REV	00

广 东 高 展 光 电 股 份 有 限 公 司

GUANGDONG SUPERVIEW OPTOELECTRONICS CO.,LTD.

样 品 承 认 书

APPROVAL SHEET

PRODUCT MODEL	G17703AE01A8(GD3219B)		
REMARKS	TFT MODULE, 128(RGB) * 160PIXELS		
APPROVED SIGNATURE BY SUPERVIEW	PREPARED BY	CHECKED BY	APPROVED BY

APPROVED SIGNATURE BY CUSTOMER:		
PREPARED BY	CHECKED BY	APPROVED BY

RECORDS OF REVISION

REV.	DATE	Page	DESCRIPTION OF CHANGES
00	2020.12.29		First issue.

CONTENT

1. GENERAL SPECIFICATION

1.1 Description

The G17703AE01A8is a color active matrix Thin Film Transistor (TFT) Liquid Crystal Display (LCD) that uses amorphous silicon(a-Si) TFT as a switching device. This model is composed of a single 1.77inches transmissive type main TFT-LCD panel. The resolution of the panel is 128*160 pixels and can display up to 262K color.

1.2 Feature

-TN type for main TFT-LCD panel

-Structure COG+FPC+BL

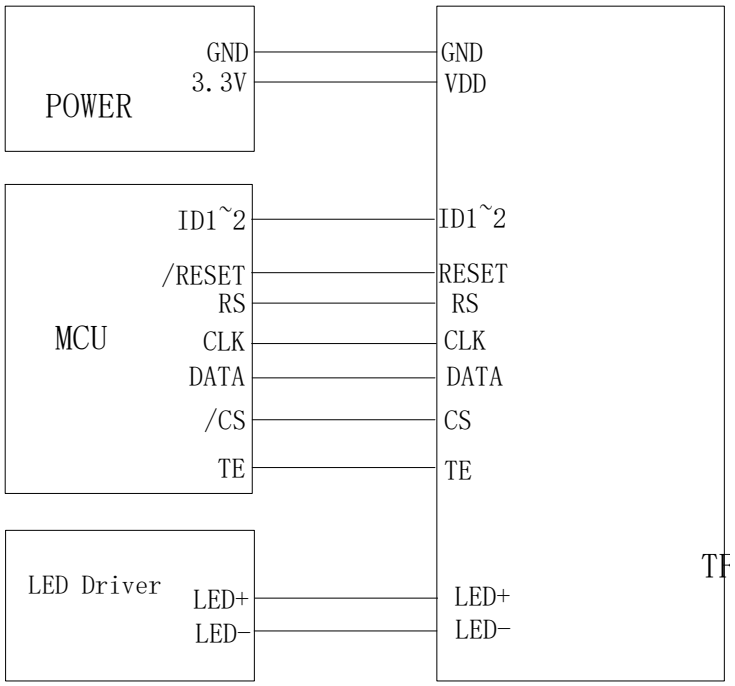
-Full, Normal (Still), Partial, Sleep, mode are available

1.3 General Specification

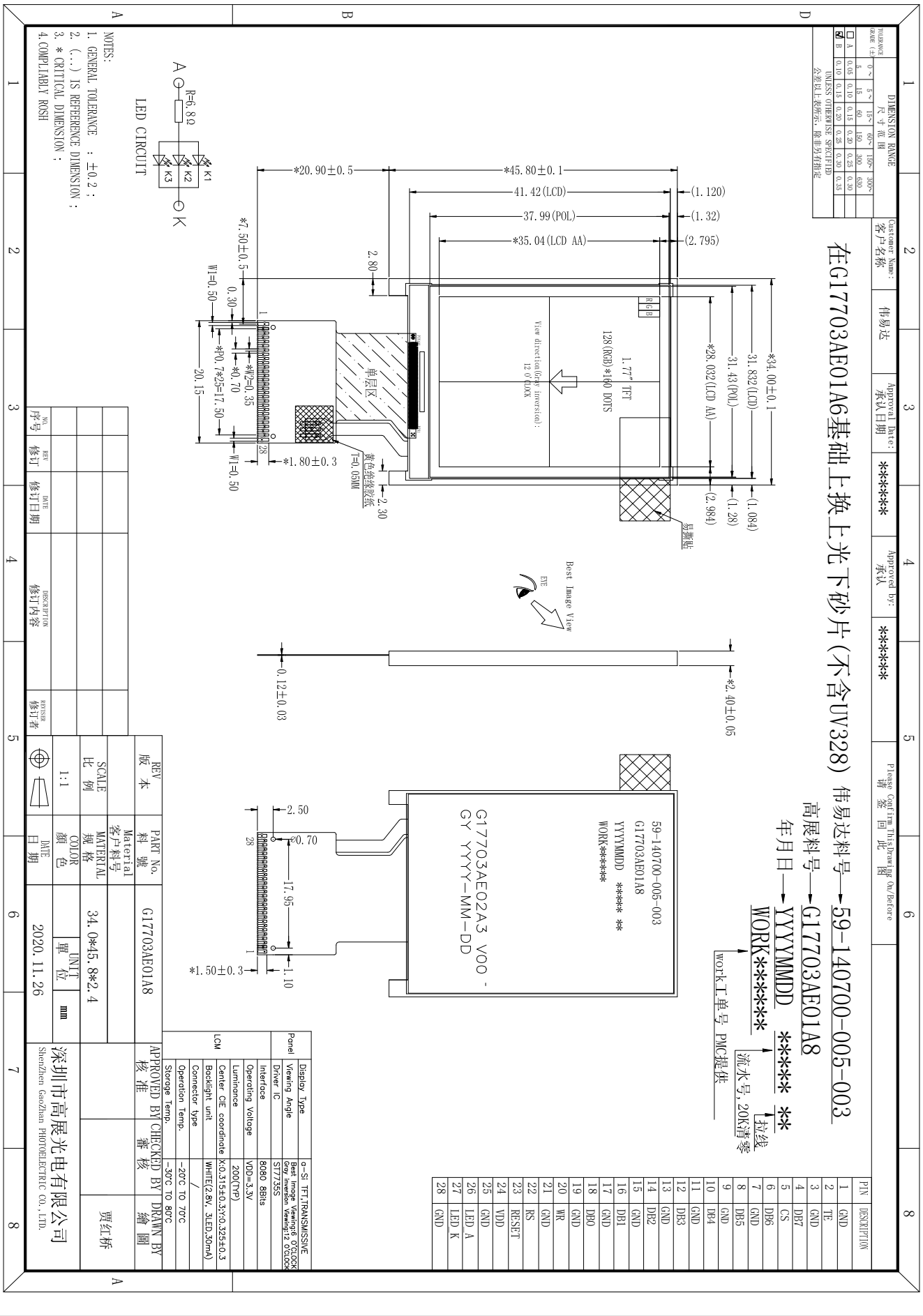
No.	Item	Specification	Unit	Remark
1	LCD Size	1.77	inch	-
2	Panel Type	a-Si TFT transmissive	-	-
3	Resolution	128 x (RGB) x 160	pixel	-
4	Display Mode	Normally White	-	-
5	Display Number of Colors	262K	-	-
6	ViewingDirection (Gray inversion)	12 o'clock	-	Note
7	Contrast Ratio	450(Typ)	-	-
8	Luminance	200(MIN)	cd/m2	-
9	Module Size	34(W) x45.8(L) x2.4(T)	mm	Note
10	Active Area	28.032(W) x 35.04(L)	mm	Note
11	Pixel Pitch	0.219(W) x 0.219（L）	mm	-
12	Weight	TBD(TYP)	g	-
13	Driver IC	ST7735S	-	-
14	Light Source	3 White LEDs	-	-
15	Interface	8080 8bit	-	-
16	Operating Temperature	-20~70	℃	-

