ORIENT DISPLAY
Your Total LCD Solution Provider

Specification for TFT

AFY800480A0-5.0INTH



Revision C

A	Orient Display
FY	TFT Type
800480	Resolution 800 x 480
A0	Serial A0
5.0	5.0'', Module Dimension 120.7 × 75.8 × 2.8 mm
I	IPS Display
N	Top: -20~+70°C; Tstr: -30~+80°C
T	Transmissive
H	High Brightness, 1000 cd/m2
/	No Touch Panel
/	Controller ST7262 Or Compatible
/	RGB Interface

REVISION RECORD

Rev No.	Rev date	Contents	Remarks
O	2019-11-14	First release	Preliminary
A	2019-12-02	Update TFT Module LCD Size. In Page 4	
B	2020-02-12	CHANGED TFT PIN DEFINE AND ADDEDCLABEL. In Page 4	
C	2020-02-12	CHANGED LCD AND IC	

Orient Display (N.A.) Ltd.
220 Royal Crest Court, Unit 06, Markham, ON, Canada L3R 9Y2
Tel: 905-477-1166 Fax: 905-477-1782

Orient Display (USA) Corp.
14925 SE Allen Road, Suite 203 B, Bellevue, WA 98006
Tel: (425)698-1938 Fax: (425)698-1852

CONTENTS

1. GENERAL INFORMATION 3

2. ABSOLUTE MAXIMUM RATINGS 3

3. ELECTRICAL CHARACTERISTICS 3

4. BACKLIGHT CHARACTERISTICS 3

5. EXTERNAL DIMENSIONS 4

6. ELECTRO-OPTICAL CHARACTERISTICS 5

7. INTERFACE DESCRIPTION 8

8. AC CHARACTERISTICS 9

9. POWER ON/OFF SEQUENCE 11

10. RELIABILITY TEST CONDITIONS 12

11. INSPECTION CRITERION 13

12. HANDLING PRECAUTIONS 14

13. PRECAUTION FOR USE 15

14. PACKING SPECIFICATION 15

1. GENERAL INFORMATION

No.	Item	Contents	Unit
1	LCD size	5.0 inch (Diagonal)	/
2	LCD type	IPS/Normally black/Transmissive	/
3	Viewing direction(eye)	Free	/
4	Gray scale inversion direction	-	/
5	Resolution(H*V)	800 *480 Pixels	/
6	Module size (L*W*H)	120.7×75.8×2.8	mm
7	Active area (L*W)	108.0*64.8	mm
8	Pixel pitch (L*W)	0.135(W)×0.135(H)	mm
9	Interface type	RGB interface	/
10	Module power consumption	TBD	W
11	Back light type	LED	/
12	Driver IC	ST7262-G4-1-E OR COMPATIBLE	/
13	Weight	TBD	g

2. ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Min.	Max.	Unit
Power supply input voltage(TFT Module)	VDD	-0.3	3.6	V
Backlight current (normal temp.)	ILED	-	100	mA
Operation temperature	Top	-20	70	°C
Storage temperature	Tst	-30	80	°C
Humidity	RH	-	90%(Max60 °C)	RH

3. ELECTRICAL CHARACTERISTICS

DC CHARACTERISTICS(at Ta=25°C)

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Power supply input voltage(TFT Module)	VDD	3.0	3.3	3.6	V	
I/O logic voltage	VDDIO	-	-	-	V	
Input voltage 'H' level	VIH	0.7VDD	-	VDD	V	
Input voltage 'L' level	VIL	VSS	-	0.3VDD	V	
Power supply current	IVDD	-	TBD	-	mA	
TFT gate on voltage	VGH	-	-	-	V	
TFT gate off voltage	VGL	-	-	-	V	
Analog power supply voltage	AVDD	-	-	-	V	
Differential input common mode voltage	Vcom	-2	0	0	V	

