Specification for TFT

AFY1280800A1-10.1INTH

Revision A

A	Orient Display
FY	TFT Type
1280800	Resolution 1280 x 800
A1	Serial A1
10.1	10.1", Module Dimension 228.85x152.74x4.25 mm
I	IPS Display
N	Top: -20~+70°C; Tstr: -30~+80°C
T	Transmissive
H	High Brightness, 1000 cd/m2
/	No Touch Panel
/	EK79202B OR COMPATIBLE
/	LVDS interface

REVISION RECORD

Rev No.	Contents	Prepared	Rev date
O	First release	TaoXing Mo	2023-02-10
A	CHANGE THE RELIABILITY TEST CONDITIONS Update BACKLIGHT CHARACTERISTICS Update RELIABILITY TEST CONDITIONS	TaoXing Mo	2023-03-22

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CONTENTS

1. GENERAL INFORMATION

No.	Item	Contents	Unit
1	LCD size	10.1 inch (Diagonal)	/
2	Display mode	IPS/NORMALLY BLACK/Transmissive	/
3	Viewing direction(eye)	FREE	/
4	Gray scale inversion direction	-	/
5	Resolution(H*V)	1280*800 Pixels	/
6	Module size (L*W*H)	228.85*152.74*4.25	mm
7	Active area (L*W)	216.96*135.60	mm
8	Pixel pitch (L*W)	0.1695*0.1695	mm
9	Interface type	LVDS interface	/
10	Color Depth	16.7M	/
11	Module power consumption	TBD(Appr)	W
12	Back light type	EDGE&WHITE LED	/
13	Driver IC	EK79202B OR COMPATIBLE	/
14	Weight	TBD(Appr)	G

2. ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Min.	Max.	Unit	Note
Power supply input voltage for TFT	VDD	-0.5	4.0	V	
Backlight current (normal temp.)	ILED	-	225	mA	
Operation temperature	Top	-20	+70	℃	Note1
Storage temperature	Tst	-30	+80	℃	Note1
Humidity	RH	20%	90%	RH	Note1

Note1 :

1).The relative humidity and temperature range are as below sketch,90%RH Max.

2).The maximum wet bulb temperature ≤40℃ and without dewing.
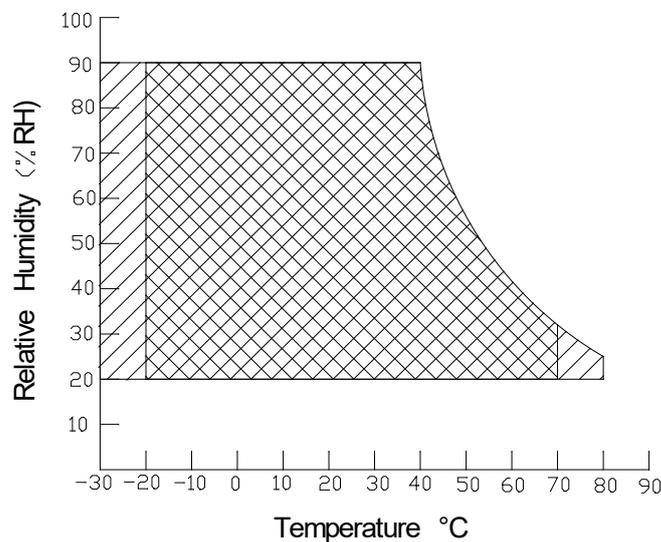
3. ELECTRICAL CHARACTERISTICS

DC CHARACTERISTICS(at Ta=25℃)