Note: Please refer to the mechanical drawing.

2. BLOCK DIAGRAM



3. MECHANICAL DRAWING



NOTES:
1. GENERAL TOLERANCE : ±0.2 ;
2. (...) IS REFERENCE DIMENSION ;
3. * CRITICAL DIMENSION ;
4. COMPLIABLY ROSH

NO. 序号	REV 修订	DATE 修订日期	DESCRIPTION 修订内容	REVISER 修订者

PIN	DESCRIPTION
1	GND
2	TE
3	GND
4	DB7
5	CS
6	DB6
7	GND
8	DB5
9	GND
10	DB4
11	GND
12	DB3
13	GND
14	DB2
15	GND
16	DB1
17	GND
18	DB0
19	GND
20	WR
21	GND
22	RS
23	RESET
24	VDD
25	GND
26	LED_A
27	LED_K
28	GND

REV 版 本	PART No. 料 號	G17703AE01A8	
	Material 客户料号		
SCALE 比 例	MATERIAL 规 格	34.0*45.8*2.4	
1:1	COLOR 顏 色	UNIT 單 位	mm
	DATE 日 期	2020.11.26	

Panel	Display Type	a-Si TFT,TRANSMISSIVE
	Viewing Angle	Best Image View:12 O'CLOCK Grey Inversion Viewing:12 O'CLOCK
	Driver IC	ST7735S
Interface		8080 8Bits
Operating Voltage		VDD=3.3V
Luminance		200(TYP)
LCM	Center CIE coordinate	X:0.315±0.3;Y:0.325±0.3
	Backlight unit	WHITE(2.8V, 3LED,30mA)
Connector type		/
Operation Temp.		-20°C TO 70°C
Storage Temp.		-30°C TO 80°C

APPROVED BY 核 准	CHECKED BY 審 核	DRAWN BY 繪 圖
		贾红桥

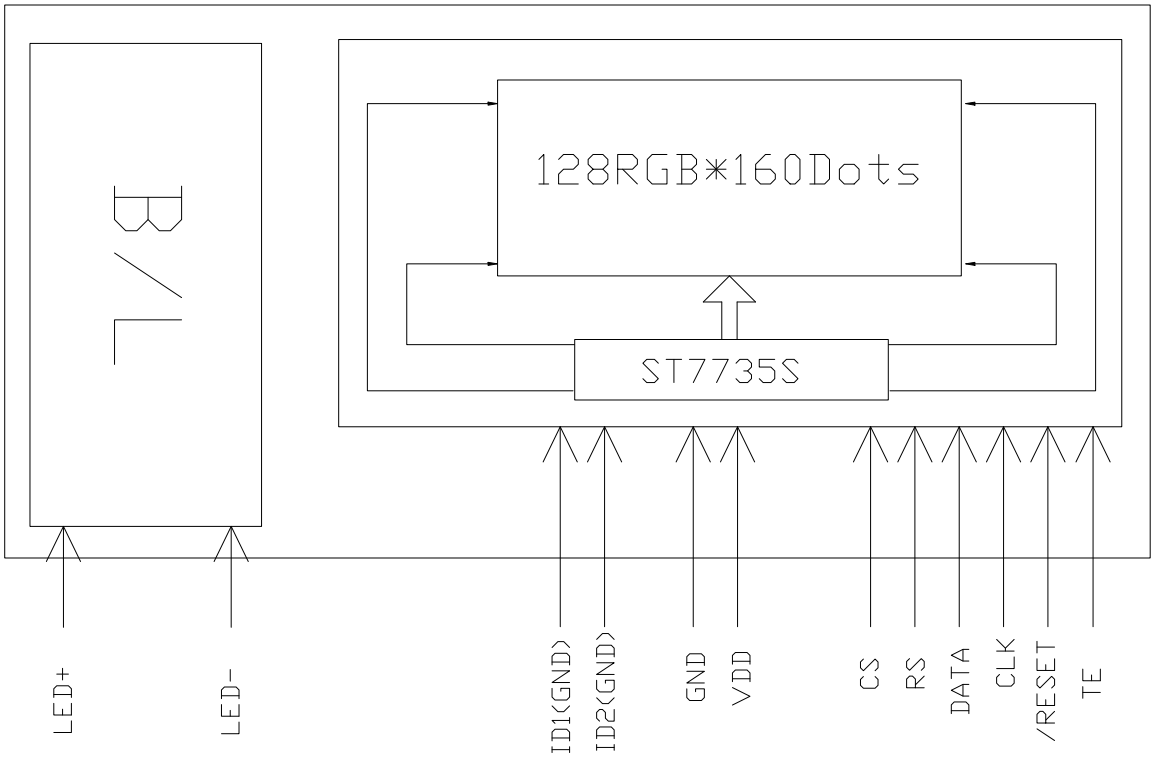
深圳市高展光电有限公司
ShenZhen GaoZhan PHOTOELECTRIC CO.,LTD.

