



晶采光電科技股份有限公司  
AMPIRE CO., LTD.

## SPECIFICATIONS FOR LCD MODULE

<b>CUSTOMER</b>	
<b>CUSTOMER PART NO.</b>	
<b>AMPIRE PART NO.</b>	<b>AM-19201200HTZQW-T00H</b>
<b>APPROVED BY</b>	
<b>DATE</b>	

Preliminary Specification

Formal Specification

**AMPIRE CO., LTD.**

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Approved by	Checked by	Organized by
Patrick	Jessica	Simon

This Specification is subject to change without notice.

## RECORD OF REVISION

Revision Date	Page	Contents	Editor
2022/08/17	--	New Release	Simon

## 1.0 General Descriptions

### 1.1 Introduction

The 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 WXGA (1920horizontal by 1200 vertical pixel) resolution.

### 1.2 Features

10.1 (16:10 diagonal) inch configuration

16.7M color LVDS interface

RoHS Compliance

New LCD IC: ST5892B

- Projective Capacitive Touch panel
  - ◆ Controller: EXC80W46
  - ◆ Interface: USB
  - ◆ Cover Glass: 1.1mm

### 1.3 Product Summary

Items	Specifications	Unit
Screen Diagonal	10.1	Inch
Active Area	216.8(W) x 135.5(H)	mm
Pixel Format	1920 x (RGB)(H) x1200(V)	-
Pixel Pitch	0.03764(H)×0.11292 (V)	mm
Pixel Arrangement	R.G.B. Vertical Stripe	-
Display Mode	Normally Black	-
Outline Dimensions	229.46(H) x 149.10(V) x 10.48(D) (Typ.)	mm
Electrical Interface (Logic)	LVDS	-
Support Color	16.7M	-
Weight	T.B.D	g

## 2.0 Absolute Maximum Ratings

### 2.1 Electrical Absolute Rating

#### 2.1.1 TFT LCD Module

Item	Symbol	Min	Max	Unit	Conditions
Power Supply Voltage	VDDIN	-0.3	3.6	V	GND=0
	VGH	-0.3	42	V	
	VGL	-19	0.3	V	
	VGH-VGL	12	32	V	

#### 2.1.2 Environment Absolute Rating

Item	Symbol	Min	Max	Unit	Note
Operating Temperature	TOP	-20	70	°C	
Storage Temperature	TST	-30	80	°C	

## 3.0 Optical Characteristics

### 3.1 Optical specification:

Item	Conditions		Min.	Typ.	Max.	Unit	Note
Viewing Angle (CR>10)	Horizontal	$\theta_L$	(80)	(85)	-	degree	(1),(4)
		$\theta_R$	(80)	(85)	-		
	Vertical	$\theta_T$	(80)	(85)	-		
		$\theta_B$	(80)	(85)	-		
Contrast Ratio	Center		(700)	(900)	-	-	(1),(2)
Response Time	Rising		-	25	-	ms	(1),(3)
	Falling		-	25	-	ms	
Color chromaticity	Red	x	0.594	0.644	0.694	-	(1),(4)
	Red	y	0.294	0.344	0.394	-	
	Green	x	0.265	0.315	0.365	-	
	Green	y	0.582	0.632	0.692	-	
	Blue	x	0.107	0.157	0.207	-	
	Blue	y	0.014	0.054	0.104	-	
	White	x	0.235	0.285	0.335	-	
	White	y	0.287	0.327	0.377	-	
White Luminance	Center		1020	1275	-	cd/m <sup>2</sup>	(1),(4)
Luminance Uniformity	BUNI		--	75	-	%	(5),(7)

### 3.2 Measuring Condition

Measuring surrounding: dark room, LED current IL

Ambient temperature: 25±2oC

15min. warm-up time.

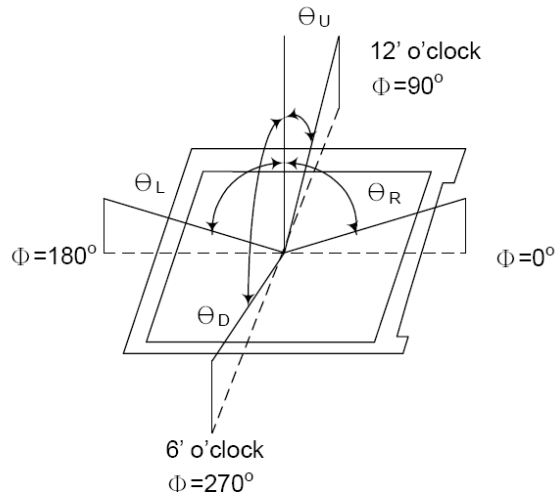
### 3.3 Measuring Equipment

FPM520 of Westar Display technologies, INC., which utilized SR-3 for

Chromaticity and BM-5A for other optical characteristics. Measuring spot size:

20 ~ 21 mm

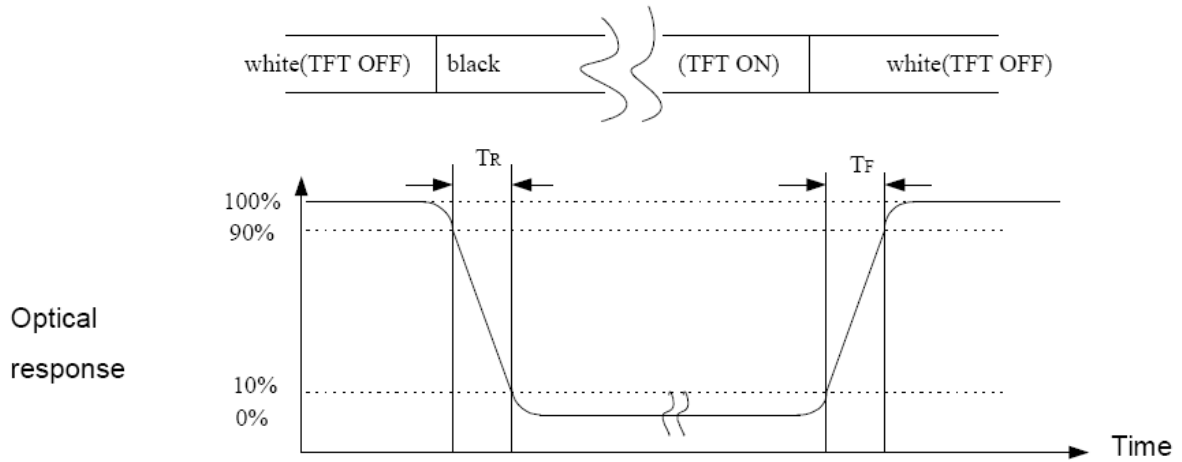
Note (1) Definition of Viewing Angle :