4. BACKLIGHT CHARACTERISTICS

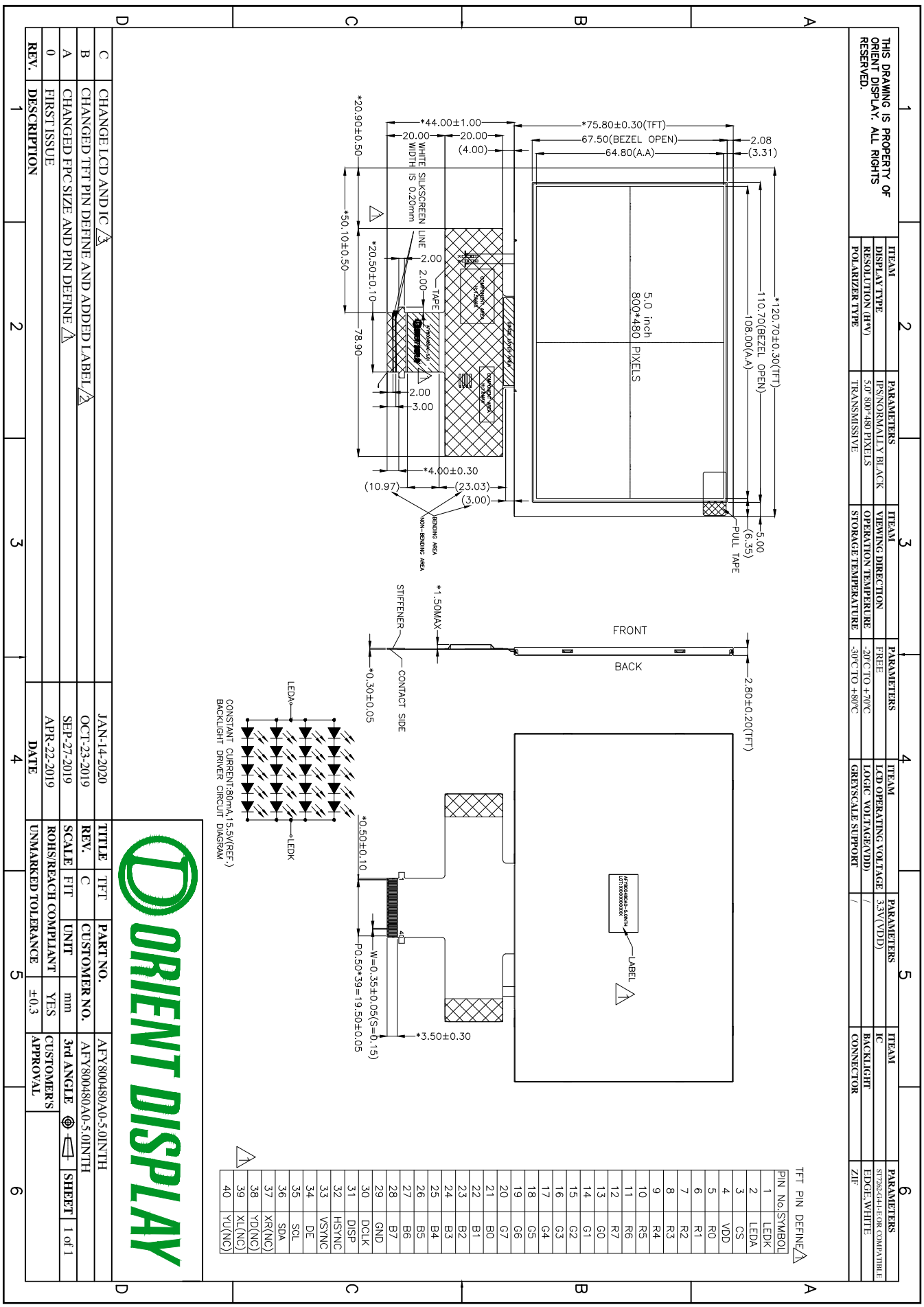
(at Ta=25°C,RH=60%)

Item	Symbol	Min.	Typ.	Max.	Unit	Note
LED forward voltage	VF	14.5	15.5	-	V	IF=20*8mA
LED forward current	IF	-	80	-	mA	
LED power consumption	PLED	-	1.24	-	W	Note1
Number of LED	-		20		PCS	
Connection mode	-	5 in series 4 in parallel			/	
LED life-time	-	20000	-	-	Hrs	Note2

Note1 : Calculator value for reference : IF*VF = PLED

Note2 : The LED life-time define as the estimated time to 50% degradation of initial brightness at Ta=25°C and IF =80mA. The LED lifetime could be decreased if operating IF is larger than 80mA.