4.INTERFACE PIN ASSIGNMENT

1	**GND**	Ground
2	TE	Tearing effect output
3	**GND**	Ground
4	**DB7**	Data bus
5	**CS**	Chip select input pin (“Low”enable)in MPU I/F and SPI I/F
6	**DB6**	Data bus
7	**GND**	Ground
8	**DB5**	Data bus
9	**GND**	Ground
10	**DB4**	Data bus
11	**GND**	Ground
12	**DB3**	Data bus
13	**GND**	Ground
14	**DB2**	Data bus
15	**GND**	Ground
16	**DB1**	Data bus
17	**GND**	Ground
18	**DB0**	Data bus
19	**GND**	Ground
20	WR	Write strobe signal to write data when RD is “Low” in MPU interface.
21	**GND**	Ground
22	RS	Display data/command selection in 80-series MPU I/F.RS=”0”:Command RS=”1”:Display data.
23	**RESET**	Reset signal(Low:active)
24	**VDD**	a **supply** voltage to the analog circuil
25	**GND**	Ground
26	**LEDA**	LED anode
27	**LEDK**	LED cathode
28	**GND**	Ground

5. ELECTRICAL SPECIFICATION for TFT

5.1. APPLICATION CIRCUIT



5.2. TFT ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBOL	STANDARD VALUE			UNIT
		MIN	TYP	MAX	
Power Supply for Analog	VCC	-0.3	-	5.5	V
Power Supply for Digital IO	IOVCC	-0.3	-	3.5	V

Note: Permanent damage to the device may occur if maximum values are exceeded or reverse voltage is applied.

5.3. TFT TYPICAL OPERATION CONDITION

5.3.1 TFT DC Characteristics

ITEM	SYMBOL	CONDITION	STANDARD VALUE			UNIT
			MIN	TYP	MAX	
Power Supply for Analog	VDD	Ta=25 ºC	2.5	2.8	3.5	V
Power Supply for Digital IO	IOVDD	Ta=25 ºC	1.65	1.8	3.3	V
Input Signal “H” Level	V_{IH}	-	0.7IOVDD	-	IOVDD	V
Input Signal “L” Level	V_{IL}	-	0	-	0.3IOVDD	V
Output Signal “H” Level	V_{OH}	I_{OH}=-1.0mA	0.8IOVDD	-	IOVDD	V
Output Signal “L” Level	V_{OL}	I_{OL}=1.0mA	0	-	0.2IOVDD	V
Frame Frequency	FRAME	-	50	70	80	Hz

Note: IOVDD=1.65 to 3.3V, VDD=2.5 to3.5V, AGND=GND=0V, Ta=-20 to 70° C

5.3.2 TFT Current Consumption

Item	Symbol	Values		Unit	Remark
		type	Max.		
8080 8Bits					
Normal(Still) Mode	I_{CC1}	40	60	mA	Note1
Standby Mode	I_{CC1}	-	150	uA	Note2

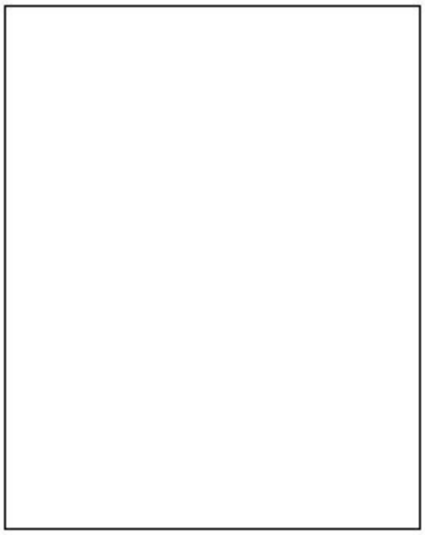
Note1: Test Condition

Typ: IOVCC=VCI=2.85V

Display Pattern: All Pixel White

Frame Rate=60Hz at 2-dot Inversion

Max. current check pattern:

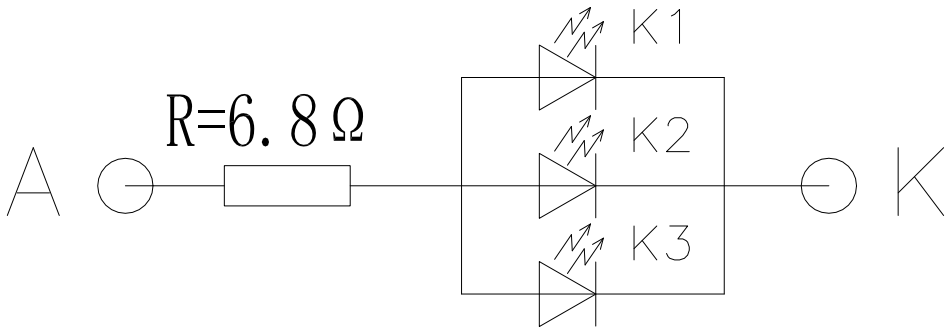


White

Note2: In the standby mode, all the internal display operations are suspended including the internal R-C oscillator.