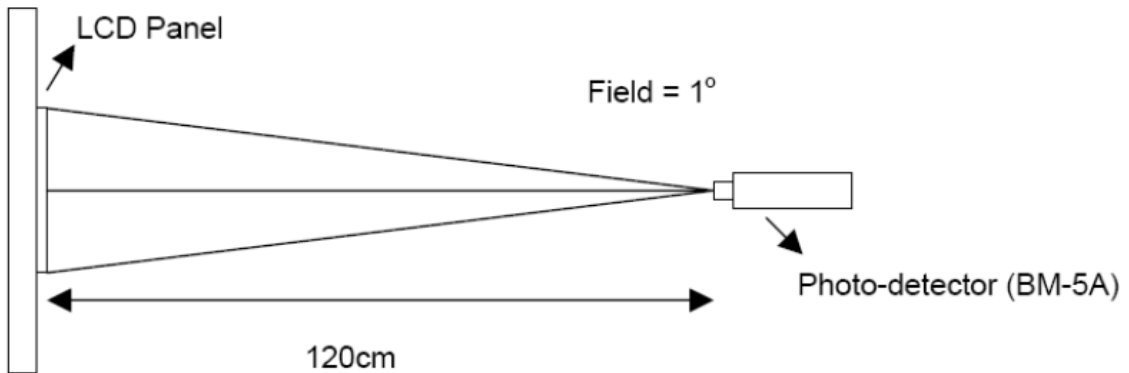
Note (2) Definition of Contrast Ratio (CR):  
 Measured at the center point of panel

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

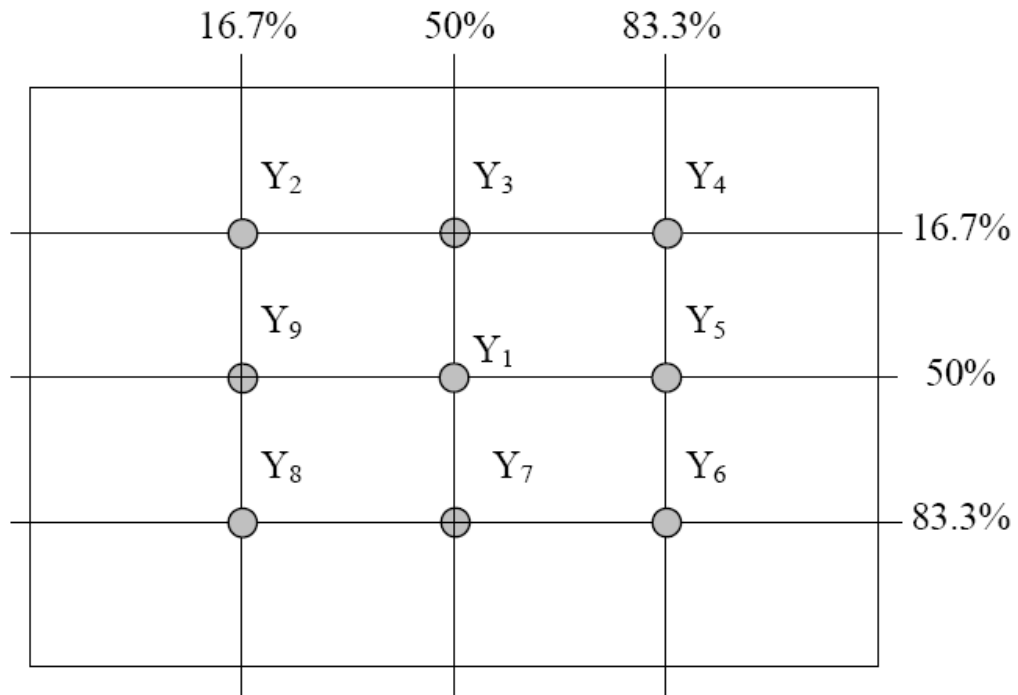
Note (3) Definition of Response Time: Sum of TR and TF