5. ETERNAL DIMENSIONS



6. ELECTRO-OPTICAL CHARACTERISTICS

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Remark	Note
Response time	Tr+ Tf	-	-	25	50	ms	FIG.1	Note 4
Contrast ratio	Cr		400	500	-	-	FIG.2	Note 1
Surface luminance	Lv	θ=0°	800	1000	-	cd/m^2	FIG.2	Note 2
Luminance uniformity	Yu	θ=0°	75	85	-	%	FIG.2	Note 3
NTSC	-	θ=0°	60	70	-	%	FIG.2	Note 5
Viewing angle	θ	∅=90°	70	80	-	deg	FIG.3	Note 6
		∅=270°	70	80	-	deg	FIG.3	
		∅=0°	70	80	-	deg	FIG.3	
		∅=180°	70	80	-	deg	FIG.3	
CIE (x,y) chromaticity	Red x	θ=0° ∅=0° Ta=25°C	Typ -0.04	TBD	Typ +0.04	-	FIG.2 CIE1931	Note 5
	Red y			TBD		-		
	Green x			TBD		-		
	Green y			TBD		-		
	Blue x			TBD		-		
	Blue y			TBD		-		
	White x			TBD		-		
	White y			TBD		-		

Note1.Definition of contrast ratio
Contrast ratio(Cr) is defined mathematically by the following formula.
For more information see FIG.2.

$$\text{Contrast ratio} = \frac{\text{Luminance measured when LCD on the “White” state}}{\text{Luminance measured when LCD on the “Black” state}}$$

Measured at the center area of the LCD
Note2.Definition of surface luminance
Surface luminance is the luminance with all pixels displaying white.
For more information see FIG.2.
Lv = Average Surface Luminance with all white pixels(P1,P2,P3, ...,Pn)
Note3.Definition of luminance uniformity
The luminance uniformity in surface luminance is determined by measuring luminance at each test position 1 through n, and then dividing the maximum luminance of n points luminance by minimum luminance of n points luminance.For more information see FIG.2.

$$Yu = \frac{\text{Minimum surface luminance with all white pixels (P1,P2,P3,.....,Pn)}}{\text{Maximum surface luminance with all white pixels (P1,P2,P3,.....,Pn)}}$$

Note4. Definition of response time
The response time is defined as the LCD optical switching time interval between “White” state and “Black”state.Rise time (T_{ON}) is the time between photo detector output intensity changed from 90% to 10%. And fall time (T_{OFF}) is the time between photo detector output intensity changed from 10% to 90%.
For additional information see FIG1.
Note5. Definition of color chromaticity (CIE1931)
CIE (x,y) chromaticity,The x,y value is determined by screen active area center position P5.For more information see FIG.2.
Note6. Definition of viewing angle
Viewing angle is the angle at which the contrast ratio is greater than 10. angles are determined for the horizontal or x axis and the vertical or y axis with respect to the z axis which is normal to the LCD surface.
For more information see FIG.3.
For viewing angle and response time testing, the testing data is base on Autronic-Melchers’s ConoScope or DMS series Instruments or compatible. For contrast ratio, Surface Luminance, Luminance uniformity and CIE,the testing data is base on TOPCON’s BM-5or BM-7 photo detector or compatible.
Note: For TFT module, Gray scale reverse occurs in the direction of panel viewing angle.
FIG.1. The definition of response Time

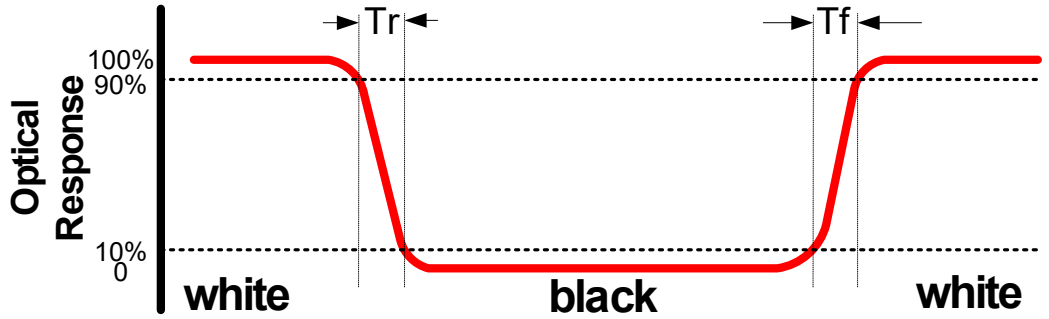


FIG.2. Measuring method for contrast ratio, surface luminance, luminance uniformity, CIE (x,y) chromaticity

Size : S≤5”(see Figure a)
A : 5 mm B : 5 mm
H,V : Active area
Light spot size ∅=5mm(BM-5) or ∅=7.7mm (BM-7)50cm distance or compatible distance from the LCD surface to detector lens.
test spot position : see Figure a.
measurement instrument : TOPCON’s luminance meter BM-5 or BM-7 or compatible (see Figure c).

