Shenzhen Leadtek Electronics Co.,Ltd

PRODUCT SPECIFICATION

TFT-LCD MODULE

Module No：LTK215S3015W

☑ Preliminary Specification

☐ Approval Specification

Designed by	Checked by	Approved by
		

Final Approval by Customer

Approved by	Comment

※The specification of “TBD” should refer to the measured value of sample . If there is difference between the design specification and measured value, we naturally shall negotiate and agree to solution with customer.

Contents

Document Revision History

Change No.	Date	Subject And Reason	Version No.	Responser
1	2021.09.16	New	V0	

1.0General Description

1.1 Introduction

LTK215S3015W is 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 and a driving circuit.This TFT LCD has a 21.5 (16:9) inch diagonally measured active display area with (1920 horizontal by 1080 vertical pixel) resolution.

1.2. Features

21.5(16:9 diagonal) inch configuration
Image Reversion: UP/DOWN and LEFT/RIGHT
ROHS design

1.3. General information

Item	Specification	Unit
Outline Dimension	495.6(H) x 292.2(V) x8.9(D)	mm
Display area	478.66(H) x 260.28 (V)	mm
Number of Pixel	1920(H) x3(RGB)x 1080 (V)	pixels
Pixel pitch	0.0831(H) x 0.241 (V)	mm
Pixel arrangement	RGB Vertical stripe	
Display mode	IPS(Normal Black)	
Color Filter Array	RGB vertical stripes	
Luminous	Min=250 / TYP=300	cd/㎡
Weight	TBD	g
Interface	LVDS	

2.0 Absolute Maximum Ratings

2.1 Environment Absolute Rating

Item	Symbol	Min.	Max.	Unit	Note
Operating Temperature	Topa	-10	50	℃	
Storage Temperature	Tstg	-20	60	℃	

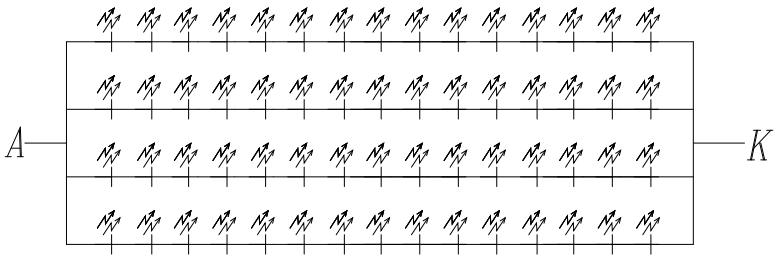
2.2 Back-light Unit:

PARAMETER	Sym.	Min.	Typ.	Max.	Unit	Test Condition	Note
LED Current	IF	–	220	–	mA	–	–
LED Voltage	VF	42	43	45	V	–	–
Life Time		–	20000	–	Hr.	I≦220mA	–
Brightness		250	300			nits	
Color	White						

Note (1) Permanent damage may occur to the LCD module if beyond this specification. Functional operation should be restricted to the conditions described under normal operating conditions.

(2)Ta=25±2℃

(3)Test condition: LED Current 220 mA



CURRENT IF=220mA
15c*4b=60LED

3.1 Optical Characteristics

Item	Symbol	Condition	Min	Typ	Max	Unit	Remark
Response Time	Tr	θ= 0°	-	-	-	ms	Note 3
	Tf		-	-	-		
	Tr+Tf		-	6.5	12		
Contrast Ratio	CR	θ= 0°	-	4000	-		Note 2,4
Viewing Angle	Top(12 o'clock)	CR≧10	80	89	-	deg	Note 1
	Bottom(6 o'clock)		80	89	-		
	Left(9 o'clock)		80	89	-		
	Right(3 o'clock)		80	89	-		
Color Chromaticity	Wx	θ= 0°	0.26	0.31	0.36		Note 5
	Wy		0.28	0.33	0.38		
	Rx		-	-	-		
	Ry		-	-	-		
	Gx		-	-	-		
	Gy		-	-	-		
	Bx		-	-	-		
	By		-	-	-		
Cross Talk	Ct		-		4	%	Note 6
Transmittance	Trans		-	5.88	-	%	
Luminance	L	θ= 0°	200	250	-	cd/㎡	
Luminance uniformity	YU		75%	-	-	%	

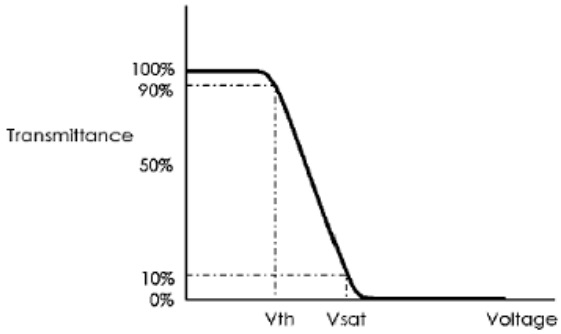
3.2 Measuring Condition

- Measuring surrounding : dark room
- Ambient temperature : 25±2℃
- 30min. warm-up time.