5.4. BACKLIGHT SPECIFICATION

5.4.1 BACKLIGHT CIRCUIT



LED CIRCUIT

5.4.2 ELECTRICAL CHARACTERISTICS

(T=25℃)

PARAMETER	SYMBOL	CONDITION	STANDARD VALUE			UNIT
			MIN	TYP	MAX	
FORWARD VOLTAGE	VF	IF=30mA	2.8	3.05	3.3	v

5.5. 4-wire Serial Interface

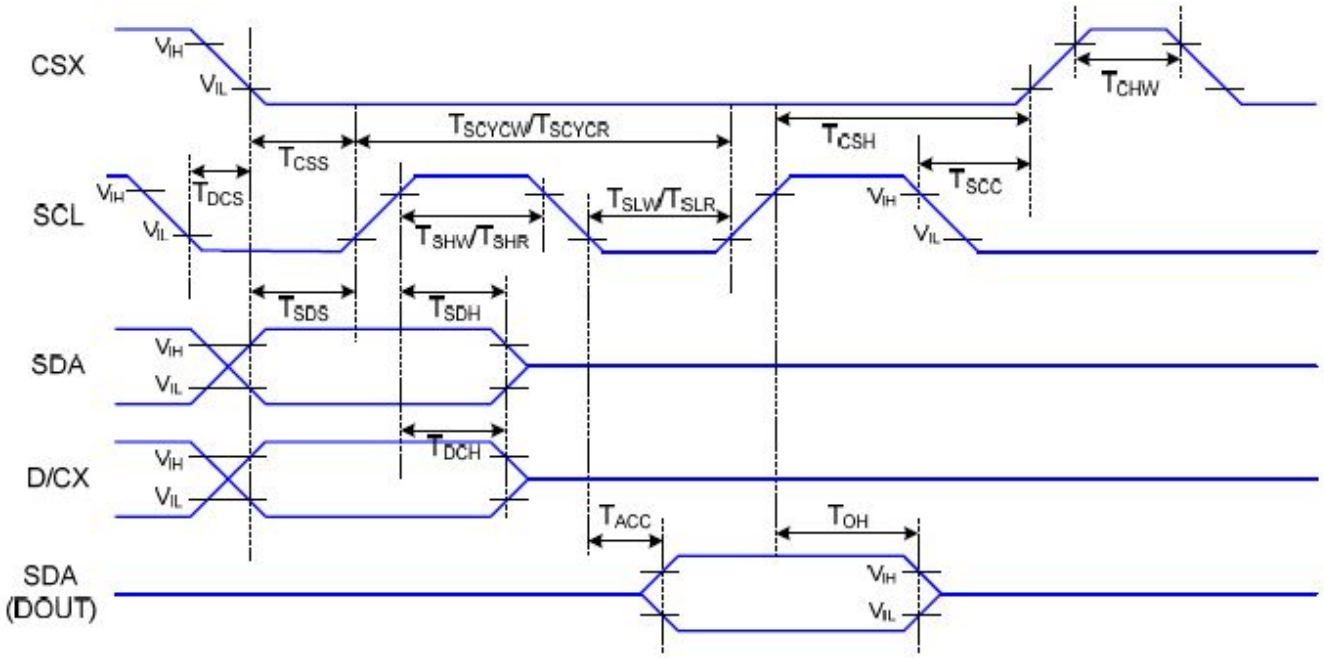


Fig. 5.5.1 4-Wire Serial command format

Ta=25 ℃,VDDI=1.65~3.7V,VDD=2.3~4.8V

Signal	Symbol	Parameter	MIN	MAX	Unit	Description
CSX	TCSS	Chip select setup time (write)	45		ns	
	TCSH	Chip select hold time (write)	45		ns	
	TCSS	Chip select setup time (read)	60		ns	
	TSCC	Chip select hold time (read)	65		ns	
	TCHW	Chip select "H" pulse width	40		ns	
SCL	TSCYCW	Serial clock cycle (Write)	66		ns	-write command & data ram
	TSHW	SCL "H" pulse width (Write)	15		ns	
	TSLW	SCL "L" pulse width (Write)	15		ns	
	TSCYCR	Serial clock cycle (Read)	150		ns	-read command & data ram
	TSHR	SCL "H" pulse width (Read)	60		ns	
	TSLR	SCL "L" pulse width (Read)	60		ns	
D/CX	TDCS	D/CX setup time	10		ns	
	TDCH	D/CX hold time	10		ns	
SDA (DIN) (DOUT)	TSDS	Data setup time	10		ns	For maximum CL=30pF For minimum CL=8pF
	TSDH	Data hold time	10		ns	
	TACC	Access time	10	50	ns	
	TOH	Output disable time	15	50	ns	

Fig 5.5.2. 4-line Serial Interface Characteristics

Note : The rising time and falling time (Tr, Tf) of input signal are specified at 15 ns or less. Logic high and low levels are specified as 30% and 70% of VDDI for Input signals.

