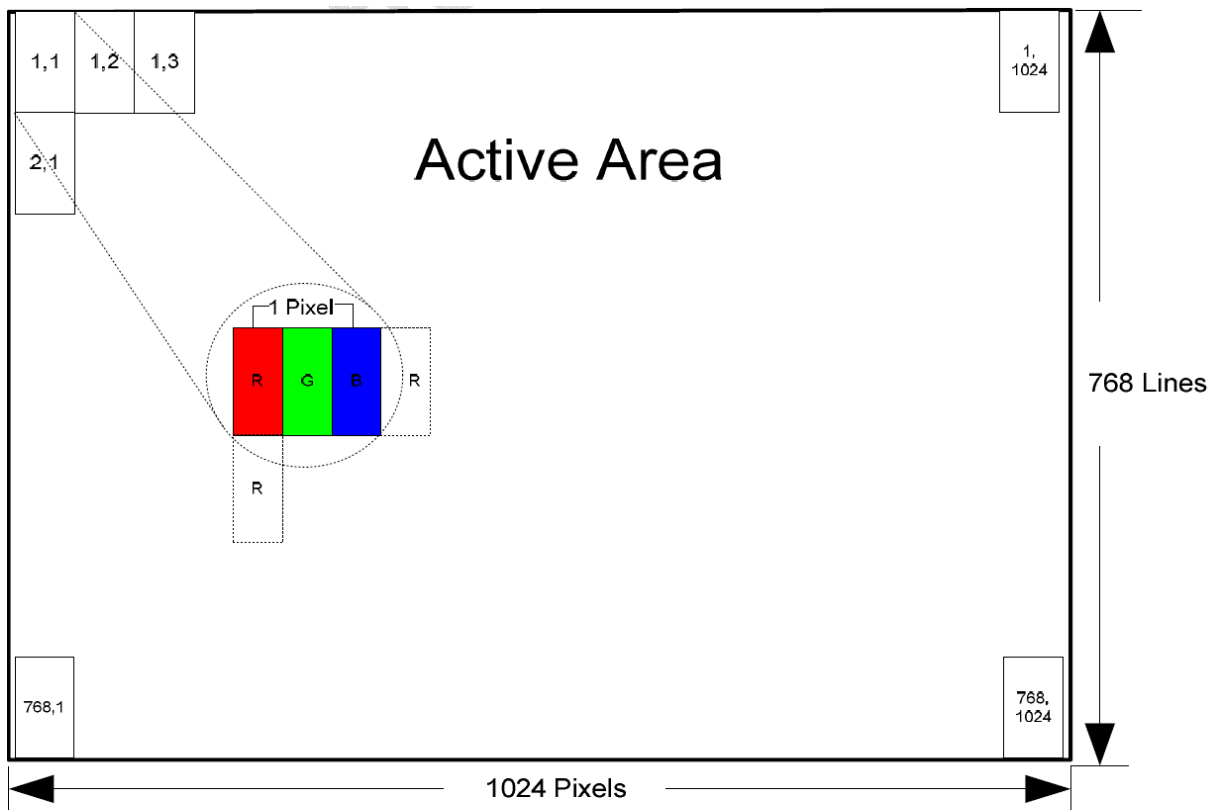
Figure 2 Pixel Mapping

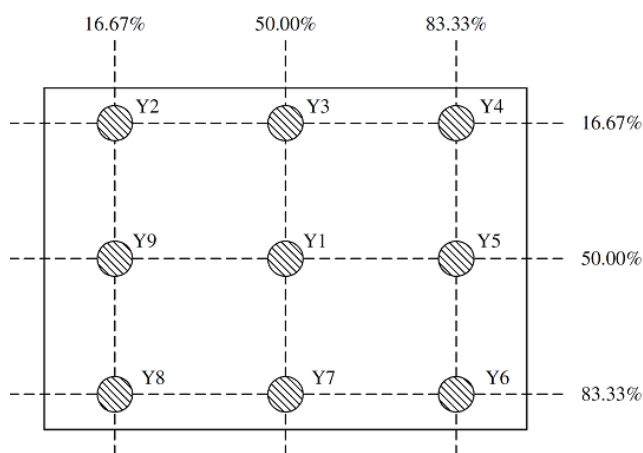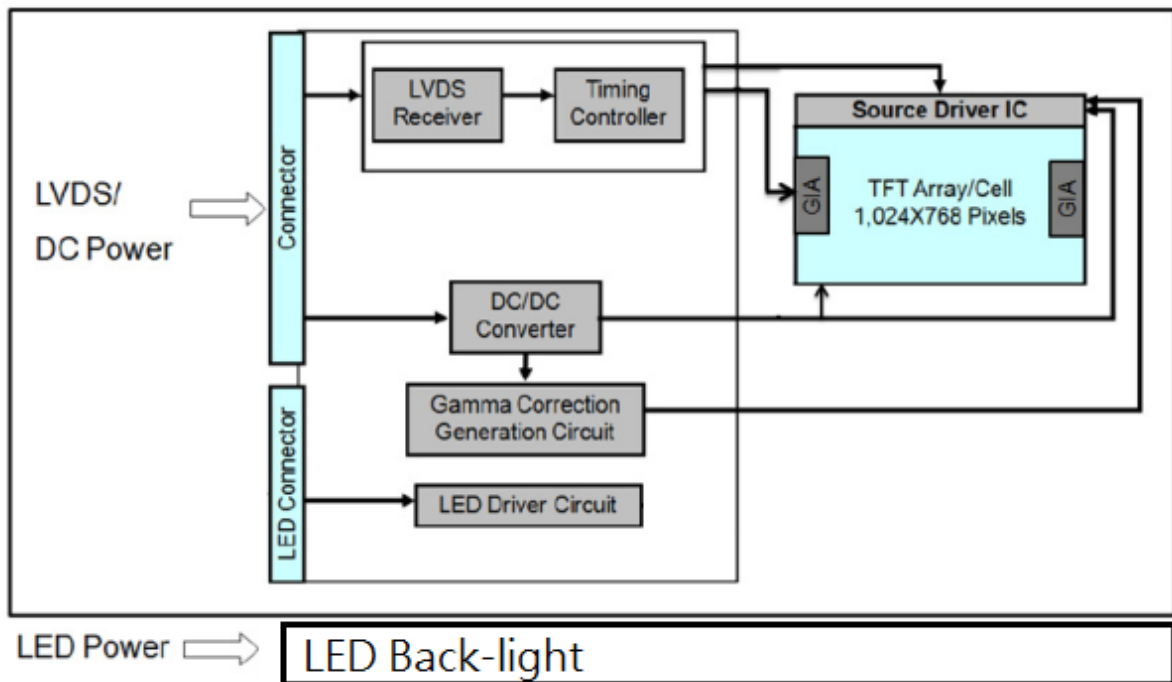# 7. Interface

7.1 Electrical Interface Connection

Right Angle Pin Header (SMT) (Offset Mounted Type) of DF19 Series

Pin No.	Symbol	Description	Note
1	VDD	3.3V Power	
2	VDD	3.3V Power	
3	GND	Floating is recommended in the Customer	
4	GND(BIST)	Lo: Connect to Ground for normal operating. Hi : LCD Panel Self-Test Enable(3.3V Typ.),	
5	IN0-	LVDS Data Signal - IN0-	
6	IN0+	LVDS Data Signal+ IN0+	
7	GND	Ground	
8	IN1-	LVDS Data Signal –IN1-	
9	IN1+	LVDS Data Signal+ IN1+	
10	GND	Ground	
11	IN2-	LVDS Data Signal –IN2-	
12	IN2+	LVDS Data Signal+ IN2+	
13	GND	Ground	
14	CLK-	LVDS Clock Signal - CLK-	
15	CLK+	LVDS Clock Signal+ CLK+	
16	GND	Ground	
17	IN3-	LVDS Data Signal - IN3-	
18	IN3+	LVDS Data Signal+ IN3+	
19	GND	Ground	
20	NC	No connection	