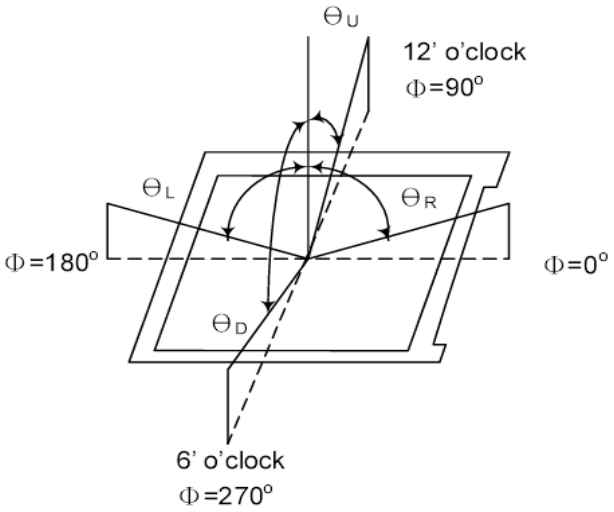
3.3 Measuring Equipment

- TOPCON BM-7
- Measuring spot size : field 2°

Note (1) Definition of Vsat and Vth (at 20℃)



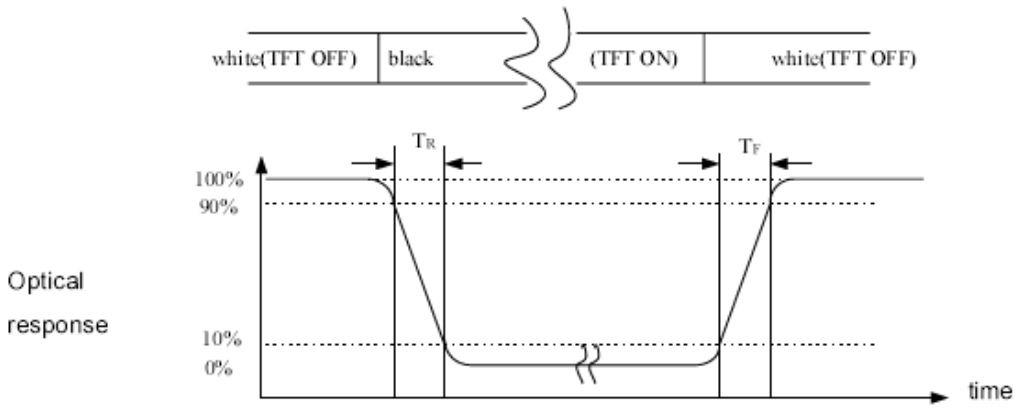
Note (2) Definition of Viewing Angle :



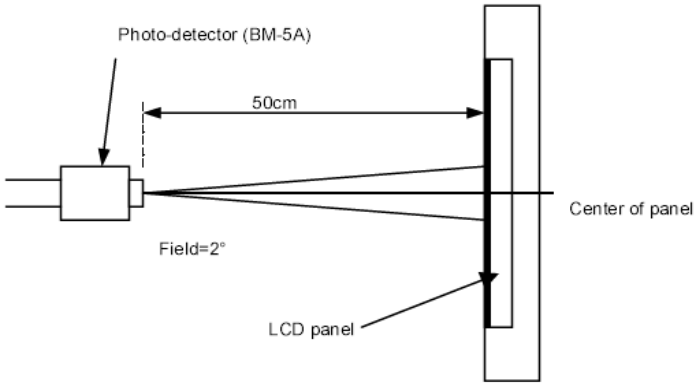
Note (3) Definition of Contrast Ratio(CR) :
measured at the center point of panel

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

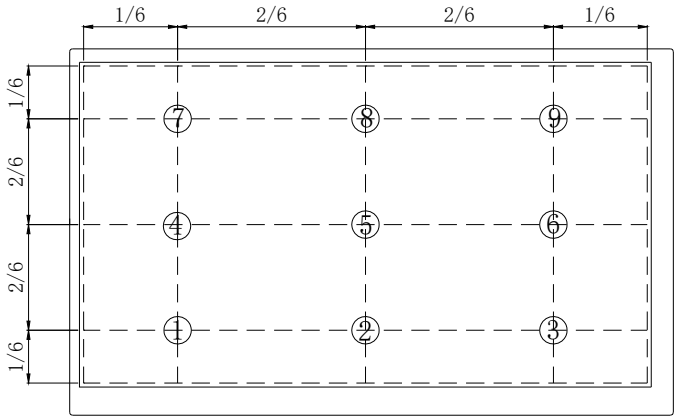
Note (4) Definition of Response Time : Sum of T_R and T_F



Note (5) Definition of optical measurement setup



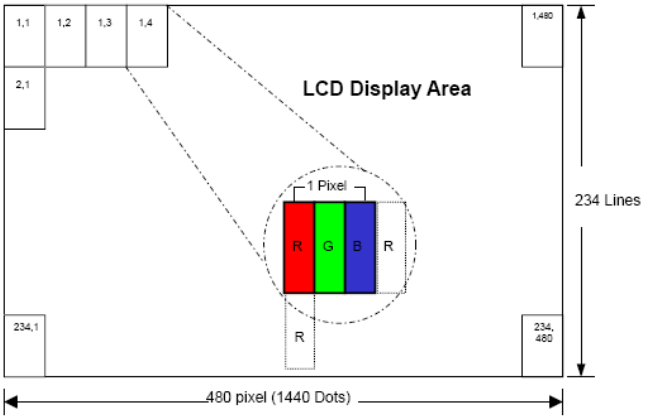
Note (6) Definition of brightness uniformity



Note (7) Rubbing Direction (The different Rubbing Direction will cause the different optima view direction.