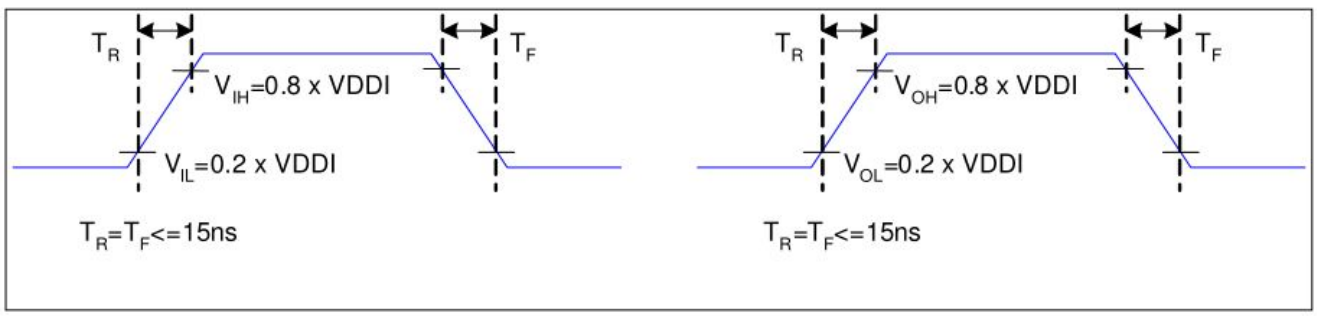
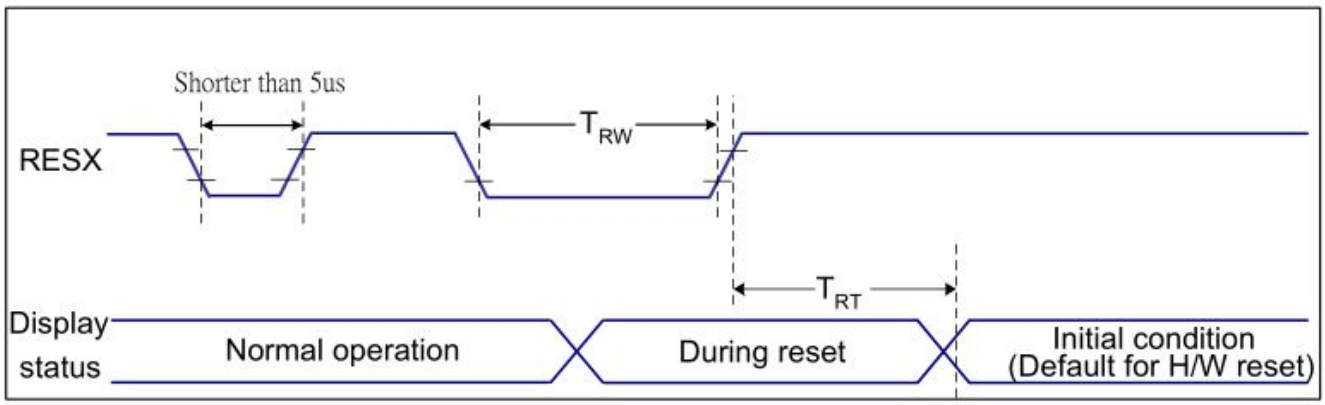


Fig 5.5.3 Rising and Falling Timing for I/O Signal

Note: The rising time and falling time (Tr, Tf) of input signal and fall time are specified at 15 ns or less. Logic high and low levels are specified as 20% and 80% of VDDI for Input signals.

5.6. TFT RESET TIMING CHARACTERISTICS



Reset Timing

VDDI=1.65 to 3.3V, VDD=2.4 to 3.3V, AGND=DGND=0V, Ta=-30 ~ 70 ℃

Related Pins	Symbol	Parameter	MIN	MAX	Unit
RESX	TRW	Reset pulse duration	10	-	us
	TRT	Reset cancel	-	5 (Note 1, 5)	ms
				120 (Note 1, 6, 7)	ms

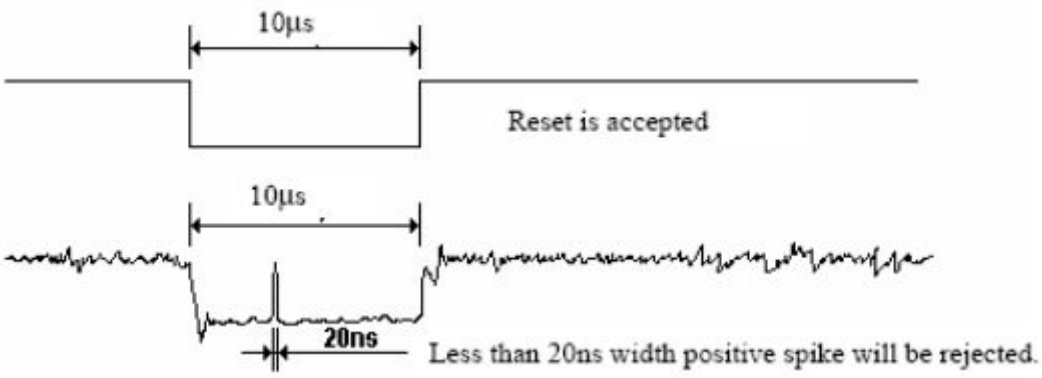
Table Reset Timing

Notes:

1. The reset cancel includes also required time for loading ID bytes, VCOM setting and other settings from NVM (or similar device) to
registers. This loading is done every time when there is HW reset cancel time (tRT) within 5 ms after a rising edge of RESX.
2. Spike due to an electrostatic discharge on RESX line does not cause irregular system reset according to the table below:

RESX Pulse	Action
Shorter than 5us	Reset Rejected
Longer than 9us	Reset
Between 5us and 9us	Reset starts

3. During the Resetting period, the display will be blanked (The display is entering blanking sequence, which maximum time is 120
ms, when Reset Starts in Sleep Out –mode. The display remains the blank state in Sleep In –mode.) and then return to Default condition
for Hardware Reset.
3. Spike Rejection also applies during a valid reset pulse as shown below:



5. When Reset applied during Sleep In Mode.
6. When Reset applied during Sleep Out Mode.
7. It is necessary to wait 5msec after releasing RESX before sending commands. Also Sleep Out command cannot be sent for
120msec.