Note (4) Definition of optical measurement setup



Note (5) Definition of brightness uniformity



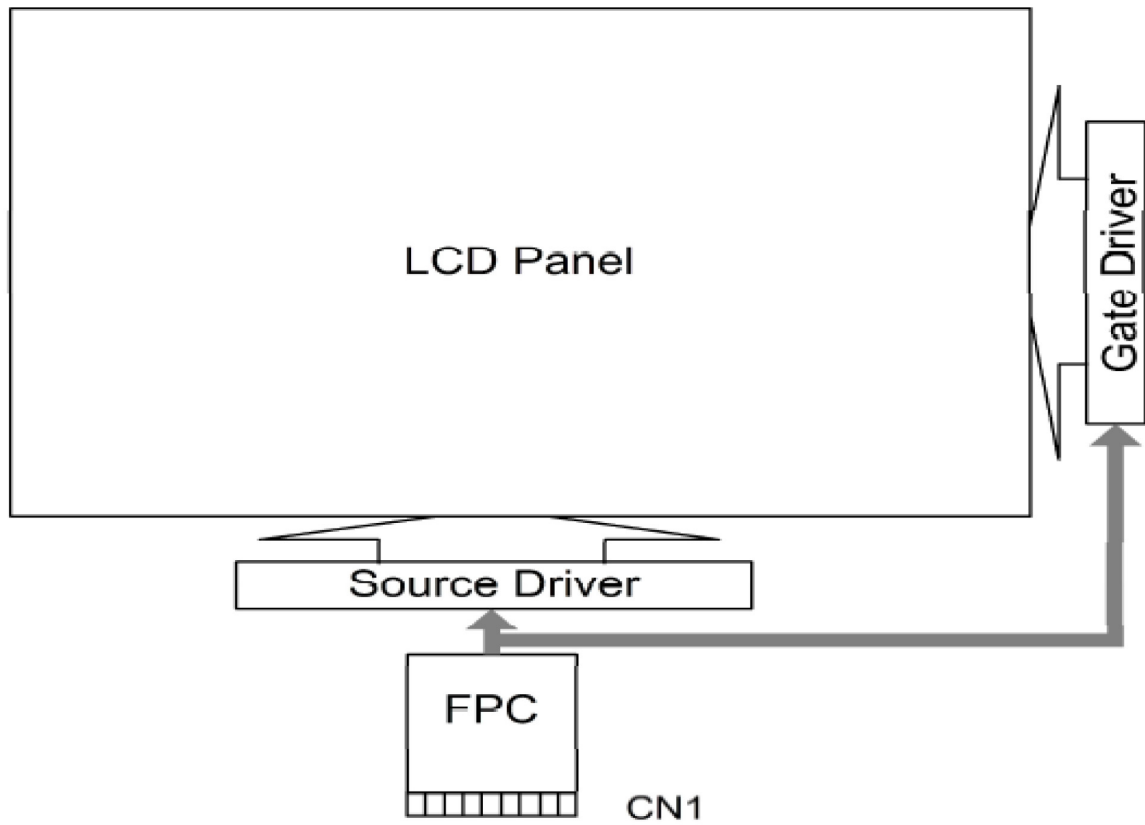
$$\text{Luminance uniformity} = \frac{(\text{Min Luminance of 9 points})}{(\text{Max Luminance of 9 points})} \times 100\%$$

Note (6) Rubbing Direction (The different Rubbing Direction will cause the different optimal view direction).

Note (7) Measured at the brightness of the panel when all terminals of LCD panel are electrically open.

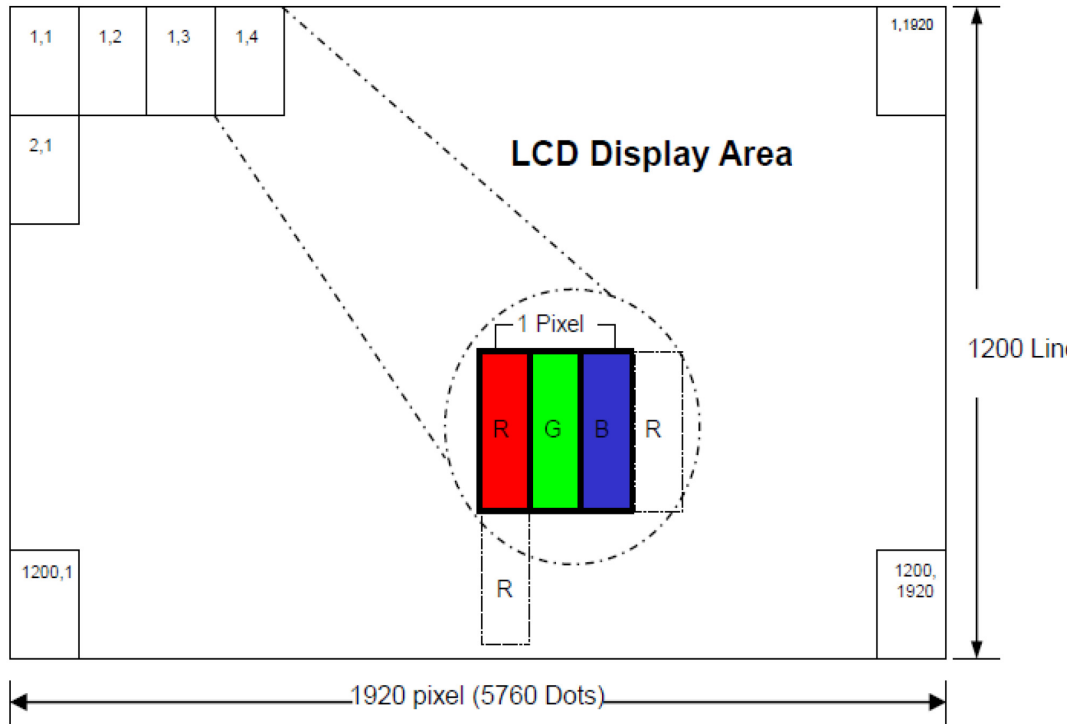
## 4.0 BLOCK DIAGRAM

### 4.1 TFT LCD Module





## 4.2 Pixel format



## 5.0 Electrical Characteristics

5.1 45PIN connector is used for the module electronics interface the recommended model is

FH34SRJ-45S-0.5SH(45)(HRS) or equivalent

Pin #	Signal Name	I/O	Description	Remarks
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 Do not use the pin. Keep it floating.	
8	I2C_SCL	I	OTP_SCL Do not use the pin. Keep it floating.	
9	I2C_SDA	I	OTP_SDA Do not use the pin. Keep it floating.	
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 Connect	
42	NC	-	Not Connect	
43	NC	-	Not Connect	

44	NC	-	Not Connect	
45	NC	-	Not Connect	

I: input O: output ,P: power

## 6.0 ELECTRICAL CHARACTERISTICS

### 6.1 TFT LCD Module

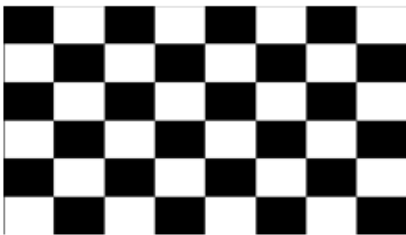
Item	Symbol	Min	TYP	Max	Unit	Note
Power supply voltage	VDD	3.0	3.3	3.6	V	GND=0
	VRP	--	--	300	mV	Ripple
Power Supply Current	IVDD	--	300	360	mA	Note 1
Power consumption	PLCD	--	1	1.2	W	Note 1
Rush Current	I <sub>ruch</sub>	--	--	3.0	A	Note 2
Input logic high voltage	V <sub>IH</sub>	2.7	--	3.3	V	
Input logic low voltage	P <sub>IL</sub>	0	--	0.5	V	

#### Note 1

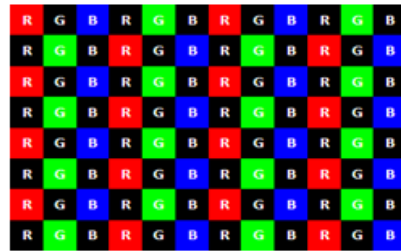
The supply voltage is measured and specified at the interface connector of LCM.