3.4 Block Diagram

3.4.1 TFT-LCD Module



4. Interface Pin Connection

CN1: 300B30-0000RA-M4 (Starconn) or equivalent (see Note (1))

CN1: 1-301223-0 (XINDAYITONG) or equivalent (see Note (1))

Pin No.	Symbol	Description	Note
1	RO[0]N	Odd LVDS Signal -	
2	RO[0]P	Odd LVDS Signal +	
3	RO[1]N	Odd LVDS Signal -	
4	RO[1]P	Odd LVDS Signal +	
5	RO[2]N	Odd LVDS Signal -	
6	RO[2]P	Odd LVDS Signal +	
7	GND	Ground	
8	ROCLK-	Odd LVDS Clock -	
9	ROCLK+	Odd LVDS Clock +	
10	RO[3]N	Odd LVDS Signal -	
11	RO[3]P	Odd LVDS Signal +	
12	RE[0]N	Even LVDS Signal -	
13	RE[0]P	Even LVDS Signal +	
14	GND	Ground	
15	RE[1]N	Even LVDS Signal -	
16	RE[1]P	Even LVDS Signal +	
17	GND	Ground	
18	RE[2]N	Even LVDS Signal -	
19	RE[2]P	Even LVDS Signal +	
20	RECLK-	Even LVDS Clock -	
21	RECLK+	Even LVDS Clock +	
22	RE[3]N	Even LVDS Signal -	
23	RE[3]P	Even LVDS Signal +	
24	GND	Ground	
25	WP	Write Protect (High: Write Enable, Low or Open: Write Disable)	(2)
26	SCL	I2C Serial Clock (for adjust VCOM)	(2)
27	SDA	I2C Serial Data (for adjust VCOM)	(2)
28	5V	DC power supply	
29	5V	DC power supply	
30	5V	DC power supply	

Note:

(1)The direction of pin assignment is shown as below:

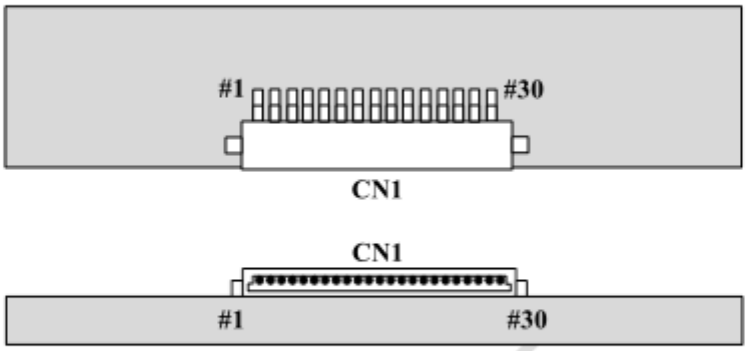


Fig. 4.1 LVDS connector direction sketch map

(2) a. Please let it open (Do not line out from PCBA connector) if it do not used.(for example：TV set)