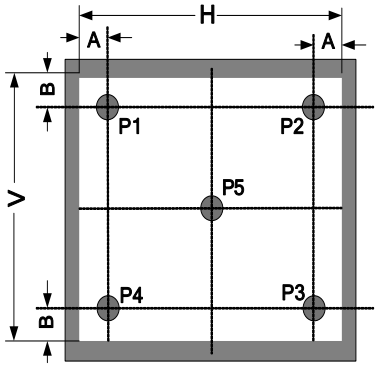


Figure a

Size : 5”＜S≤12.3”(see Figure b)
H,V : Active area
Light spot size ∅=5mm(BM-5) or ∅=7.7mm (BM-7)50cm distance or compatible distance from the LCD surface to detector lens.
test spot position : see Figure b.
measurement instrument : TOPCON’s luminance meter BM-5 or BM-7 or compatible (see Figure c).

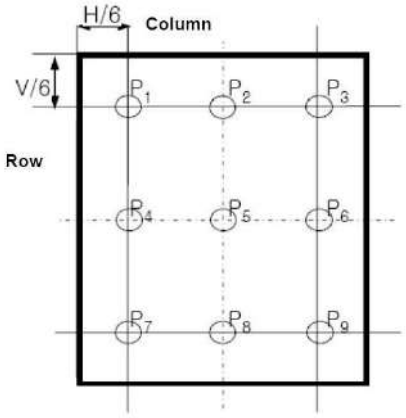


Figure b

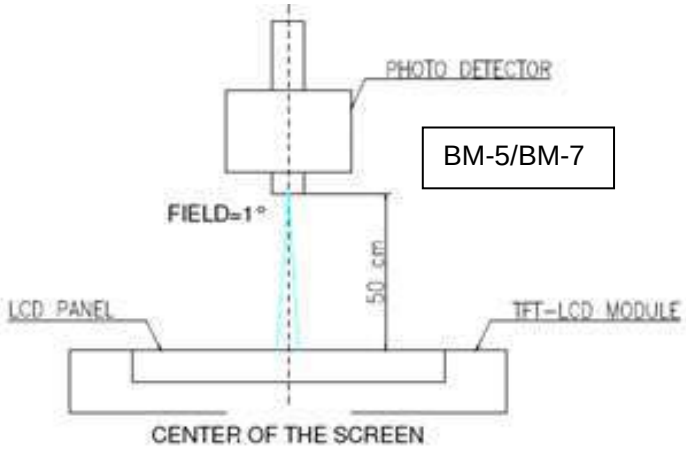
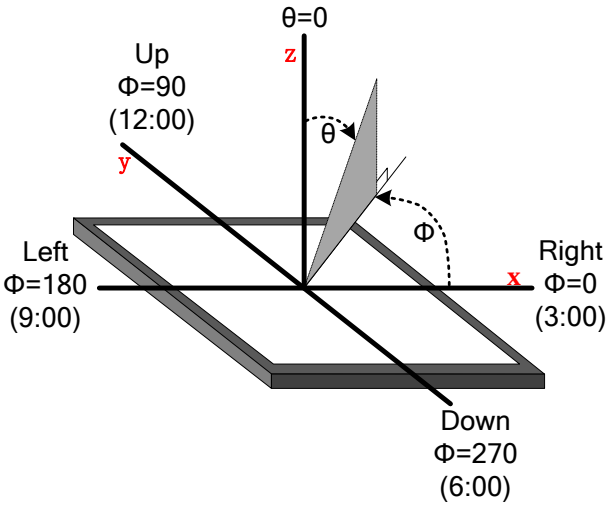


Figure c

FIG.3. The definition of viewing angle



7. INTERFACE DESCRIPTION

TFT Module Interface description

1	LEDK	P	Power for LED backlight(Cathode)
2	LEDA	P	Power for LED backlight(Anode)
3	CS	I	Chip Selected signal When CS=0,the chip is enable.
4	VDD	P	Power for LCD
5-12	R0-R7	I	Red data Bus
13-20	G0-G7	I	Green data Bus
21-28	B0-B7	I	Blue data Bus
29	GND	P	Ground
30	DCLK	I	Dot clock
31	DISP	I	Set display mode. DISP=0:Standby mode. DISP=1:Normal display mode.
32	HSYNC	I	Horizontal sync input.
33	VSYNC	I	Vertical sync input
34	DE	I	Data enable
35	SCL	I	Serial Clock input Signal
36	SDA	I/O	Serial Data input Signal
37	XR/NC	/	No connected
38	YD/NC	/	No connected
39	XL/NC	/	No connected
40	YU/NC	/	No connected