6.OPTICAL CHA

(T_a=+25ºC, VCI=+2.85V IOVCC=+1.8V, I_B=20mA)

Item		Symbol	Condition	Values			Unit	Remark
				Min.	Typ.	Max.		
Viewing Angle Range	Left	θ_L	CR≧10	35	45	-	degree	Note 1
	Right	θ_R		35	45	-		
	Top	Φ_T		35	45	-		
	Bottom	Φ_B		10	20	-		
Response Time		Rising	Normal θ=Φ=0°	-	2	4	ms	Note 2
		Falling		-	6	12		
Contrast Ratio		CR	Normal θ=Φ=0°	--	500	-	-	Note 3
Luminance		L	Normal θ=Φ=0°		200	--	cd/m^2	Note 4
Color temperaturey	White		Normal θ=Φ=0°	-750	6750	+750	K	Note 5

Judgement criterion：

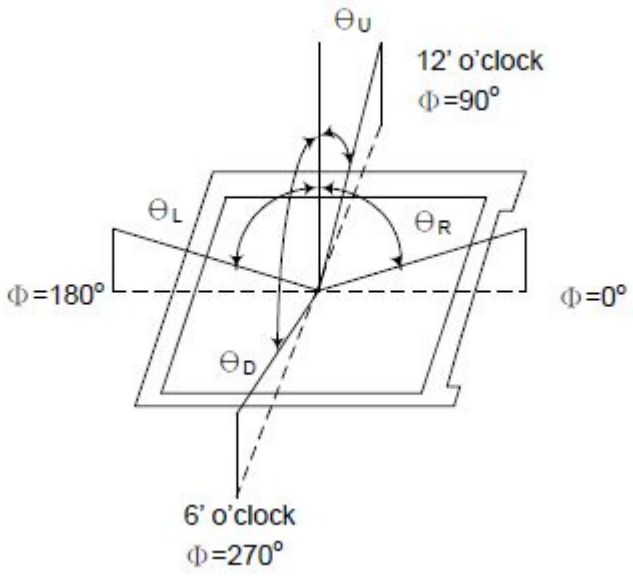
$$\Delta c_{白}' = \sqrt{(\Delta u')^2 + (\Delta v'/1.5)^2} = \sqrt{(u'_{白} - u'_{白0})^2 + [(v'_{白} - v'_{白0})/1.5]^2}$$

，the "$u'_{白0}$"and "$u'_{白0}$" is the type value in the Figure 1.

the error of the Red 、Green and Blue must be controlled as follow

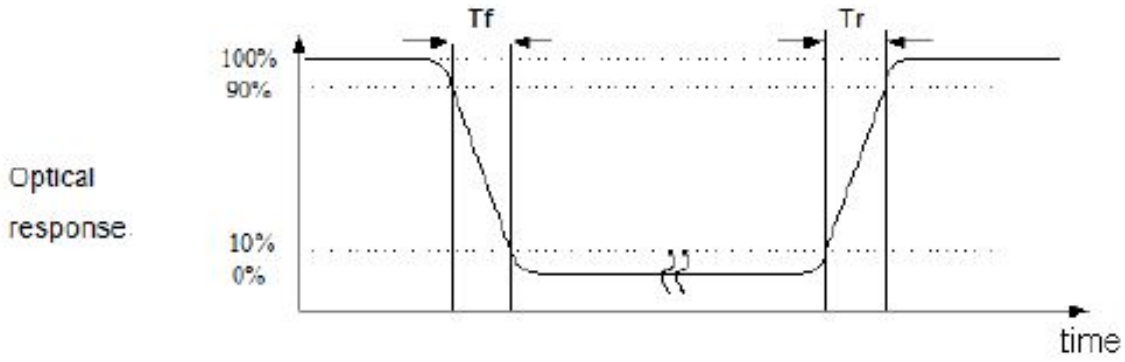
$\Delta c_{白}' \leqslant 0.0115$， $\Delta c_{红}' \leqslant 0.0230$， $\Delta c_{绿}' \leqslant 0.0230$， $\Delta c_{蓝}' \leqslant 0.0230$。

Note 1: Definition of viewing angle range



Note 2: Definition of response time

The output signals of TRD-100 are measured when the input signals are changed to “White” (falling time) and from “White” to Black” (rising time). respectively. The interval is between the 10% and 90% of amplitudes. Refer to figure as below.



Note 3: Definition of contrast ratio

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD on the "White" state}}{\text{Luminance measured when LCD on the "Black" state}}$$

Note 4: Definition of luminance

Measured at the center area of the panel when LCD panel is driven at “white” state.

Note 5: Definition of color chromaticity (CIE1931)

Color coordinates measured at the center point of LCD when panel is driven at “White”, “Red”, “Green” and “Blue” state respectively.

7.THE STANDARD OF INSPECTION FOR TFT

1. Scope

Specifications contain1

* Display Quality Evaluation lity
* Mechanics Specification

2. Sampling plan

Unless there is other agreement , sampling plan for incoming inspection should follow GB2828-2003.

2.1 Lot size: Quantity per shipment as one lot (different model as different lot .)

2.2 Sampling type: Normal inspection, single sampling.

2.3 Sampling level: Level II.

2.4 AQL

Acceptable Quality Level

MA : AQL 0.40

Major defect: AQL=0.40

MI : AQL 0.65

Minor defect: AQL=0.65

MA+MI : AQL 0.65

Total defect : AQL=0.65

3. Panel inspection condition

3.1 Environment:Room Temperature: 25±5℃.Humidity: 55±5% RH.Illumination: 800~1200Lux.

3.2 Inspection Distance：25±5 cm from the inspector to the module.

3.3 Inspection Angle:The vision of inspector should be perpendicular to the surface of the module.

4. Display Quality

4.1 Function Related:

defect type	definition
重缺陷（MA）	show or functional defects, serious deviation from the specifications, customers can not work properly.
	Severe skin defects, serious deviation from the specifications, the client does not work properly.
轻缺陷（MI）	slightly deviate from the specifications, does not affect the product function, but the appearance of an impact on product

Note: 1. The following standards unless otherwise specified, units are mm .