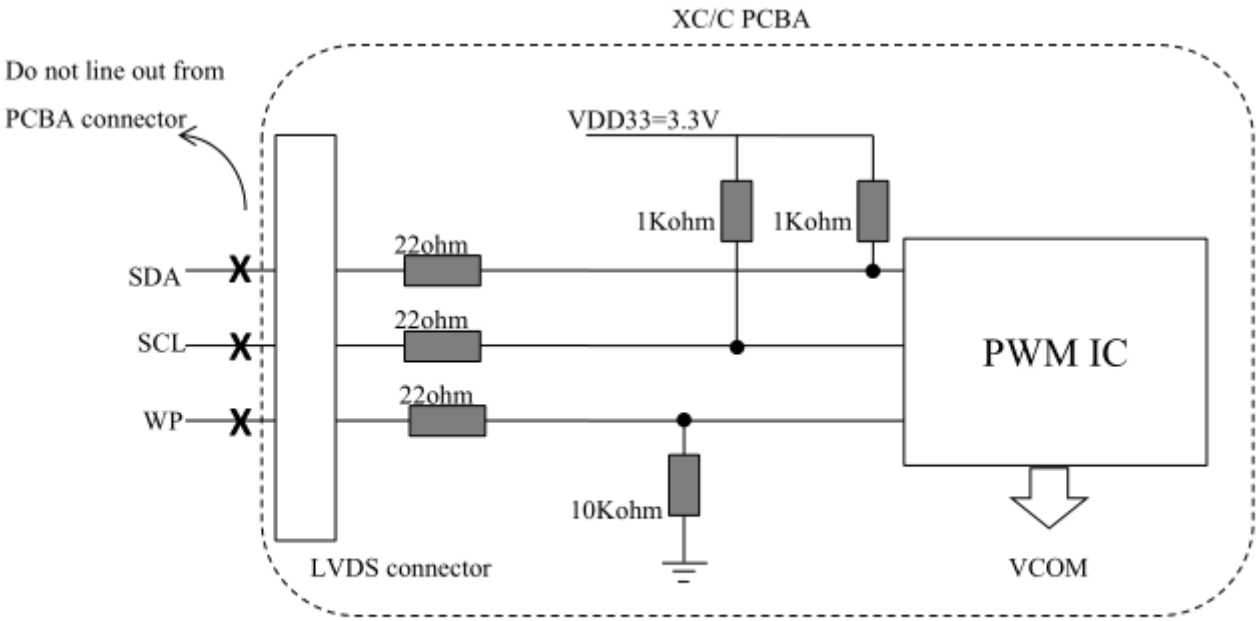


Fig. 4.2 WP/SDA/SCL PCBA set

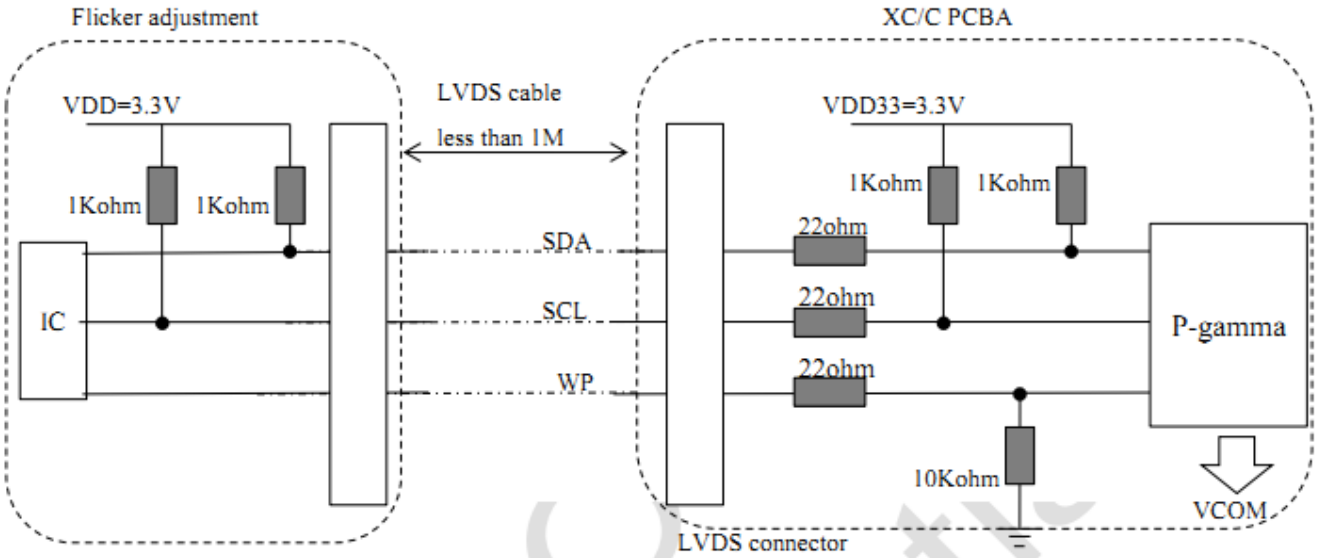


Fig. 4.3 WP/SDA/SCL flicker set

4.2 Block Diagram of Interface

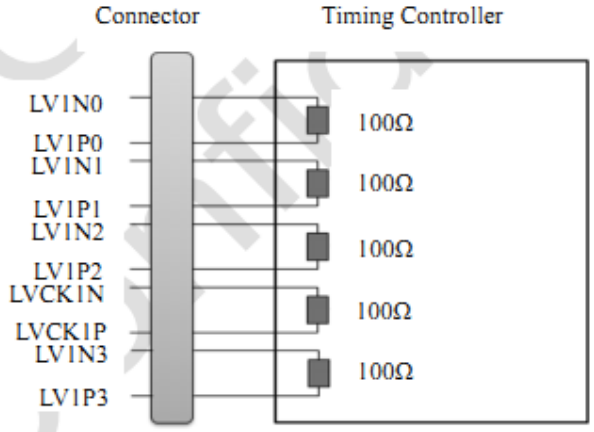


Fig. 4.4 Block diagram of interface

Attention:

(1) This open cell uses a 100 ohms (Ω) resistor between positive and negative lines of each receiver input.

(2) LVDS cable impedance shall be 50 ohms per signal line or about 100 ohms per twist-pair line respectively.