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Power supply input voltage(TFT Module)	VDD	2.3	2.5	2.7	V	
Input voltage 'H' level	VIH	0.8VDD	-	VDD	V	
Input voltage 'L' level	VIL	VSS	-	0.2VDD	V	
Power supply current	IVDD	-	TBD	-	mA	
TFT gate on voltage	VGH	14.5	15.0	15.5	V	
TFT gate off voltage	VGL	-13.5	-13.0	-12.5	V	
Analog power supply voltage	AVDD	8.0	8.2	8.4	V	
Differential input common mode voltage	Vcom	-	-	-	V	Note1
LVDS Differential input high Threshold voltage	R_{XVTH}	-	-	+100	mV	R_{XVCM}=1.2V
LVDS Differential input low Threshold voltage	R_{XVTL}	-100	-	-	mV	
LVDS Differential input common mode voltage	R_{XVCM}	0.7	-	1.6	V	
LVDS Differential voltage	|VID|	200	-	600	mV	

Note1 :   The value is just the reference value. VCOM must be adjusted to optimize display quality, as Crosstalk and Contrast Ratio etc..

4. BACKLIGHT CHARACTERISTICS

(at Ta=25℃,RH=60%)

Item	Symbol	Min.	Typ.	Max.	Unit	Note
LED forward voltage	VF	18.9	21.7	23.1	V	
LED forward current	IF	-	180	-	mA	IF=30*6mA
LED power consumption	PLED	-	3.906	-	W	Note1
Number of LED	-		42		PCS	
Connection mode	-	7 in series 6 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℃ and IF =40mA. The LED lifetime could be decreased if operating IF is larger than 40mA.

5. EXTERNAL DIMENSIONS

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ITEAM	PARAMETERS
DISPLAY TYPE	IPS/NORMAL BLACK
RESOLUTION (H*V)	10.1" 1280*800 PIXELS
POLARIZER TYPE	TRANSMISSIVE

ITEAM	PARAMETERS
VIEWING DIRECTION	FREE
OPERATION TEMPERURE	-20°C TO +70°C
STORAGE TEMPERATURE	-30°C TO +80°C

ITEAM	PARAMETERS
LCD OPERATING VOLTAGE	2.5V
LOGIC VOLTAGE(VDD)	/
SURFACE LUMINANCE	1000 Nits

ITEAM	PARAMETERS
IC	EK79202B OR COMPATIBLE
BACKLIGHT	EDGE,WHITE
CONNECTOR	01-196479-XX041-3 OR COMPATIBLE

TFT PIN DEFINITION

PIN NO.	SYMBOL
1	NC
2	VDD
3	VDD
4	NC
5	NC
6	NC
7	GND
8	RXIN0-
9	RXIN0+
10	GND
11	RXIN1-
12	RXIN1+
13	GND
14	RXIN2-
15	RXIN2+
16	GND
17	RXCLK-
18	RXCLK+
19	GND
20	RXIN3-
21	RXIN3+
22	GND
23	NC
24	NC
25	GND
26	NC
27	NC
28	AVDD
29	AVDD
30	GND
31	LED-
32	LED-
33	NC
34	NC
35	VGL
36	NC
37	NC
38	VGH
39	LED+
40	LED+

BACKLIGHT PRINTING CONTENT

LED-AFY1280800A-10.1I
YYMMDD

PRINTING CONTENT

AFY1280800A1-10.1INTH
LOT:XXXXXXXXXXX

*228.85±0.30(OUTLINE)
*220.46(BEZEL V.A)
216.98(TFT A.A)

10.1 inch
1280*800 PIXELS

MYLAR
MYLAR

CUSTOMER NO.——AFY1280800A1-10.1INTH
LOT NO.——LOT:XXXXXXXXXXX

PRINTING CONTENT SCALE: 3/1

*152.74±0.30(OUTLINE)
*139.10(BEZEL V.A)
135.60(TFT A.A)
(74.00)
6.20
4.45
(113.42)

PULL TAPE
*5.20
6.95

FRONT
BACK
*4.25±0.30(TFT)
*2.50MAX

19.05±1.00
*17.50±0.30(PCB)
(4.6B)
(14.00)
(2-ø2.00 hol)
01-196479-XX041-3
OR COMPATIBLE
PROTECT TAPE
(161.00)
*171.00±0.30(PCB)
AI-FOIL
(4.00)
(5.00)
*31.66±0.50