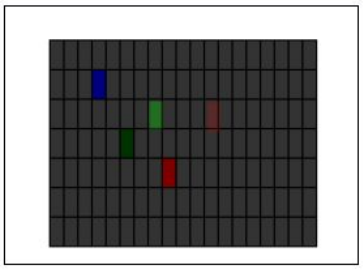
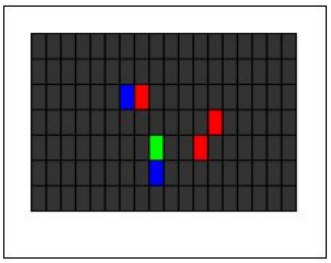
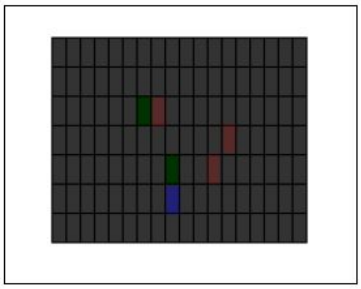
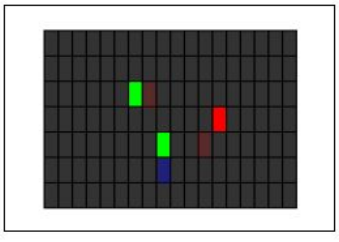
2. The following criteria for use in TFT small size: 7 inches or less (does not contain a 7-inch) TFT products.

4.2 functional test

Defect Type		Inspection method and acceptance		A level
LCD/Pol /BL/TP screen point defect	4.3 inches below	Line film card	Φ≤0.1	ignore
			0.1＜Φ≤0.15	2
			0.15＜Φ≤0.2	1
			Φ ＞0.2	0

dot shape defect of LCD/POL/BLU/TP	4.3 inches above		Φ≤0.1	ignore
			0.1<Φ≤0.15	2
			0.15<Φ≤0.2	1
			0.2<Φ≤0.25	1
			Φ > 0.25	0
	distance between dots	**Line film card**	/	≥5
Line shape defect of LCD/POL/BLU/TP	/	Line film card	w≤0.02	ignore
	/		L≤4, 0.02<w≦0.03	2
	/		L≤4, 0.03<w≦0.05	2
			w>0.05	follow dot defect
	distance between lines	Line film card	/	≥5
show state	no display	visible	/	NG
	abnormal display		/	
	Lack of planning		/	
	Muiti plan		/	
	Lack of screen		/	
	White		/	follow the limited sample
	Mura		/	
	Triad/white		/	
	flash		/	
	strong/light		/	

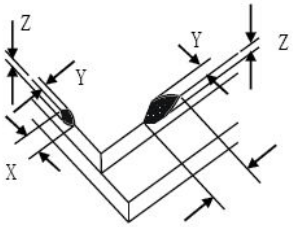
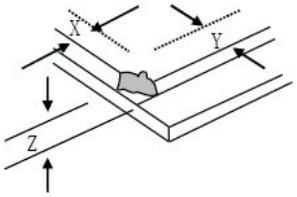
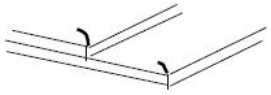
	Interference pattern		/	
POL	lack of border	visible	See the border of an right view	NG
BLU	LED no display	visible	/	NG
	LED Unstable		/	
	LED dark		/	
	dirt		/	
	mura		/	follow the limited sample
	light leakage		/	
	film bump		/	
	white line	Line film card	/	Follow line defect
	dark line		/	
	scratch		/	
TP	do not convert	When Click the screen ,touch screen test point can not convert		NG
	automatically convert	Do not click on the touch screen when the test point test point automatically converted		
dots	bright dots（4.3 inches below）	Leak 10x eyepiece		1
	bright dots（4.3 inches above）			1

	dark dots（4.3 inches below）	Leak 10x eyepiece		ignore
	dark dots（4.3 inches above）			
	2-adjacent bright dots（4.3 inches below）	Leak 10x eyepiece		0
	2-adjacent bright dots（4.3 inches above）			1
	2-adjacent dark dots (4.3 inches below)	Leak 10x eyepiece		ignore
	2-adjacent dark dots (4.3 inches above)			
	Bright and Dark Dots（4.3 inches below）	Leak 10x eyepiece		1
	Bright and Dark Dots（4.3 inches above）			1

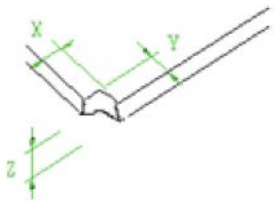
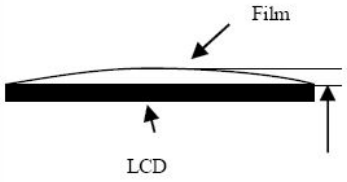
	distance between two dots	Line film card	/	≥5