The current draw and power consumption specified is for VDD=3.3V, Frame rate  $f_v=60\text{Hz}$  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)

## 6.2 Back-Light Unit

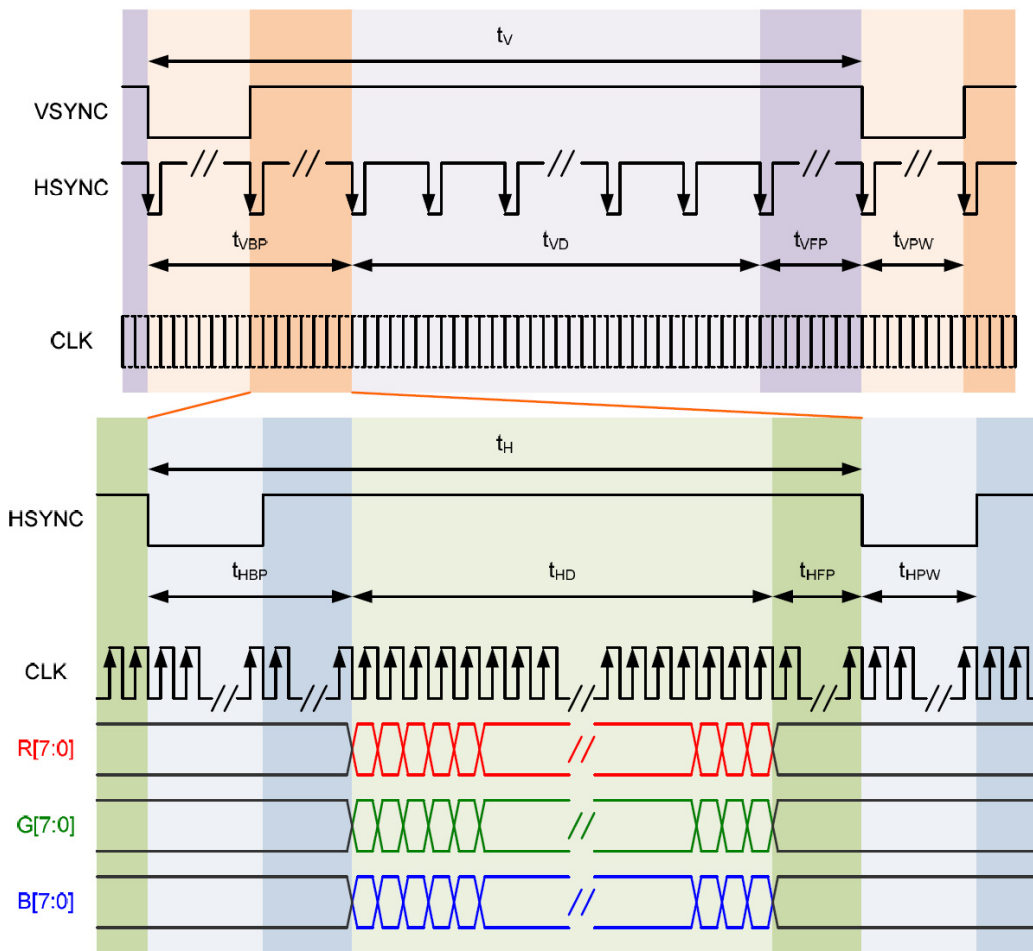
Item	Symbol	Values			Unit	Note
		Min.	Typ.	Max.		
LED voltage	VAK	14	14.3	14.5	V	$I_L = 600\text{mA}$ $T_a = 25^\circ\text{C}$
LED current	$I_L$	--	600	--	mA	Note (1) $T_a = 25^\circ\text{C}$
		--	450	--	mA	Note (1) $T_a = 60^\circ\text{C}$
LED Life Time	-	50K	--	--	Hour	Note (2)

Note (1) LED life time (Hr) can be defined as the time in which it continues to operate under the condition:  $T_a = 25 \pm 3^\circ\text{C}$ , typical  $I_L$  value indicated in the above table until the brightness becomes less than 50%.

Note (2) The "LED life time" is defined as the module brightness decrease to 50% original brightness at  $T_a = 25^\circ\text{C}$ . The LED lifetime could be decreased if operating  $I_L$  is larger. The constant current driving method is suggested.