4.3 LVDS Interface

4.3.1 VESA Format

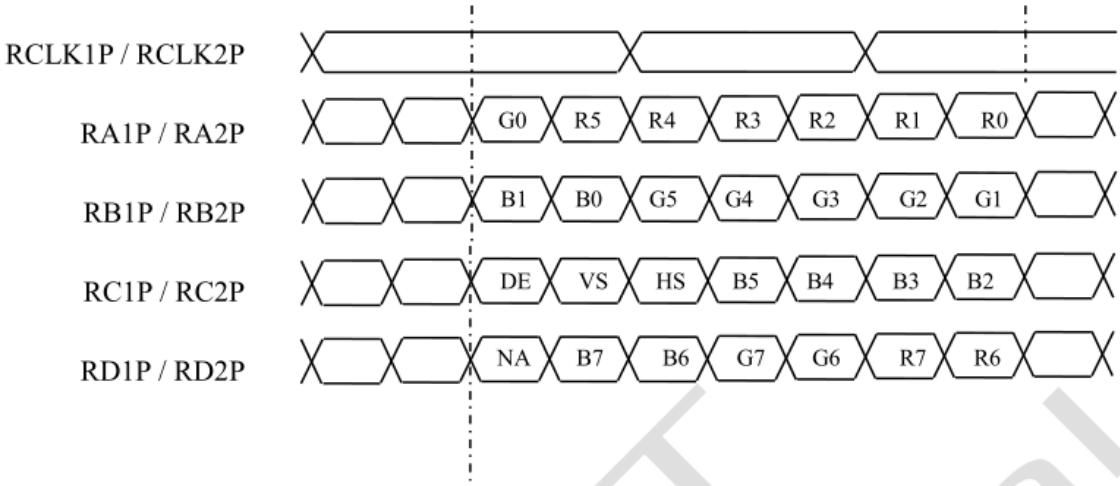
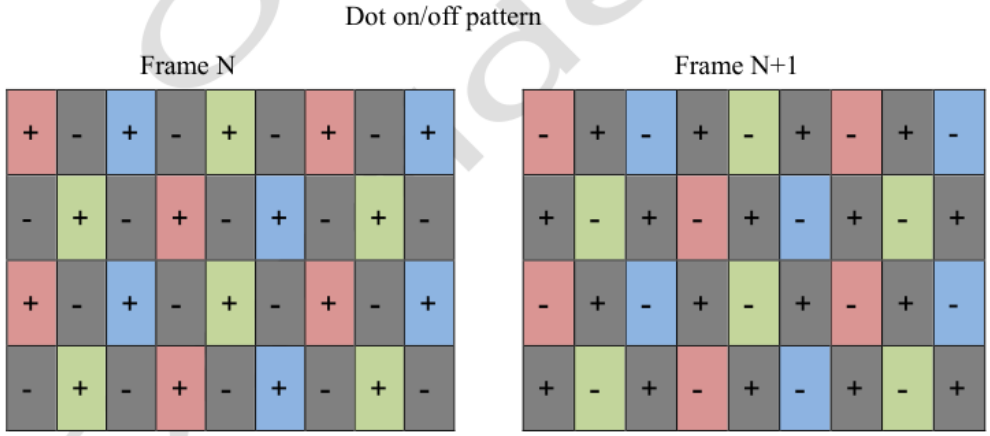


Fig. 4.5 VESA format

4.4 Flicker Pattern

Flicker should be adjusted by the Dot on/off pattern, where are displayed alternately at vertical line. (Dot inversion)



5. Interface Timing

5.1 Timing Table (DE Only Mode)

Signal	Item	Symbol	Min.	Typ.	Max.	Unit	Note
LVDS Receiver Clock	Frequency	Fclkin (=1/T_{Clk})	64	74.25	96	MHz	(1) (2)
	Input cycle to cycle jitter	Trcl	—	—	200	ps	(3)
	Spread spectrum modulation range	Fclkin_mod	Fclkin-2%	—	Fclkin+2%	MHz	(4)
	Spread spectrum modulation frequency	F_{SSM}	60	—	200	KHz	
LVDS Receiver Data	Receiver Skew Margin	T_{RSM}	-400	—	400	ps	(5)
Vertical Active Display Term	Frame Rate	F	48	60	75	Hz	
	Total	T_V	1092	1125	1380	T_H	$T_V = T_{VD} + T_{VB}$
	Display	T_{VD}		1080			
	Blank	T_{VB}	12	45	300	T_H	
Horizontal Active Display Term	Total	T_H	1046	1100	1174	T_{CLK}	$T_H = T_{HD} + T_{HB}$
	Display	T_{HD}		960			
	Blank	T_{HB}	86	140	214	T_{CLK}	

Note:

(1) The TFT LCD open cell is operated in DE only mode, H sync and V sync input signal have no effect on normal operation.

(2) Please make sure the range of pixel clock follows the following equations:

Fclkin(max) ≥ Fmax × Tv × Th Fmin × Tv × Th ≥ Fclkin(min)