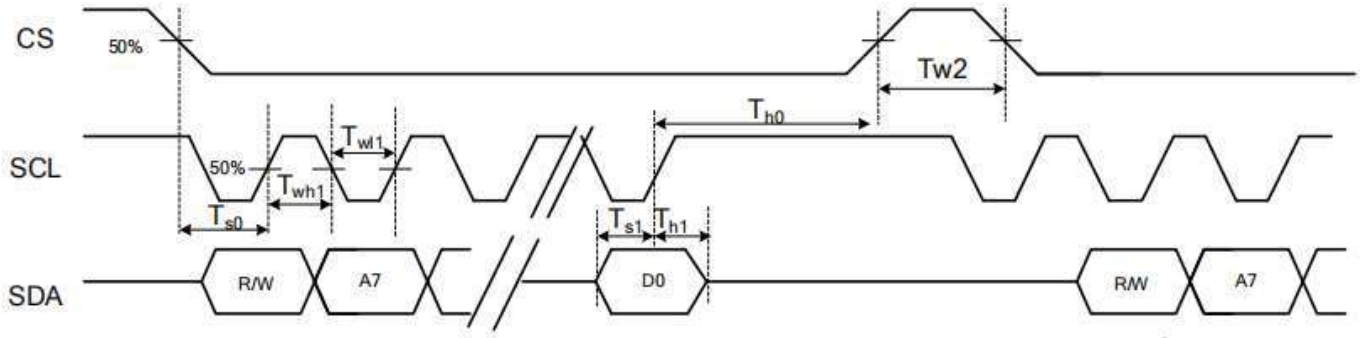
8. AC CHARACTERISTICS

AC Electrical Characteristics (PVDD=PVDD1=VDD=VDDI= 3.3V, AGND= 0V, TA=25 · C, Bare Chip)