LED driver board
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	

LED Driver	High Temperature thermal protection by NTC Negative Temperature Coefficient)

8. LED Driving Conditions

Item	Symbol	Min.	Typ.	Max.	Unit	Condition
LED Driver voltage	VLED	-	12	-	V	
Power Supply Current For LED Driver	ILED	-	TBD	-	A	VLED=12V VADJ=5V (duty100%)
ADJ Input Voltage	VADJ	3.3	5	VLED	V	duty=100%
ADJ Dimming Freq.	FADJ	0.1		30	kHz	
LED Backlight Voltage	VF	--	39	--	V	For reference
LED Backlight Current	IF	-	480	--	mA	Ta=25℃
LED Power Consumption			18.72		W	
LED Life Time		--	50K	-	Hr	Note (1)

13Sx4P = 52 LED
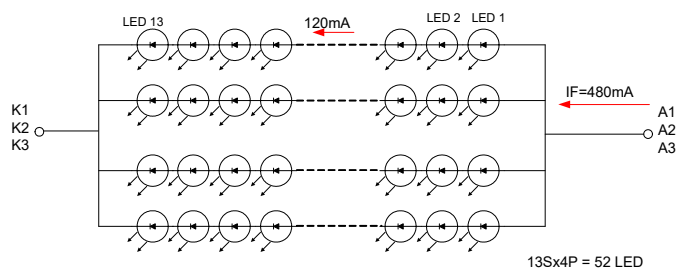
Note(1)   The constant current source is needed for white LED back-light driving. When LCM is operated at 60 ℃ ambient temperature, the IAK of the LED back-light should be adjusted to 360 mA max
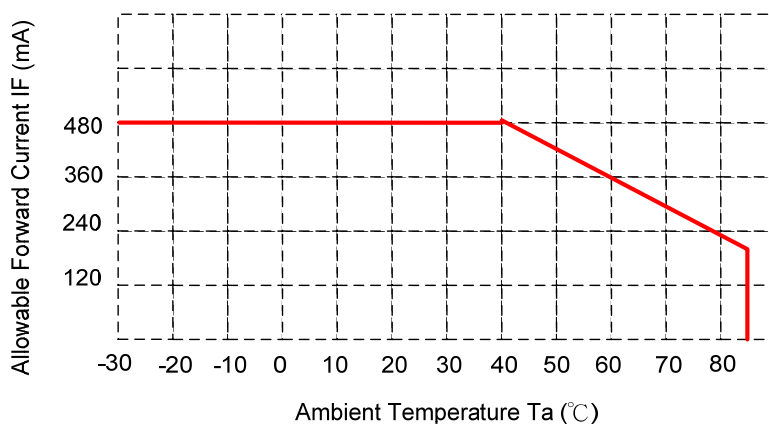
CN3 (LED interface):

CN3:P1.0 6pin, Mating Connector: CviLux CI1406M1HRL-NH or Equivalent

Pin No.	Symbol	Description	Note
1	A1	LED Anode	
2	A2	LED Anode	
3	A3	LED Anode	
4	K1	LED Cathode	
5	K2	LED Cathode	
6	K3	LED Cathode	