## 6.3 LVDS Signal Timing Diagram of Interface Signal

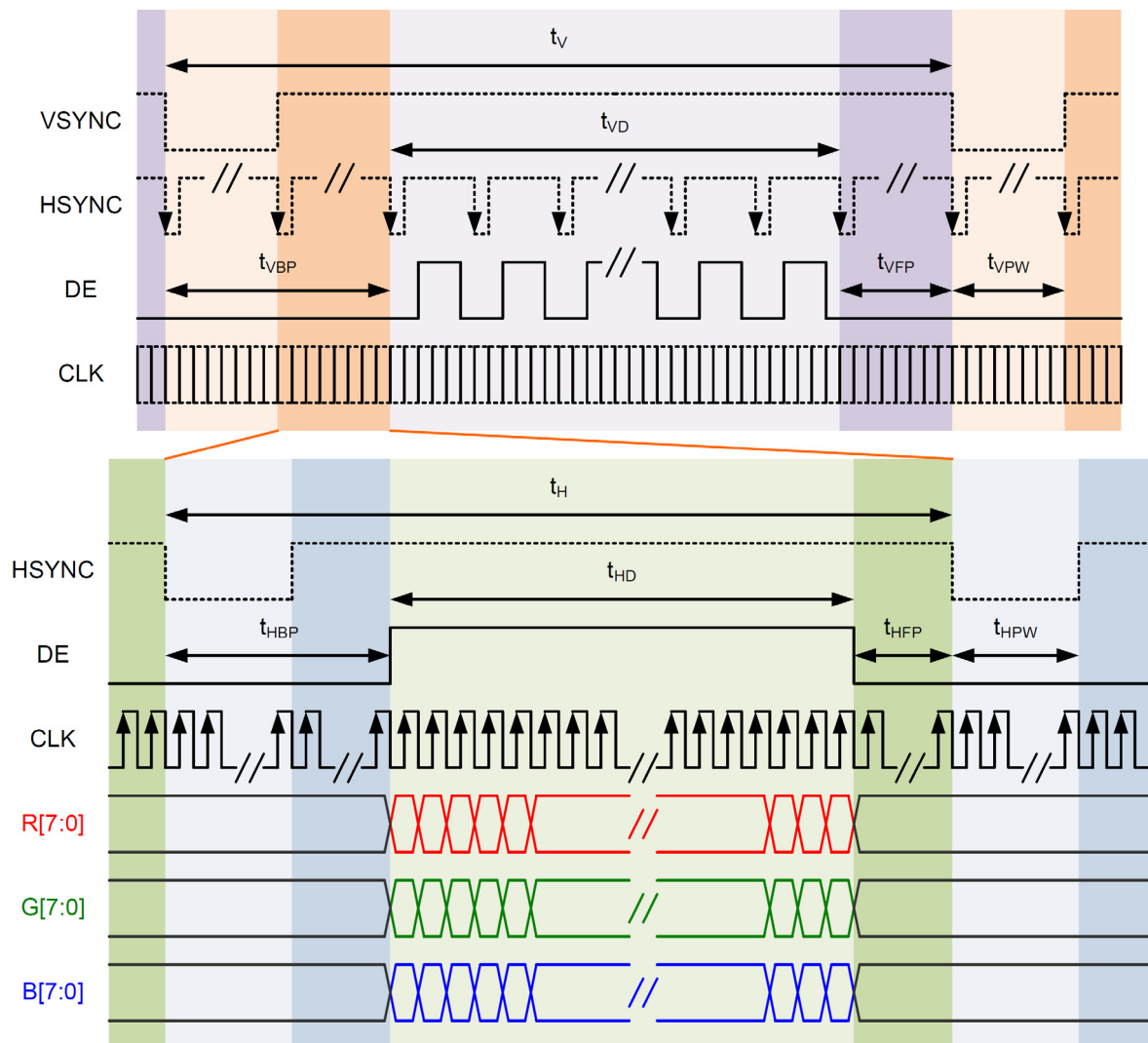
### LVDS / Parallel RGB (SYNC Mode)



1080RGB x 1920 (2-Port LVDS)

Parameter	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
CLK frequency	tCLK	73.7	75.7	78	Mhz	
Horizontal blanking time	tHBT	48	50	54	tCLK	tHBP + tHFP
Horizontal back porch	tHBP	24	26	28	tCLK	Include tHPW
Horizontal display area	tHD	960			tCLK	
Horizontal front porch	tHFP	24	24	26	tCLK	
Horizontal period	tH	1008	1010	1014	tCLK	
Horizontal pulse width	tHPW	2	2	2	tCLK	
Vertical blanking time	tVBT	40	50	60	tH	tVBP + tVFP
Vertical back porch	tVBP	20	26	30	tH	Include tVPW
Vertical display area	tVD	1200			tH	
Vertical front porch	tVFP	20	24	30	tH	
Vertical period	tV	1240	1250	1260	tH	
Vertical pulse width	tVPW	2	2	2	tH	
Frame rate	FR	59	60	61	Hz	

### LVDS / Parallel RGB (DE Mode)

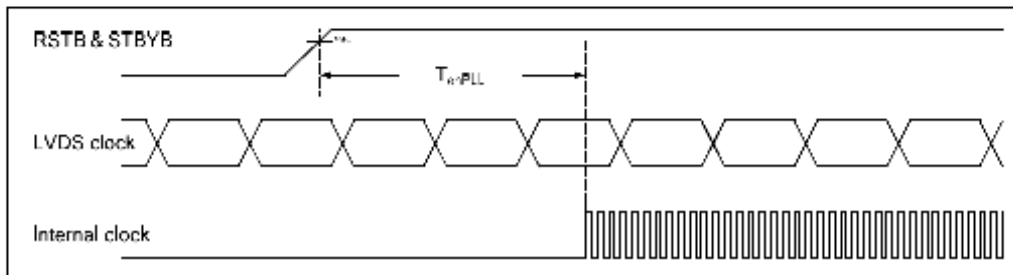
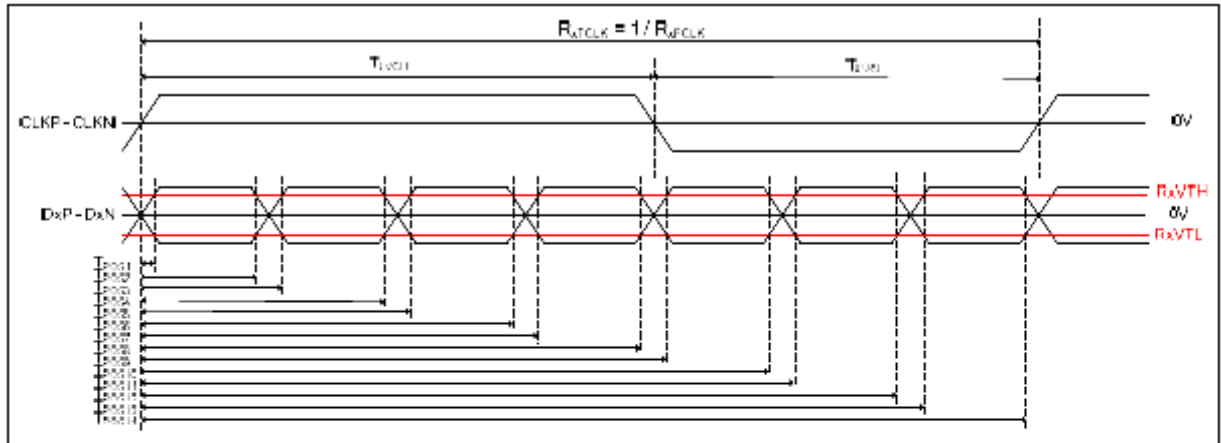