8.1 System Operation AC Characteristics

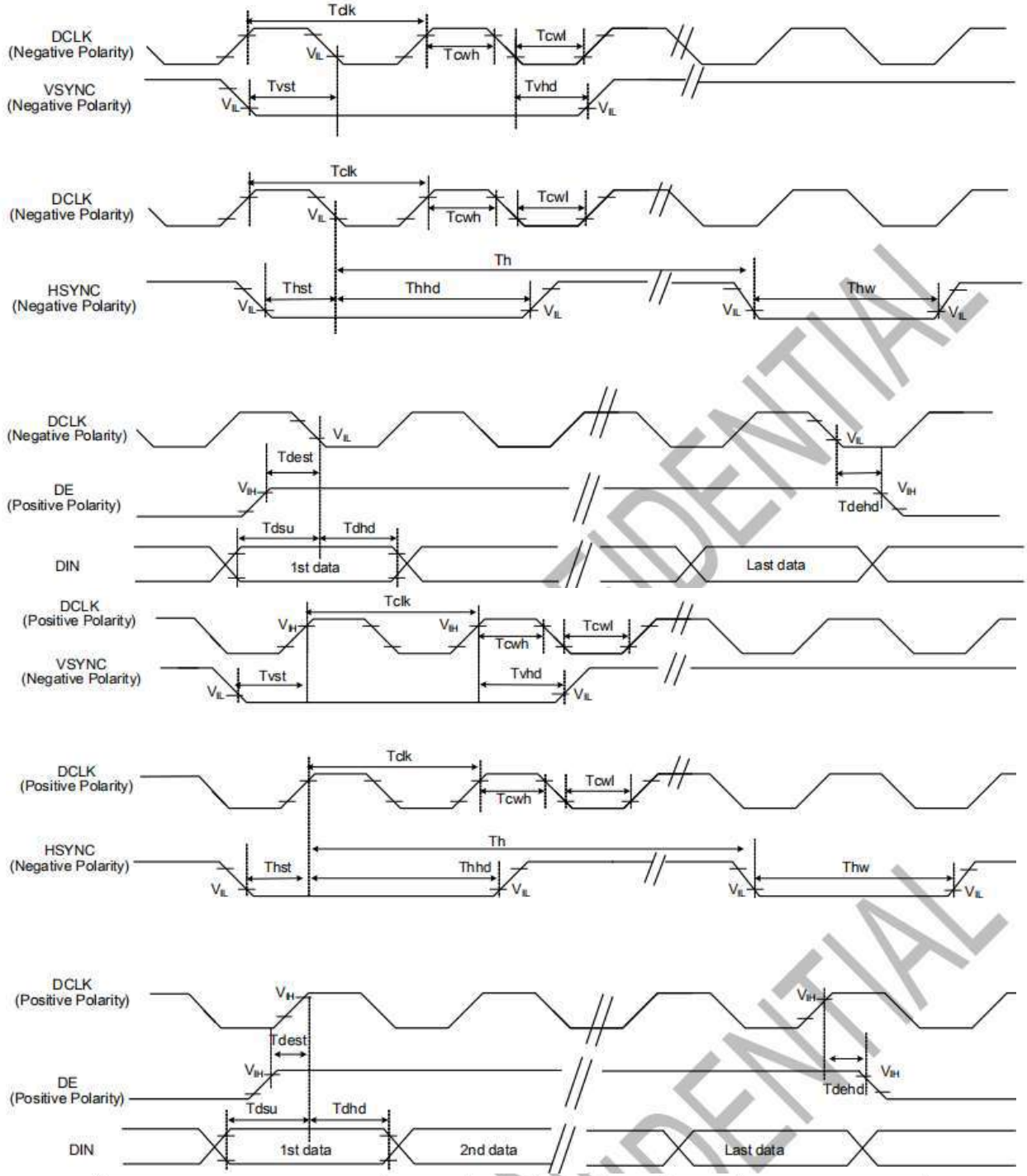
Item .	Symbol	Min	Typ.	Max.	Unit	Conditions
VDD Power Source Slew Time	TPOR	-	-	20	mS	From 0V to 99% VDD
GRB Pulse Width	tRSTW	10	50	-	uS	R=10Kohm, C=1uF
SD Output Stable Time	Tst	-	-	TBD	uS	Output settled within +20mV Loading = 6.8k+28.2pF.
GD Output Rise and Fall Time	Tgst	-	-	TBD	uS	Output settled (5%~95%), Loading = 4.7k+29.8pF

8.2 System Bus Timing for 3-Wire SPI Interface



Item	Symbol	Min	Typ	Max	Unit	Conditions
CS Input Setup Time	Ts0	50	-	-	ns	
Serial Data Input Setup Time	Ts1	50	-	-	ns	
CS Input Hold Time	Th0	50	-	-	ns	
Serial Data Input Hold Time	Th1	50	-	-	ns	
SCL Write Pulse High Width	Twh1	50	-	-	ns	
SCL Write Pulse Low Width	Twl1	50	-	-	ns	
SCL Read Pulse High Width	Trh1	300			ns	
SCL Read Pulse Low Width	Trl1	400			ns	
CS Pulse High Width	Tpor	400	-	-	ns	