9. Power ON/OFF Sequence

Interface signals are also shown in the chart. Signals from any system shall be Hi-resistance state or low level when VDD voltage is off.
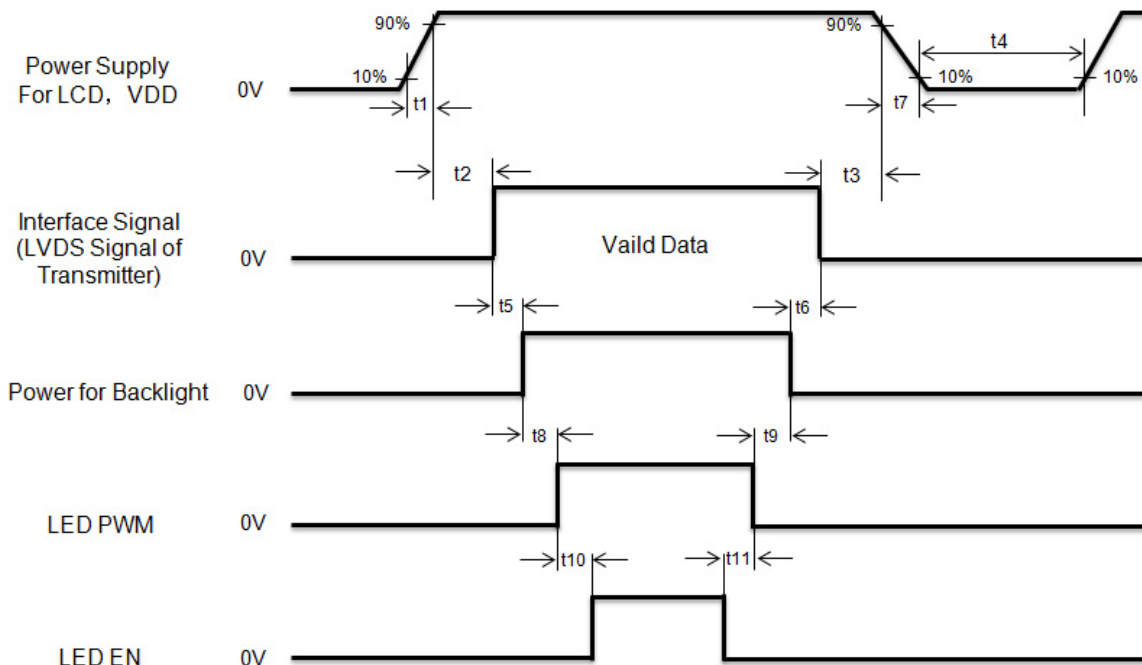
Figure 12 Power Sequence

Table 11 Power Sequencing Requirements

Parameter	Symbol	Min.	Typ.	Max.	Unit
VCC Rise Time	T1	(0.5)	-	(10)	ms
VCC Good to Signal Valid	T2	(0)	-	(50)	ms
Signal Disable to Power Down	T3	(0)	-	(1,000)	ms
Power Off	T4	(1,000)	-	-	ms
Signal Valid to VLED On	T5	(300)	-	-	ms
VLED Off to Signal Disable	T6	(200)	-	-	ms
VCC Fall Time	T7	(0.5)	-	(10)	ms
VLED On to LED PWM On	T8	(10)	-	-	ms
LED PWM Off to VLED Off	T9	(10)	-	-	ms
LED PWM On LED EN On	T10	(10)	-	-	ms
LED EN Off to LED PWM Off	T11	(10)	-	-	ms

10. Reliability Test Conditions

Test Item	Test Conditions	Note
High Temperature Operation	85±3°C , Dry t=240 hrs	
Low Temperature Operation	-30±3°C , Dry t=240 hrs	
High Temperature Storage	85±3°C , Dry t=240 hrs	1,2
Low Temperature Storage	-30±3°C , Dry t=240 hrs	1,2
Storage at High Temperature and Humidity	50°C, 85% 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 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. Handing & Cautions

11.1 Cautions when taking out the module

(1) Pick the pouch only, when taking out module from a shipping package.

11.2 Cautions for handling the module

(1) As the electrostatic discharges may break the LCD module, handle the LCD module with care. Peel a protection sheet off from the LCD panel surface as slowly as possible.

(2) As the LCD panel and backlight element are made from fragile glass material, impulse and pressure to the LCD module should be avoided.

(3) As the surface of the polarizer is very soft and easily scratched, use a soft dry cloth without chemicals for cleaning.

(4) Do not pull the interface connector in or out while the LCD module is operating.