4.3 Visual Inspection specification

defect type		Inspection method and acceptance		
dot defect of pol/TP	4.3 inches below	Leak 10x eyepiece.Line film card	Φ≤0.1	ignore
			0.1<Φ≤0.15	2
			0.15<Φ≤0.2	1
			Φ >0.2	0
	4.3 inches above		Φ≤0.1	ignore
			0.1<Φ≤0.15	2
			0.15<Φ≤0.2	1
			0.2<Φ≤0.25	1
			Φ >0.25	0
	Distance between dot defect	Line film card	/	≥5
line shape defect	/	Leak 10x eyepiece.Line film card	w≤0.02	ignore
	/		L≤4, 0.02<w≦0.03	2
	/		L≤4, 0.03<w≦0.05	2
	/		w>0.05	Follow dot defect
	Distance between dot defect	Line film card	/	≥5
tape	Adhesion is not enough	tear the protective film can not afford		NG
protective film	dirt	visible	oil, jelly, finger printing	NG

pol	indentation	/	/	Follow limited sample
	skin dirt	visible	/	NG
	bubble	Visible,Line film card	border area	Φ≤width of dark border
			view area	Follow dot defect
broken	edge broken	Visible,Line film card		X ignore Y ≤ black border width Z ≤ single glass thickness
	corner broken	Visible,Line film card		X ≤ black border width Y ≤ black border width Z ≤ single glass thickness
			corner chipping	X*Y ≤4mm² / Z ≤T
	crack	visible		NG
Cell bubble	/	visible	/	NG
Lc leakage	/	visible	/	NG
Silicone	does not cover ITO lead	visible	/	NG
FPC	broken	visible	/	NG
	scratch	Line film card	Injury to the base material and influence electricity	NG
	dirt	visible	/	NG
	fold	visible	/	NG

	burr	Visible	/	NG
	connecting finger dirt	Visible	oil, jelly, finger printing	NG
	PI film	Visible	Skew ,dislocation	NG
tape	peeling	Visible	/	NG
BLU	Location column fracture,deformation	Visible	/	NG
	FPC broken		/	
	Plastic box broken,deformation		/	
bezel	scratch	Visible	oil, jelly, finger printing	NG
	Clasp is not tightened	Visible	/	NG
	wrap	Visible	Follow specification	NG
	deformation	Visible	/	NG
Touch panel	pattern	Visible	Pattern dimness	NG
	dot or line defect	Leak 10x eyepiece.Line film card	/	follow dot or line defect
	dirt	Visible	/	Limit sample
	Top wound, scratch, surface crease	Visible Visual mirror	/	follow dot or line defect

	Scratch、drape	Leak 10x eyepiece.Line film card		
	FPC broken	visible	/	NG
	edge broken	Line film card		X ≤black border width Y ≤ black border width Z ≤ single glass thickness Note: enter the display area is NG X ≤2 Y ≤2 Z ≤T
	crack	visible		NG
	newtong ring	visible		≤1/5 panel
	irregular newtong ring	visible		≤1/4 panel
	film rouse	Line film card		≤0.4

Note：

1.Inspection conditions and environment:

(1) lighting:100W cool white fluorescent lamp,the distance between illuminant and TP is 500 to 550mm, illuminance is 600 to 800 Lux.

(2) Distance:The distance between eyes and the surface of TP is 300 to 350mm.

(3) location:It is 45°from the examine plane to the desktop.Up and down,left and right,each turn 90°.

(4) The time to examine each piece is not less than 12 seconds.

2.Under 25% contrast,if the defect can be seem,is Hard Scratch, if can't be seem,is Soft Scratch.

3.The standard must be checked with Cover Glass.

8.RELIABILITY TESTS

ITEM	CONDITION	CRITERION
Operating Temperature Test	High Temperature: +60 ºC, 120 hrs	No defects in display and operational functions
	Low Temperature: -20 ºC,120 hrs	
Storage Temperature Test	High Temperature: +70 ºC, 120 hrs	No defects in display and operational functions
	Low Temperature: -20 ºC, 120 hrs	
Humidity Endurance Test	60ºC, 90%RH, 120 hrs	No defects in display and operational functions
Thermal Shock Test	-20 ºC (30mins)～ +70 ºC (30mins) 10 cycles	No defects in display and operational functions
Electro Static Discharge	± 4KV, Human BodyMode,150pF/330Ω; ± 8KV,Air Mode,150pF/330Ω	No defects in display and operational functions

NOTE:

1) The samples must be free from defect before test, must be restored at room condition at least for 2 hours after reliability test before any inspection.

2) Before test the function of TP, the sample must be placed in room temperature for 24hrs after RA test.

9. PRECAUTIONS

9.1. HANDLING

9.1.1. Polarizer Cleaning, Petroleum ether (or N-hexane) is recommended for cleaning the front/rear polarizers and reflectors, acetone, toluene and ethanol are not allowed to avoid damaging the surface.

9.1.2. Body grounding, must wear Anti-ESD wrist strap while pick up LCDs.

9.1.3. FPC Soldering, less than 300℃/3S, solder must be grounding on grounding bench.

9.1.4. If use electric Screwdriver to do assembly, screwdriver must be grounding.

9.2. STORAGE

9.2.1. Keep in a sealed polyethylene bag.

9.2.2. Keep in a dark place.

9.2.3. Keep in temperature between 0ºC and 35ºC.

NOT allowed at 70ºC for more than 160 Hours, or at -20ºC for more than 48 Hrs.

9.3. SAFETY

If liquid crystal leak out of a damaged glass cell, DO NOT put it in your mouth or touch eyes, if the liquid crystal touch your skin or clothes, please wash it off immediately using soap and water.

10. LIMITED WARRANTY

Unless otherwise agreed between Superview and customer, Superview will replace or repair any of its LCD modules which are found to be functionally defective when inspected in accordance with Superview LCD acceptance standards (copies available upon request) for a period of one year from date of shipments. Cosmetic/visual defects over specs must be returned to Superview within 30 days of shipment. Confirmation of such date shall be based on freight documents. The warranty liability of Superview limited to repair and/or replacement on the terms set forth above. Superview shall not be responsible for any subsequent or consequential events.

10.1. RETURNING LCM UNDER WARRANTY – TERMS AND CONDITIONS

10.1.1. No warranty can be granted if the precautions stated above have been disregarded. The typical examples of violations are :

- Broken LCD glass.
- Circuit modified in any way, including addition of components.

10.1.2. Module repairs will be invoiced to the customer upon mutual agreement. Modules must be returned with sufficient description of the failures or defects. Any connectors or cable installed by the customer must be removed completely without damaging the PCB's eyelet, conductors and terminals.