8.3 System Bus Timing for RGB Interface

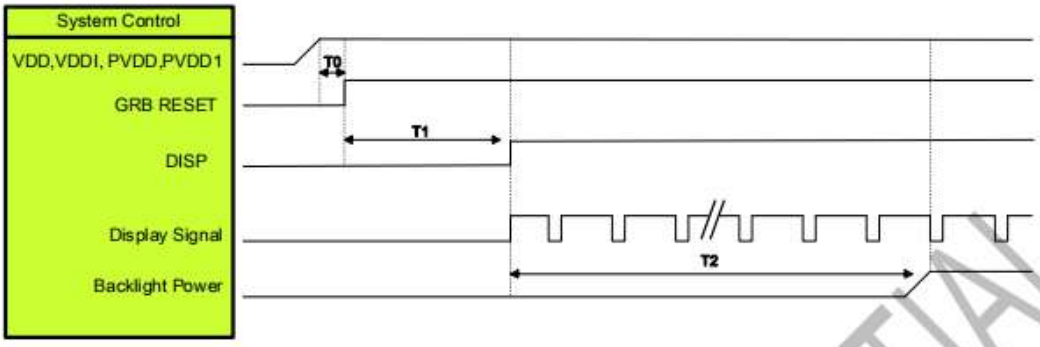


Item	Symbol	Min.	Typ.	Max.	Unit	Conditions
CLK Pulse Duty	Tcw	40	50	60	%	
HSYNC Width	Thw	2	-	-	DCLK	
HSYNC Period	Th	55	60	65	us	
VSYNC Setup Time	Tvst	12	-	-	ns	
VSYNC Hold Time	Tvhd	12	-	-	ns	
HSYNC Setup Time	Thst	12	-	-	ns	
HSYNC Hold Time	Thhd	12	-	-	ns	
Data Setup Time	Tdsu	12	-	-	ns	
Data Hold Time	Tdhd	12	-	-	ns	
DE Setup Time	Tdest	12	-	-	ns	
DE Hold Time	Tdehd	12	-	-	ns	

CONFIDENTIAL

9. POWER ON/OFF SEQUNECE

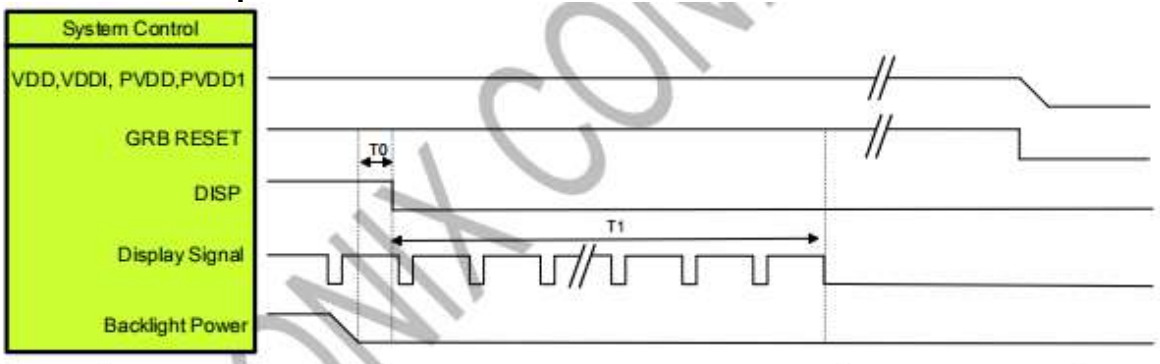
9. 1 Power On Sequence



Symbol	Description	Min. Time	Unit
T0	System power stability to GRB RESET signal	0	ms
T1	GRB RESET= "High" to DISP="High"	10	ms
T2	Display Signal output to Backlight Power on	250	ms

Note: RGB interface Display signal: DCLK; VSYNC; HSYNC; DE; DR[7:0]; DG[7:0]; DB[7:0]

9.2 Power Off Sequence



Symbol	Description	Min. Time	Unit
T0	Backlight Power off to DISP="Low"	5	ms
T1	DISP="Low" to IC internal voltage discharge complete	100	ms

Note: RGB interface Display signal: DCLK; VSYNC; HSYNC; DE; DR[7:0]; DG[7:0]; DB[7:0]

AUROMIX CONFIDENTIAL

10. RELIABILITY TEST CONDITIONS

No.	Test item	Test condition	Inspection after test
10.1	High temperature storage	80±2°C/240 hours	Inspection after 2~4hours storage at room temperature, the sample shall be free from defects : 1.Current changing value before test and after test is 50% larger; 2. Function defect : Non-display,abnormal-display,missing lines, Short lines,ITO corrosion; 3.Visual defect : Air bubble in the LCD,Seal leak,Glass crack.
10.2	Low temperature storage	-30±2°C/240 hours	
10.3	High temperature operating	70±2°C/120 hours	
10.4	Low temperature operating	-20±2°C/120 hours	
10.5	Temperature cycle	-20±2°C~25°C~70±2°C*10cycles (30min.) (5min.) (30min.)	
10.6	Damp proof test	50°C*90% RH/120 hours	
10.7	Vibration test	Frequency : 10Hz~55Hz~10Hz Amplitude : 1.5mm , X , Y , Z direction for total 3hours (Packing condition)	
10.8	Dropping test	Drop to the ground from 1m height, one time, every side of carton. (Packing condition)	
10.9	ESD test	Voltage : ±8KV R : 330Ω C : 150pF Air discharge, 10time	

Remark :
1.The test samples should be applied to only one test item.
2.Sample size for each test item is 3~5pcs.
3.For damp proof test, Pure water(Resistance>10MΩ) should be used.
4.In case of malfunction defect caused by ESD damage, if it would be recovered to normal state after resetting, it would be judged as a good part.
5.EL evaluation should be excepted from reliability test with humidity and temperature: Some defects such as black spot/blemish can happen by natural chemical reaction with humidity and Fluorescence EL has.
6.Failure judgment criterion: Basic specification, Electrical characteristic, Mechanical characteristic, Optical characteristic.