Main frequency Max is 96Mhz without spread spectrum

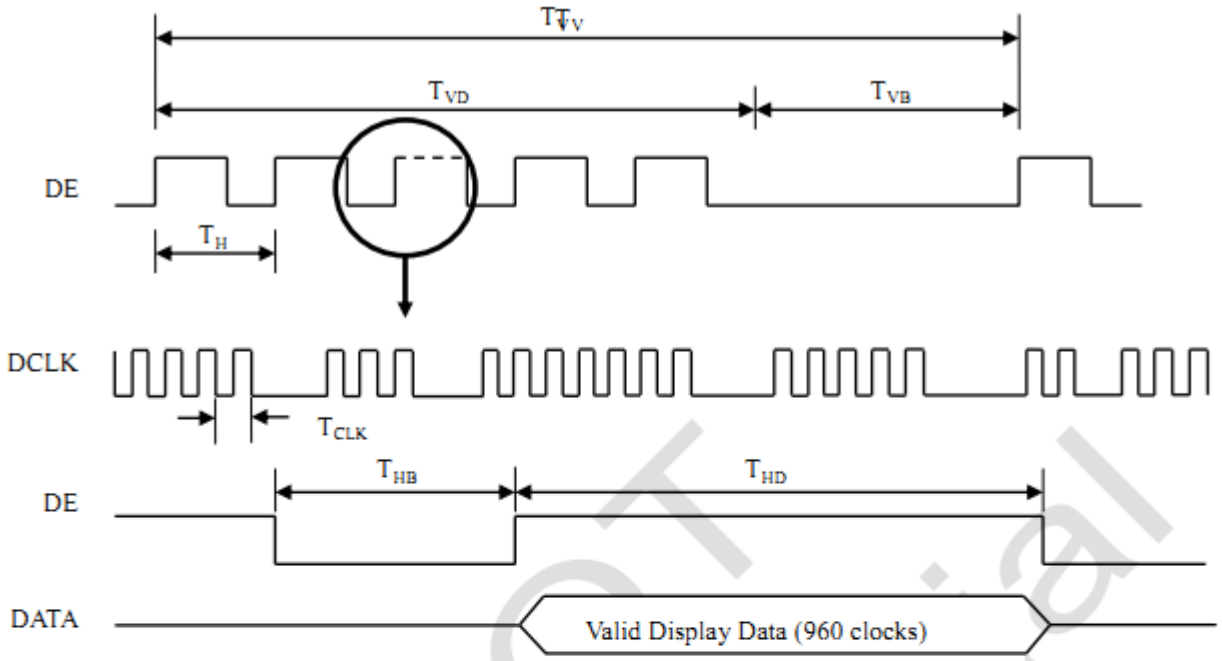


Fig. 5.1 Interface signal timing diagram

(3)The input clock cycle-to-cycle is defined as below figures.

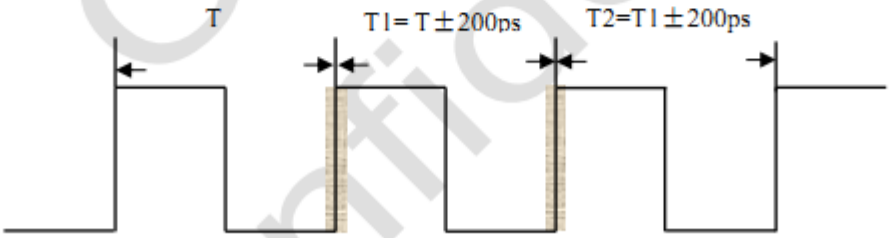


Fig. 5.2 Jitter

(4) The SSCG (Spread Spectrum Clock Generator) is defined as the following figure.

The LVDS SSM's suggestion is off by default, SOC board must test all validation if SOC board open the LVDS SSM.

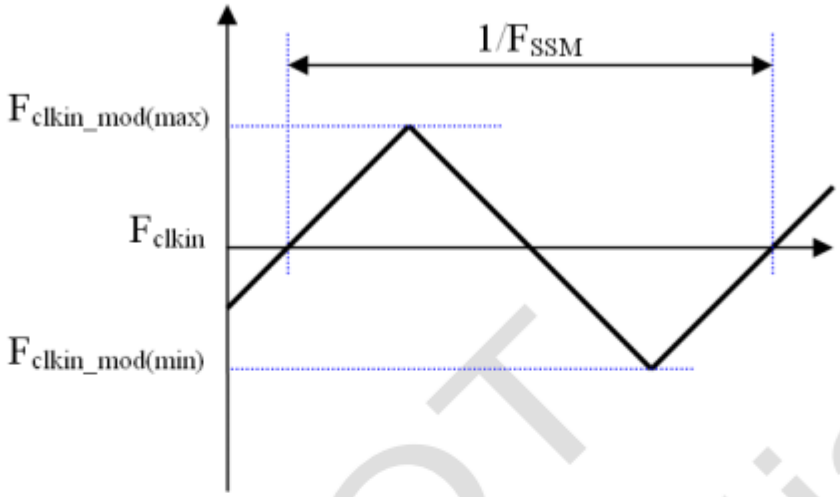


Fig. 5.3 SSCG

(5) The LVDS timing diagram and setup/hold time is defined and showed as the following figure.

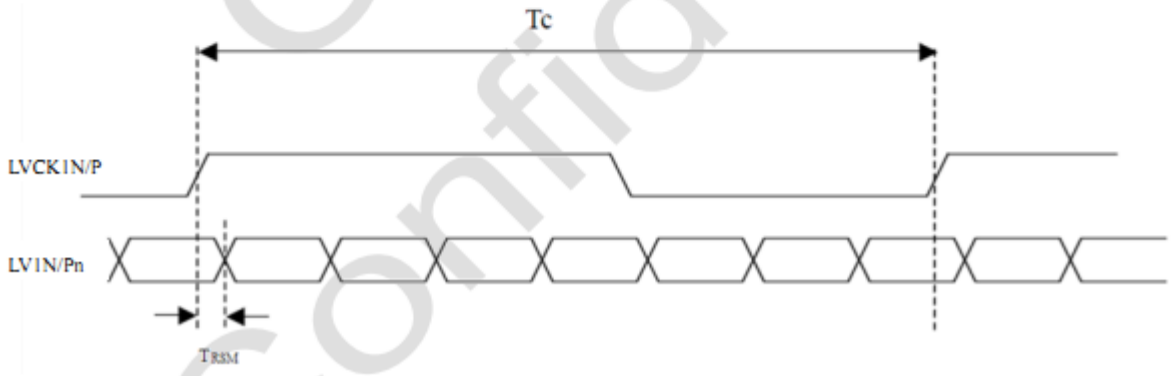


Fig.5.4 LVDS receive interface timing diagram

5.2 Power On/Off Sequence

To prevent a latch-up or DC operation of the Open cell, the power on/off sequence should be as the diagram below.