LED-
LED+

CONSTANT CURRENT:180mA,21.7V(REF.)
BACKLIGHT DRIVER CIRCUIT DIAGRAM

ORIENT DISPLAY

TITLE	TFT	PART NO.	AFY1280800A1-10.1INTH
REV.	B	CUSTOMER NO.	AFY1280800A1-10.1INTH
SCALE	FIT	UNIT	mm
ROHS/REACH COMPLIANT	YES		
UNMARKED TOLERANCE	±0.2		

3rd ANGLE
SHEET 1 of 1
CUSTOMER'S APPROVAL

REV.	SYMBOL	DESCRIPTION	DATE
B		CHANGE THE RELIABILITY TEST CONDITIONS	MAR-21-2023
A		CHANGED BACKLIGHT PRINTING CONTENT	FEB-07-2023
0	-	FIRST ISSUE	DEC-14-2022

6. ELECTRO - OPTICAL CHARACTERISTICS

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Remark	Note
Response time	Tr+ Tf	-	-	25	50	ms	FIG.1	Note 1
Contrast ratio	Cr		480	640	-	-	FIG.2	Note 2
Surface luminance	Lv	$\theta=0°$	800	1000	-	cd/m^2	FIG.2	Note 3
Luminance uniformity	Yu	$\theta=0°$	75	80	-	%	FIG.2	Note 4
NTSC	-	$\theta=0°$	-	50	-	%	FIG.2	Note 5
Viewing angle	θ	$\varnothing=90°$	75	85	-	deg	FIG.3	Note 6
		$\varnothing=270°$	75	85	-	deg	FIG.3	
		$\varnothing=0°$	75	85	-	deg	FIG.3	
		$\varnothing=180°$	75	85	-	deg	FIG.3	
CIE (x,y) chromaticity	Red x	$\theta=0°$ $\varnothing=0°$ Ta=25℃	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		-		

The TFT module should be stabilized at a given temperature for 10 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 10 minutes in a windless room.

Note1. Definition of response time

The response time is defined as the LCD optical switching time interval between "White" state and "Black"state.

Normally white: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%.

Normally black:Rise time (T$_{ON}$) is the time between photo detector output intensity changed from 10% to 90%. And fall time (T$_{OFF}$) is the time between photo detector output intensity changed from 90% to 10%.

For additional information see FIG1.

Note2.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

Note3.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)

Note4.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.

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

Note5. Definition of color chromaticity (CIE1931)

CIE (x,y) chromaticity,The x,y value is determined by screen active area center position.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 display 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 CS-2000/BM-7 photo detector or compatible.

**FIG.1. The definition of response Time**
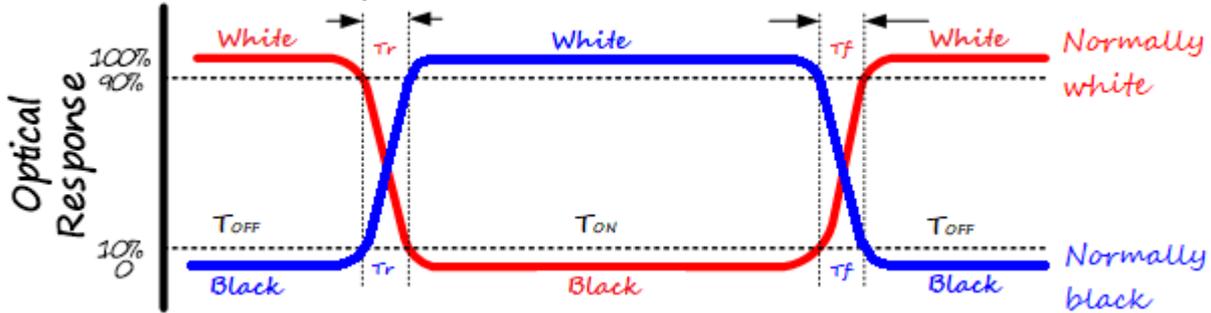
**FIG.2. Measuring method for contrast ratio, surface luminance,
luminance uniformity, CIE (x,y) chromaticity**

H,V : Active area

Light spot size $\varnothing$=1.5mm or $\varnothing$=7.7mm (CS-2000/BM-7)50cm distance or compatible distance from the LCM surface to detector lens.