## 1080RGB x 1920 (2-Port LVDS)

Parameter	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
CLK frequency	tCLK	73.7	75.7	78	Mhz	
Horizontal blanking time	tHBT	48	50	54	tCLK	tHBP + tHFP
Horizontal display area	tHD	960			tCLK	
Horizontal period	tH	1008	1010	1014	tCLK	
Horizontal pulse width	tHPW	2	2	2	tCLK	
Vertical blanking time	tVBT	40	50	60	tH	tVBP + tVFP
Vertical display area	tVD	1200			tH	
Vertical period	tV	1240	1250	1260	tH	
Vertical pulse width	tVPW	2	2	2	tH	
Frame rate	FR	59	60	61	Hz	

Note: ST5892B can't accept the tolerance of tVBT = +/- 1 in DE mode.

## 6.4 LVDS AC Timing Specification



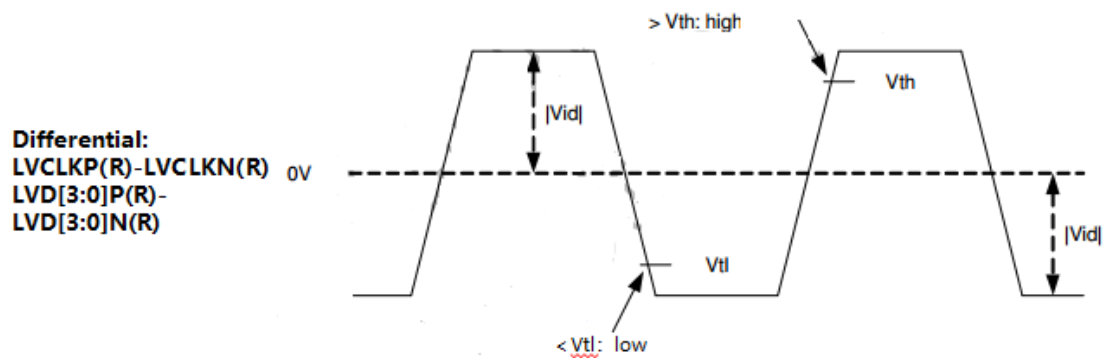
VSSI = VSSRX = VSSP = 0V, VDDI = VDDP = VDDR = 3.0 ~ 3.3V, -40 ~ 85°C

Item	Signal	Symbol	Rating			Unit
			Min.	Typ.	Max.	
Clock Frequency	CLK	$R_{nFCLK}$	20	-	100	MHz
Clock Period		$R_{nTCLK}$	10	-	50	ns
1 data bit time		UI	-	1/7	-	$R_{nTCLK}$
Clock high time	CLK	$T_{LVCH}$		4		UI
Clock low time		$T_{LVCL}$		3		UI
Position 1	DATA	$T_{POS1}$	-0.25	0	0.25	UI
Position 2		$T_{POS2}$	0.75	-	1.25	
Position 3		$T_{POS3}$	0.75	1	1.25	
Position 4		$T_{POS4}$	1.75	-	2.25	
Position 5		$T_{POS5}$	1.75	2	2.25	
Position 6		$T_{POS6}$	2.75	-	3.25	
Position 7		$T_{POS7}$	2.75	3	3.25	
Position 8		$T_{POS8}$	3.75	-	4.25	
Position 9		$T_{POS9}$	3.75	4	4.25	
Position 10		$T_{POS10}$	4.75	-	5.25	
Position 11		$T_{POS11}$	4.75	5	5.25	
Position 12		$T_{POS12}$	5.75	-	6.25	
Position 13		$T_{POS13}$	5.75	6	6.25	
Position 14		$T_{POS14}$	6.75	-	7.25	
PLL wake-up time		$T_{wtPLL}$	-	150	us	