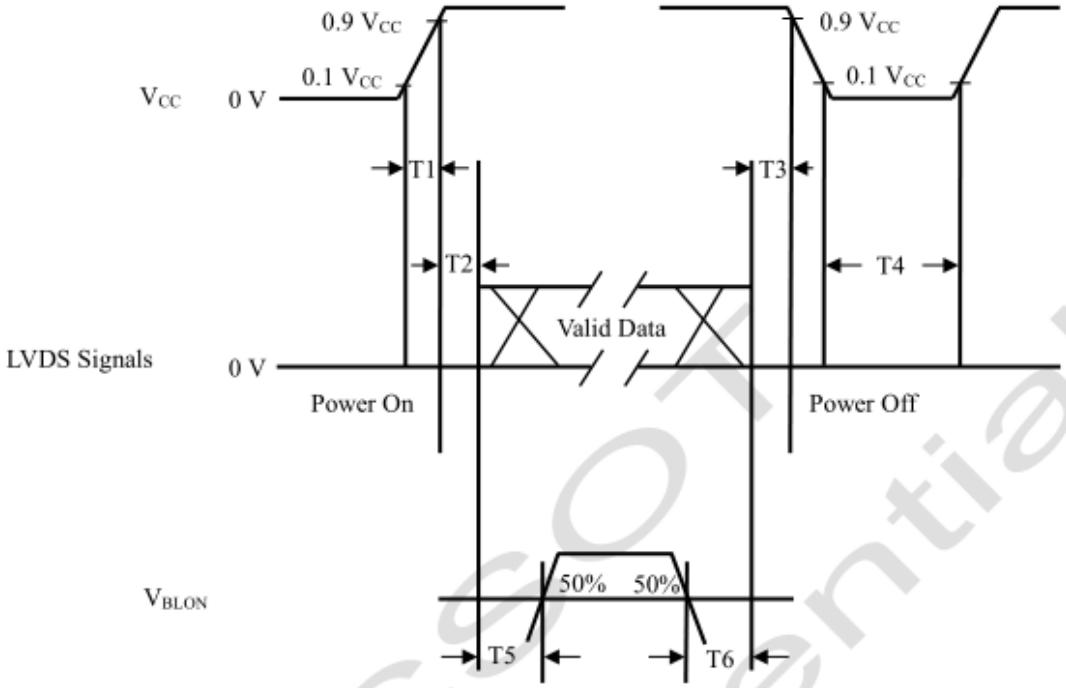


Fig.5.5 Power on/off sequence

Parameter	Values			Unit
	Min.	Typ.	Max.	
T1	0.5	-	10.0	ms
T2	0.0	-	50	ms
T3	0.0	-	50	ms
T4	1000.0	-	-	ms
T5	500.0	-	-	ms
T6	100.0	-	-	ms

Attention:

(1) The supply voltage of the external system for the open cell input should follow the definition of VCC.

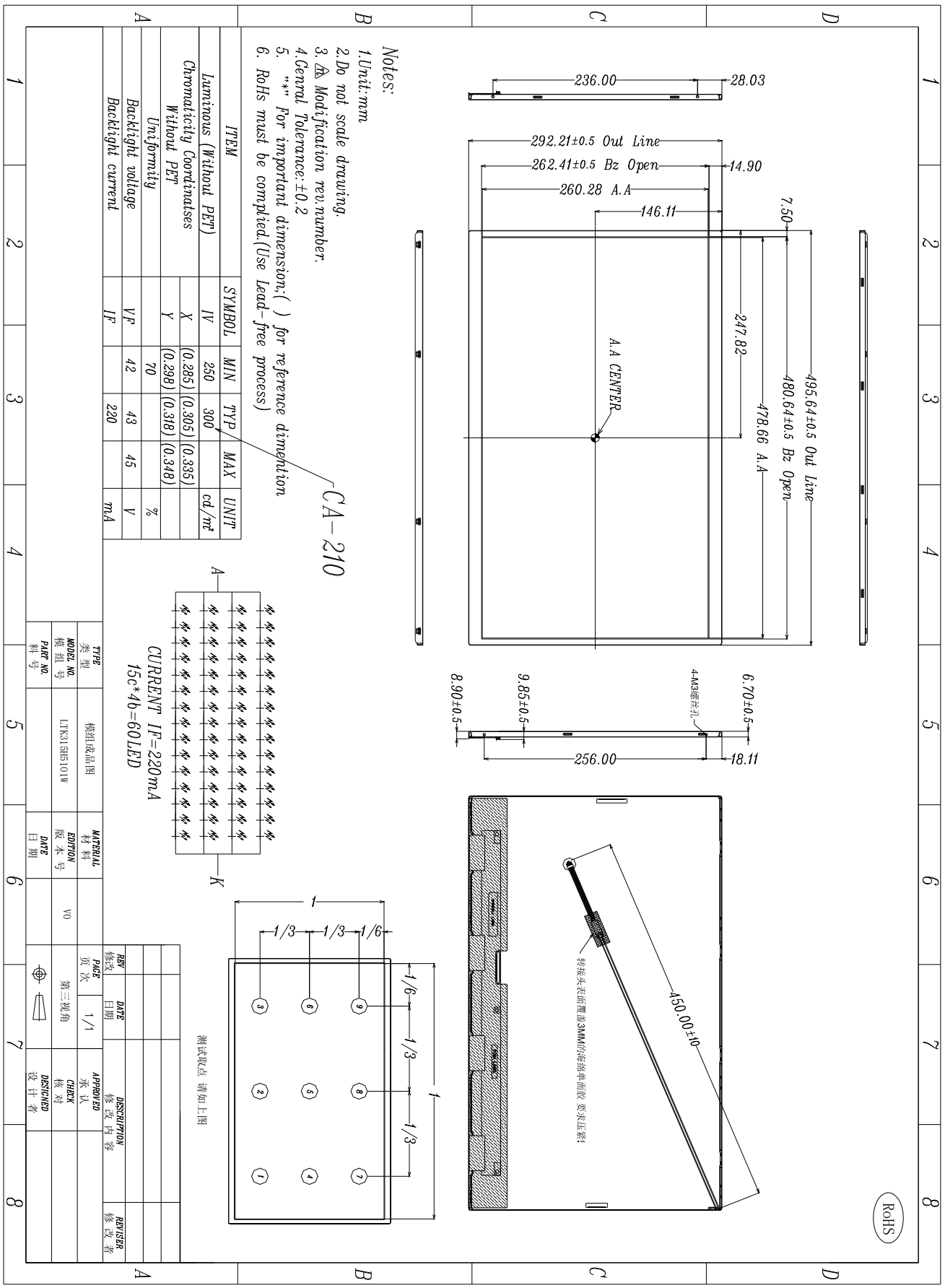
(2) When the customer's backlight turns on before the LCD operation or the LCD turns off before the backlight turns off, the display may momentarily become abnormal screen.