Test spot position : see Figure a.

measurement instrument : Luminance meter CS-2000/BM-7 or compatible ,see Figure b.
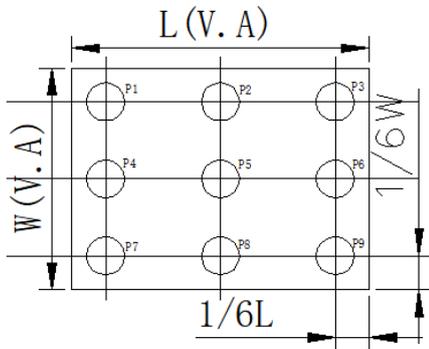
Figure a
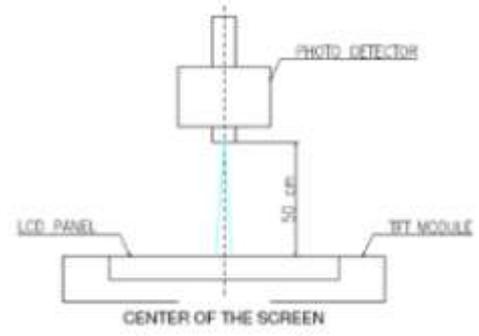
Figure b

FIG.3. The definition of viewing angle
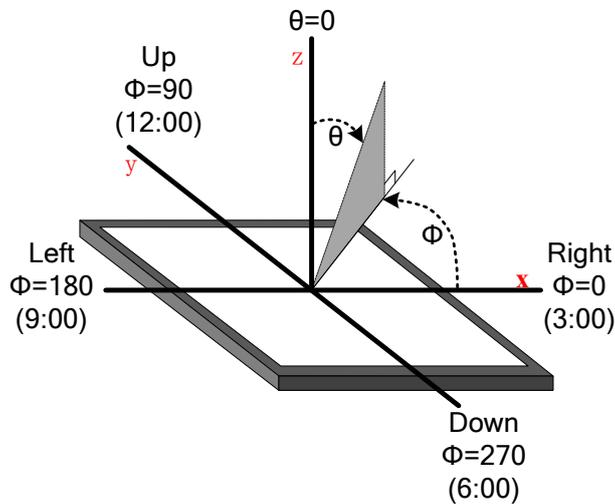
7. INTERFACE DESCRIPTION

Module Interface description

Interface No.	Name	I/O or connect to	Description
1	NC	/	No connection
2-3	VDD	P	Power Supply
4-6	NC	/	No connection
7	GND	P	Ground
8	Rxin0-	I	-LVDS Differential Data Input
9	Rxin0+	I	+LVDS Differential Data Input
10	GND	P	Ground
11	Rxin1-	I	-LVDS Differential Data Input
12	Rxin1+	I	+LVDS Differential Data Input
13	GND	P	Ground
14	Rxin2-	I	-LVDS Differential Data Input
15	Rxin2+	I	+LVDS Differential Data Input
16	GND	P	Ground
17	RxCLK-	I	-LVDS Differential Clock Input
18	RxCLK+	I	+LVDS Differential Clock Input
19	GND	P	Ground
20	Rxin3-	I	-LVDS Differential Data Input
21	Rxin3+	I	+LVDS Differential Data Input
22	GND	P	Ground
23-24	NC	/	No connection
25	GND	P	Ground
26-28	NC	/	No connection
29	AVDD	P	Power for Analog Circuit
30	GND	P	Ground
31-32	LED-	P	LED Cathode
33-34	NC	/	No connection
35	VGL	P	Gate OFF Voltage
36-37	NC	/	No connection
38	VGH	P	Gate ON Voltage
39-40	LED+	P	LED Anode