(5) Put the module display side down on a flat horizontal plane.

(6) Handle connectors and cables with care.

11.3 Cautions for the operation

(1) When the module is operating, do not lose MCLK, DE signals. If any one of these signals were lost, the LCD panel would be damaged.

(2) Obey the supply voltage sequence. If wrong sequence were applied, the module would be damaged.

11.4 Cautions for the atmosphere

(1) Dewdrop atmosphere should be avoided.

(2) Do not store and/or operate the LCD module in a high temperature and/or humidity atmosphere. Storage in an electro-conductive polymer-packing pouch and under relatively low temperature atmosphere is recommended.

11.5 Cautions for the module characteristics

(1) Do not apply fixed pattern data signal to the LCD module at product aging.

(2) Applying fixed pattern for a long time may cause image sticking.

11.6 Other cautions

(1) Do not disassemble and/or re-assemble LCD module.

(2) Do not re-adjust variable resistor or switch etc.

(3) When returning the module for repair or etc, please pack the module not to be broken. We recommend using the original shipping packages.

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

(5) 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

A Block

	R	G	B

0.297
0.099
0.297

CN3

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

CN1

1	VDD	11	IN2−
2	VDD	12	IN2+
3	GND	13	GND
4	GND	14	CLK−
5	IN0−	15	CLK+
6	IN0+	16	GND
7	GND	17	IN3−
8	IN1−	18	IN3+
9	IN1+	19	GND
10	GND	20	NC

Note:
1. Unless indicated, Tolerance "±0.5"
2. UV Glue For OLB Protection.
3. CN1: P1.0/20PIN DF19K-20P-1H(52). ②
4. CN3:P1.0 6pin, Mating Connector: CviLux CI1406M1HRL-NH or Equivalent

5.5±0.3x2
224.0±0.3
14.75

(11.1)
(12.702)
231.3±0.3 (Bezel opening)
228.096 (A,A)
(9.55)
(11.19)

(163.25±0.3)
307.4±0.3 (Bezel opening)
304.128 (A,A)

326.5±0.5 (Outline)

253.5±0.5 (Outline)
(126.75±0.3)

protective film

4-M3 User Hole
Depth 4.5mmMax.

176.0±0.3
38.75
12.0±0.5
2-5.5±0.3

1	1024768Q6 FOG	7
2	New LED (1000nits)	8
3	New Bezel	9
4	Cable(1710106010)	10
5	TFT−1024768−118−0	11
6		12

TOLERANCE GRADE(±)

DIM.	A	B
MM		
IN. NO.		

PARTS NO. LCM		
1024768QA−40		

DWN. MILLY
DATE 10−26−22
CHK. DATE
APPD. DATE

AMPIRE 晶采光電科技

TITLE 1024768QA−40
(15.0")

DWG. NO. *2210101MA
SHEET 1 OF 1

REV. REVISION RECORD

		DATE	NAME
0	NEW RELEASE	10-26-22	MILLY
1	Rename TFT−1024768−118−0 to 1024768QA−40	12-01-22	MILLY
2	Modify Connector	07-26-23	MILLY