(3) In case that VCC is in off level, please keep the level of input signals on the low or high impedance. If T2 < 0, that may cause electrical overstress.

(4) T4 should be measured after the module has been fully discharged between power off and on period.

(5) Interface signal shall not be kept at high impedance when the power is on.

6.Outline dimension



7.0 General Precaution

7.1 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.

7.2 Asembly Precaytton

10.2.1 Please use the mounting hole on the module side in installing and do not bending or wrenching LCD in assembling. And please do not drop, bend or twist LCD module in handling.
10.2.2 Please design display housing in accordance with the following guide lines.
10.2.2.1 Housing case must be destined carefully so as not to put stresses on LCD all sides and not to wrench module. The stresses may cause non-uniformity even if there is no non-uniformity statically.
10.2.2.2 Keep sufficient clearance between LCD module back surface and housing when the LCD module is mounted. The clearance in the design is recommended taking into account the tolerance of LCD module thickness and mounting structure height on the housing.
10.2.3 Please do not push or scratch LCD panel surface with any-thing hard. And do not soil LCD panel surface by touching with bare hands. (Polarizer film, surface of LCD panel is easy to be flawed.)
10.2.4 Please do not press any parts on the rear side such as source IC, gate IC, and FPC during handling LCD module. If pressing rear part is unavoidable, handle the LCD module with care not to damage them.
10.2.5 Please wipe out LCD panel surface with absorbent cotton or soft cloth in case of it being soiled.
10.2.6 Please wipe out drops of adhesives like saliva and water on LCD panel surface immediately. They might damage to cause panel surface variation and color change.
10.2.7 Please do not take a LCD module to pieces and reconstruct it. Resolving and reconstructing modules may cause them not to work well.

10.3 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. HannStar does not warrant the module, if customers disassemble or modify the module.

10.4 Breakage of LCD Panel

10.4.1 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.
10.4.2 If liquid crystal contacts mouth or eyes, rinse out with water immediately.
10.4.3 If liquid crystal contacts skin or cloths, wash it off immediately with alcohol and rinse thoroughly with water.
10.4.4 Handle carefully with chips of glass that may cause injury, when the glass is broken.

7.5 Absolute Maximum Ratings and Power Protection Circuit

10.5.1 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.
10.5.2 Please do not leave LCD module in the environment of high humidity and high temperature for a long time.
10.5.3 It's recommended employing protection circuit for power supply.
10.6 Operation
10.6.1 Do not touch, push or rub the polarizer with anything harder than HB pencil lead.Use fingerstalls of soft gloves in order to keep clean display quality, when persons handle the LCD module for incoming inspection or assembly.
10.6.2 When the surface is dusty, please wipe gently with absorbent cotton or other soft material.
10.6.3 Wipe off saliva or water drops as soon as possible. If saliva or water drops contact with polarizer for a long time, they may causes deformation or color fading.
10.6.4 When cleaning the adhesives, please use absorbent cotton wetted with a little petroleum benzine or other adequate solvent.

7.6 Static Electricity

10.7.1 Protection film must remove very slowly from the surface of LCD module to prevent from electrostatic occurrence.
10.7.2 Because LCD module uses CMOS-IC on TFT-LCD panel, it is very weak to electrostatic discharge. Please be careful with electrostatic discharge.
10.7.3 Persons who handle the module should be grounded through adequate methods.

7.8 Disposal

When disposing LCD module, obey the local environmental regulations.

7.9 OTHERS

10.9.1 A strong incident light into LCD panel might cause display characteristics' changing inferior because of polarizer film, color filter, and other materials becoming inferior. Please do not expose LCD module direct sunlight land strong UV rays.
10.9.2 Please pay attention to a panel side of LCD module not to contact with other materials in preserving it alone.
10.9.3 For the packaging box, please pay attention to the followings:
10.9.3.1 Packaging box and inner case for LCD are designed to protect the LCDs from the damage or scratching during transportation. Please do not open except picking LCDs up from the box.
10.9.3.2 Please do not pile them up more than 6 boxes. (They are not designed so.) And please do not turn over.
10.9.3.3 Please handle packaging box with care not to give them sudden shock and vibrations. And also please do not throw them up.
10.9.3.4 Packing box and inner case for LCDs are made of cardboard. So please pay attention not to get them wet. (Such like keeping them in high humidity or wet place can occur getting them wet.)