I: input, O: output, P: Power,NC or / : No connection

8.AC CHARACTERISTICS

LVDS Signal Timing Characteristics

Parameter	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
LVDS Differential input high Threshold voltage	R_{xVTH}	-	-	+100	mV	R_{XVCM}=1.2V
LVDS Differential input low Threshold voltage	R_{xVTL}	-100	-	-	mV	
LVDS Differential input common mode voltage	R_{xVCM}	0.7	-	1.6	V	
LVDS Differential voltage	$|V_{ID}|$	200	-	600	mV	
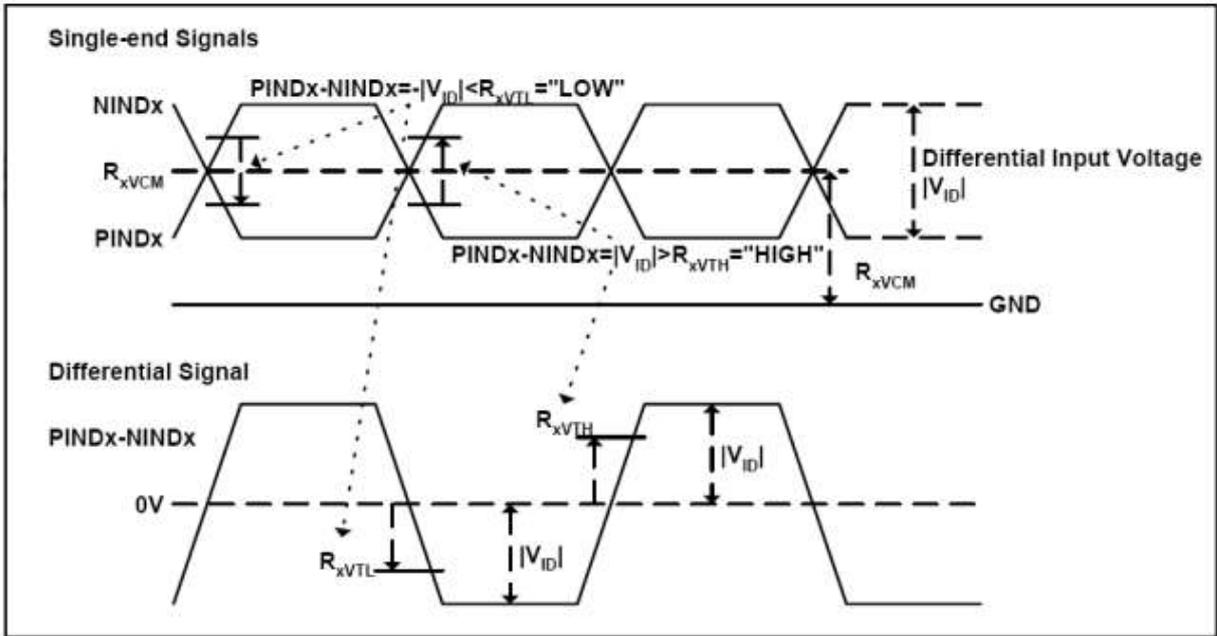
LVDS Data Input Format
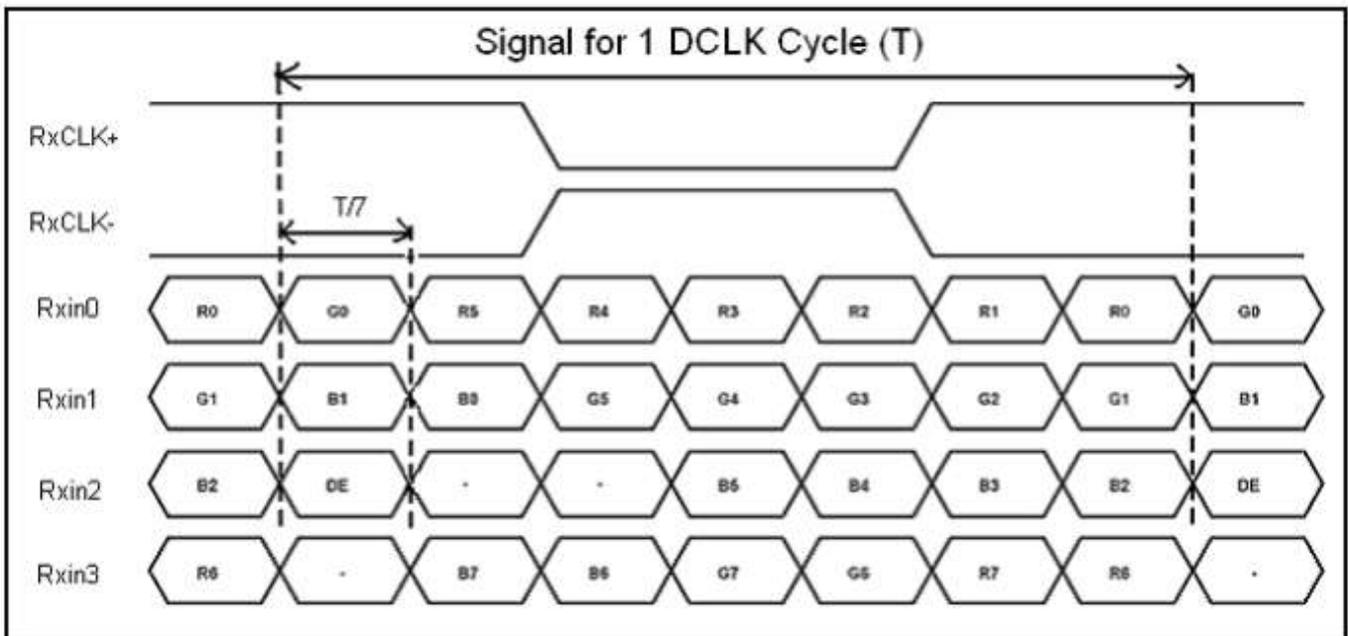
Timing Table