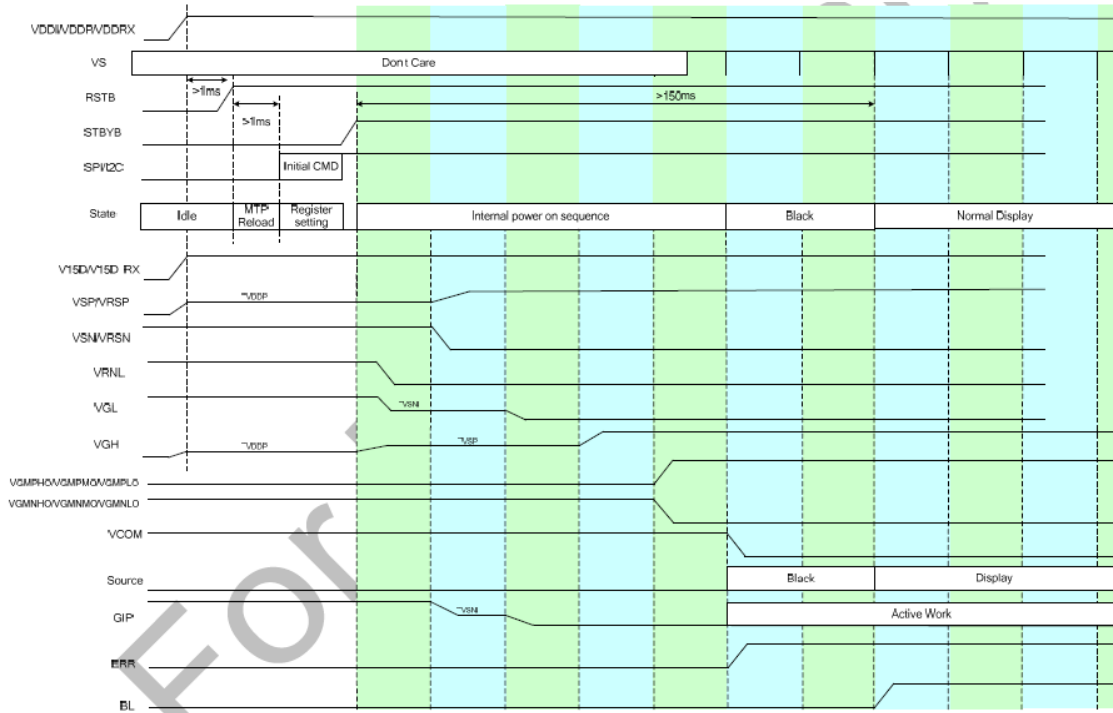
## 6.4.1 LVDS DC Timing Specification

Item	Symbol	Condition	MIN	TYP	MAX	Unit
Differential input high Threshold voltage	$V_{th}$	$V_{cm}=1.2V$	-	-	+0.1	V
Differential input low Threshold voltage	$V_{tl}$	-	-0.1	-	-	V
Differential input common Threshold voltage	$V_{cm}$	-	1	1.2	$1.7- V_{id} /2$	V
LVDS input voltage	$V_{inlv}$	-	0.7	-	1.7	V
Differential input voltage	$ V_{id} $	-	0.35	-	0.6	V
Differential input leakage voltage	$I_{vleak}$	-	-10	-	+10	$\mu A$

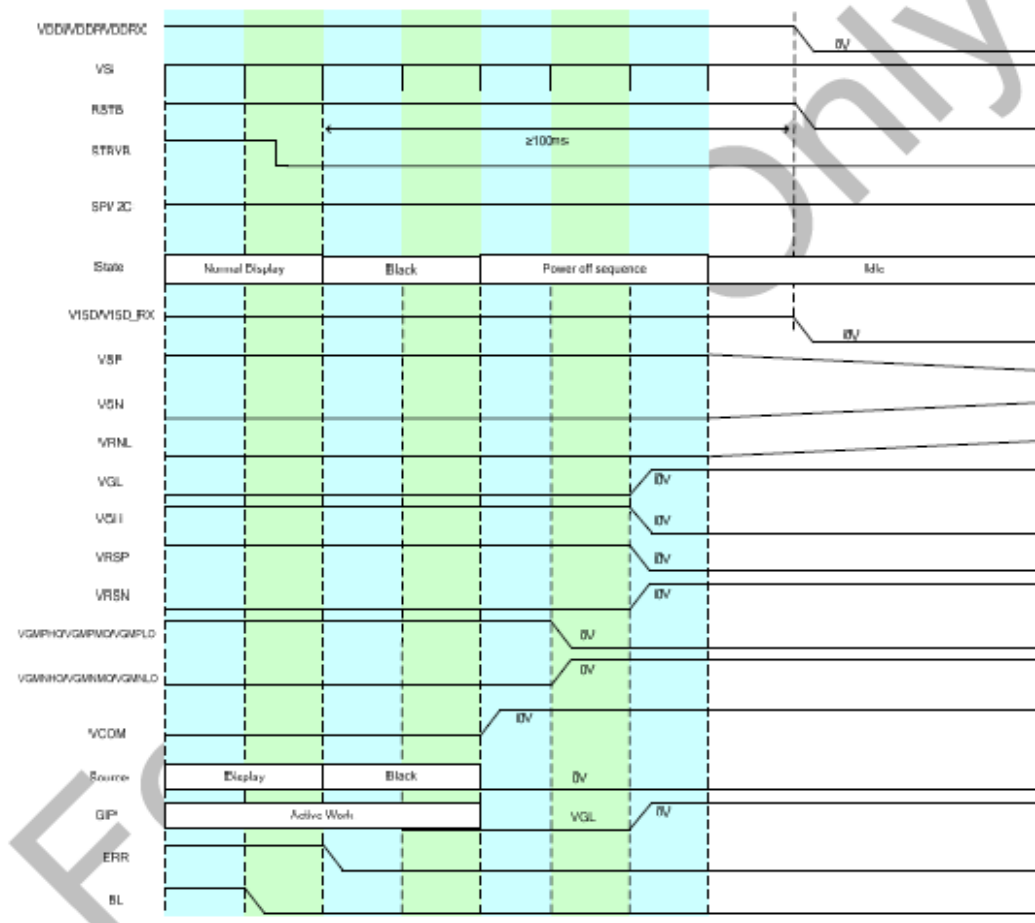


## 6.5 Power ON/OFF Sequence

### Power on



### Power standby and Power Off



## 8. Projected capacitive-type Touch panel specification

### 8.1 Basic Characteristic

Item	Specification
Type	Projective Capacitive Touch Panel
Activation	Multi-fingers or Single-finger
X/Y Position Reporting	Absolute Position
Touch Force	No contact pressure required
Calibration	No need for calibration
Report Rate	Approx. 100 points/sec
Control IC	<b>EXC80W46</b>

### 8.2 Electrical Absolute Max Rating

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Power supply voltage	VIN	-0.3	5.5	V	GND=0V

### 8.3 Electrical Characteristics

Specify the normal operating condition  
(GND=0V)

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Power supply voltage	VIN	4.75	5	5.25	V	

### 8.4 Interface

Pin No.	Symbol	Function
1	GND	Ground.
2	DA-	USB Data-.
3	DA+	USB Data+.
4	VIN	Power supply.
5	NA	Please keep this pin NC.
6	NA	Please keep this pin NC.

## 9. 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
Thermal Shock Test	-20°C ~ 25°C ~ 70°C 30 m in. 5 min. 30 min. ( 1 cycle ) Total 100 cycle(Dry)	1,2
Humidity Test	40 °C, Humidity 90%, 240 hrs	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 °C, 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.