11.INSPECTION CRITERION

Refer to《Inspection Criterion for TFT Products-To customer》 V2.3

12. HANDLING PRECAUTIONS

12.1 Mounting method

The LCD module consists of two thin glass plates with polarizes which easily be damaged. And since the module in so constructed as to be fixed by utilizing fitting holes in the printed circuit board.
Extreme care should be needed when handling the LCD modules.

12.2 Caution of LCD handling and cleaning

When cleaning the display surface, Use soft cloth with solvent
[recommended below] and wipe lightly :
●.Isopropyl alcohol
●.Ethyl alcohol
Do not wipe the display surface with dry or hard materials that will damage the polarizer surface.
Do not use the following solvent :
●.Water
●.Aromatics
Do not wipe ITO pad area with the dry or hard materials that will damage the ITO patterns
Do not use the following solvent on the pad or prevent it from being contaminated :
●.Soldering flux
●.Chlorine (Cl) , Sulfur (S)
If goods were sent without being silicon coated on the pad, ITO patterns could be damaged due to the corrosion as time goes on.
If ITO corrosion happen by miss-handling or using some materials such as Chlorine (Cl), Sulfur (S) from customer, Responsibility is on customer.

12.3 Caution against static charge

The LCD module use C-MOS LSI drivers, so we recommended that you :
Connect any unused input terminal to Vdd or Vss, do not input any signals before power is turned on, and ground your body, work/assembly areas, assembly equipment to protect against static electricity.

12.4 Packing

Module employ LCD elements and must be treated as such.
●.Avoid intense shock and falls from a height.
●.To prevent modules from degradation, do not operate or store them exposed direct to sunshine or high temperature/humidity.

12.5 Caution for operation

●.It is an indispensable condition to drive LCD's within the specified voltage limit since the higher voltage then the limit cause the shorter LCD life.
●.An electrochemical reaction due to direct current causes LCD's undesirable deterioration, so that the use of direct current drive should be avoided.
●.Response time will be extremely delayed at lower temperature then the operating temperature range and on the other hand at higher temperature LCD's how dark color in them. However those phenomena do not mean malfunction or out of order with LCD's, which will come back in the specified operation temperature.
●.If the display area is pushed hard during operation, some font will be abnormally displayed but it resumes normal condition after turning off once.
●.A slight dew depositing on terminals is a cause for electro-chemical reaction resulting in terminal open circuit.
●.Usage under the maximum operating temperature, 50%Rh or less is required.
●.When fixed patterns are displayed for a long time,remnant image is likely to occur.

12.6 Storage

In the case of storing for a long period of time for instance, for years for the purpose or replacement use, the following ways are recommended.
●.Storing in an ambient temperature 10°C to 30°C, and in a relative humidity of 45% to 75%. Don't expose to sunlight or fluorescent light.
●.Storing in a polyethylene bag with the opening sealed so as not to enter fresh air outside in it . And with no desiccant.
●.Placing in a dark place where neither exposure to direct sunlight nor light's keeping the storage temperature range.
●.Storing with no touch on polarizer surface by the anything else.

It is recommended to store them as they have been contained in the inner container at the time of delivery from us.

12.7 Safety

●.It is recommendable to crash damaged or unnecessary LCD's into pieces and wash off liquid crystal by either of solvents such as acetone and ethanol, which should be burned up later.
●.When any liquid leaked out of a damaged glass cell comes in contact with your hands, please wash it off well with soap and water.

13. PRECAUTION FOR USE

13.1 A limit sample should be provided by the both parties on an occasion when the both parties agreed its necessity. Judgment by a limit sample shall take effect after the limit sample has been established and confirmed by the both parties.
13.2 On the following occasions, the handing of problem should be decided through discussion and agreement between responsible of the both parties.
●.When a question is arisen in this specification.
●.When a new problem is arisen which is not specified in this specifications.
●.When an inspection specifications change or operating condition change in customer is reported to ODNA, and some problem is arisen in this specification due to the change.
●.When a new problem is arisen at the customer's operating set for sample evaluation in the customer site.

14. PACKING SPECIFICATION

Please consult our technical department for detail information.