CN3

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

CN1

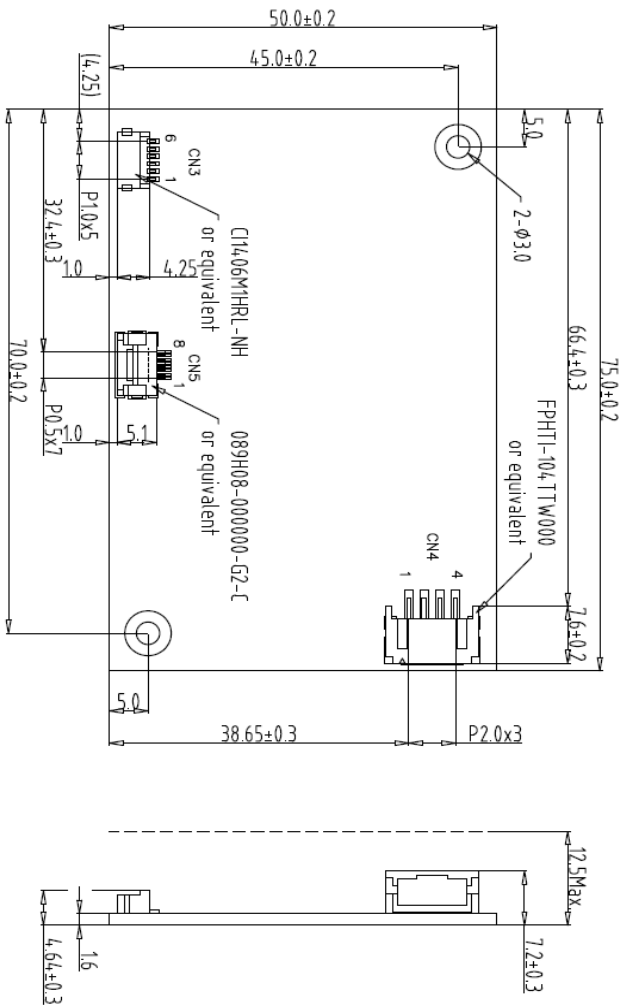|			
1	VDD	11	IN2-
2	VDD	12	IN2+
3	GND	13	GND
4	GND	14	CLK-
5	IN0-	15	CLK+
6	IN0+	16	GND
7	GND	17	IN3-
8	IN1-	18	IN3+
9	IN1+	19	GND
10	GND	20	NC

Note:
1. Unless indicated, Tolerance "±0.5"
2. UV Glue For OLB Protection.
3. CN1: P1.0/20PIN DF19K-20P-1H(52). ☑
4. CN3:P1.0 6pin, Mating Connector: Cvilux CI1406M1HRL-NH or Equivalent

Back view

Dimensions: (202.0±10.0), 106.23±1.0, 312.23±1.0, (134.4±1.0), (65.27±1.0)

1	1024768Q06 FOG	7	
2	New LED (1000nits)	8	
3	New Bezel	9	
4	Cable(1710106010)	10	
5	TFT-1024768-118-0	11	
6		12	

TOLERANCE GRADE(±)	A	B	DIM.				
			IB NO.	MM			
			DIM.	MM	DIM.		

PARTS NO.LCM-1 1024768QA-40

PARTS NO.LCM-1024768QA-40

DWN. MILLY
DATE 10-26-22

CHK.
DATE

APPD.
DATE

AMPIRE 晶采光電科技

TITLE 1024768QA-40 (15.0")
DWG. NO. *221010 2MA
SHEET 1 OF 1

CN5

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

CN3

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

CN4

1	VIN
2	LED_EN
3	GND
4	PWM

Note:
1. Unless indicated, Tolerance Grade "±0.3" is adopted.
2. UV Glue For OLB Protection.

CN3
CI1406M1HRL-NH or equivalent
P1.0x5
4.25
[4.25]
32.4±0.3
1.0

CN5
089H08-000000-G2-C or equivalent
P0.5x7
1.0
5.1
70.0±0.2

50.0±0.2
45.0±0.2
5.0
2-Φ3.0
66.4±0.3
75.0±0.2
FPHT1-104TTW000 or equivalent
7.6±0.2

CN4
1   4
P2.0x3
38.65±0.3
5.0

12.5Max
7.2±0.3
4.64±0.3
1.6

	TOLERANCE GRADE(±)					
1		7		A	B	DIM.
2		8				IB NO.
3		9				MM
4		10				DWN.
5		11				CHK.
6		12				APPD.

PARTS NO.LCM-2
102476BQ2

DMN. EMILY
DATE 04-18-13
CHK.
DATE
APPD.
DATE

AMPIRE 晶采光電科技

TITLE (15.0")
102476BQ2
DWG. NO. *13044?MA
SHEET 1 OF 1

13. Package
TBD