## **10 . GENERAL PRECAUTION**

### **10.1 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.

### **10.2 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.

### **10.3 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.

### **10.4 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.

### **10.5 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.

## **10.6 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.

## **10.7 Mechanism**

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

## **10.8 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.

## **10.9 Strong Light Exposure**

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

## **10.10 Disposal**

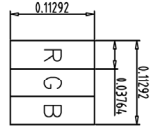
When disposing LCD module, obey the local environmental regulations.

## **10.11 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.

# 11 . Outline Dimension

REV	REVISION RECORD	DATE NAME
0	NEW RELEASE	08-10-22/MILLY

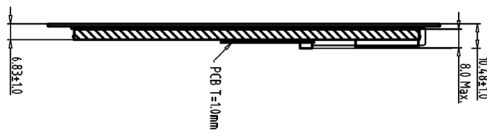
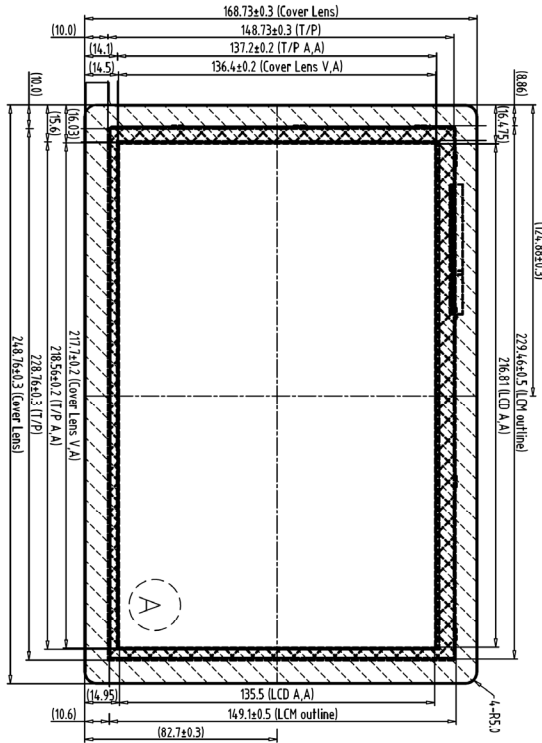


A Block

1	VDDIN	24	OLV3P
2	VDDIN	25	GND
3	VDDIN	26	ELVON
4	VDDIN	27	ELVOP
5	VDDIN	28	GND
6	GND	29	ELVIN
7	VDD_OTP	30	ELV1P
8	I2C_SCL	31	GND
9	I2C_SDA	32	ELVCLKP
10	GND	33	ELVCLKP
11	OLVON	34	GND
12	OLVOP	35	ELV2P
13	GND	36	ELV2P
14	OLVIN	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		

JP3

1	PGND
2	D-
3	D+
4	PVDD
5	NC
6	NC

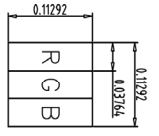


- Note:
1. Unless indicated, Tolerance "±0.5"
  2. UV Glue For OLB Protection.
  3. LVDS Connector:LS050-W40B-H10-G or Equivalent.

1	19201200H-00-A LCM	7		TOLERANCE GRADE(F)	A	B	DTM	MM	DWG.	MILLY	DATE	TITLE
2	1280800N-T C/P (1791280811)	8					TE NO.		CHK		08-10-22	19201200H-T
3	1280800NN T/P Controller Board	9										(10,1")
4	(USB)EX80W46)	10					PARTS NO. LCM	APPD.				*2208048MA
5		11					19201200H-T					SHEET 1 OF 1
6		12										



REV	REVISION RECORD	DATE NAME
0	NEW RELEASE	08-10-22/MILLY

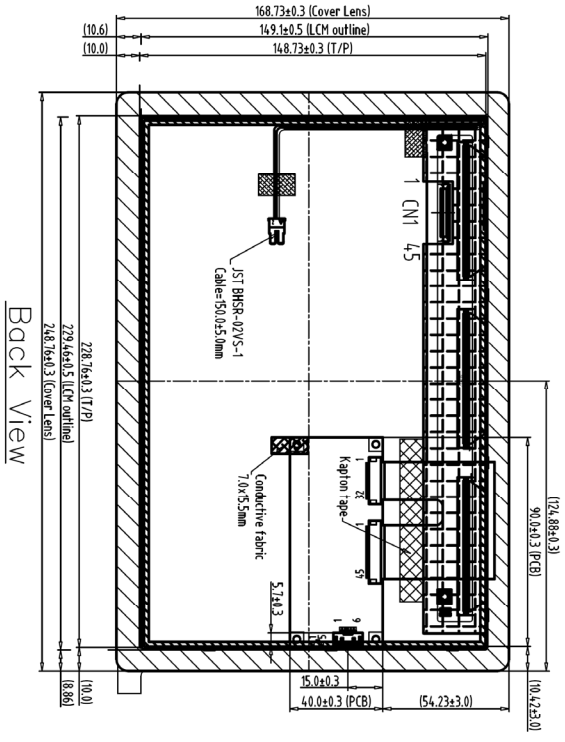


A Block

1	VDDIN	24	OLV3P
2	VDDIN	25	GND
3	VDDIN	26	ELVON
4	VDDIN	27	ELVOP
5	VDDIN	28	GND
6	GND	29	ELVIN
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	OLVIN	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		

JP3

1	PGND
2	D-
3	D+
4	PVDD
5	NC
6	NC



Back View

- Note:
1. Unless indicated, Tolerance "±0.5"
  2. UV Glue For OLB Protection.
  3. LVDS Connector:LS050-W40B-H10-G or Equivalent.

1	19201200H-00-A LCM	7	TOLERANCE GRADE(F)	A	B	DTM	MM	DWN.	MILLY	DATE	TITLE
2	1280800N-T CTP (1791280811)	8				IE NO.				08-10-22	19201200H-T
3	1280800NN T/P Controller Board	9						CHK.		DATE	(10.1")
4	(USB)(EX80W46)	10								DATE	DWG. NO.
5		11								DATE	*2208049MA
6		12								DATE	SHEET 1 OF 1