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Clock Frequency	1/Tc	66.3	72.4	78.9	MHz	Frame rate =60Hz
Horizontal display area	tHD		1280		Tc	
HSYNC pulse width	tHPW	2	-	40	Tc	
HSYNC back porch(with pulse width)	tHBP	88	88	88	Tc	
HSYNC front porch	tHFP	12	72	132	Tc	
Vertical display area	tVD		800		tH	
VSYNC pulse width	tVPW	2	-	20	tH	
VSYNC back porch(with pulse width)	tVBP	23	23	23	tH	
VSYNC front porch	tVFP	1	15	49	tH	
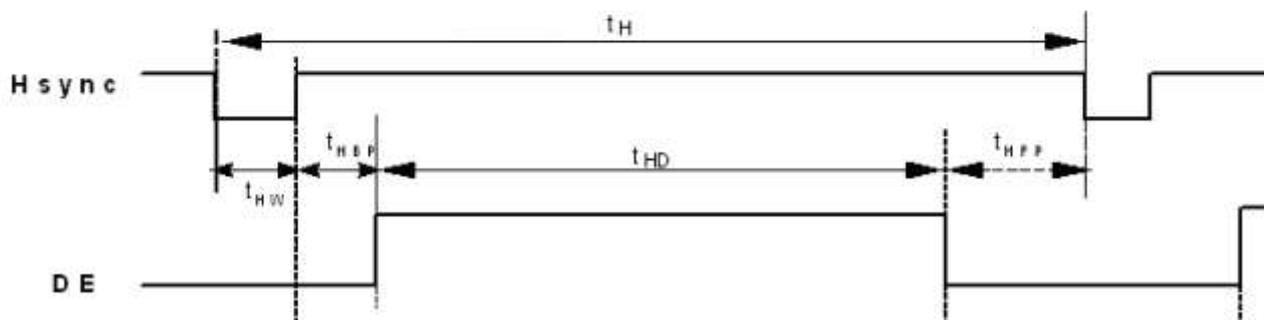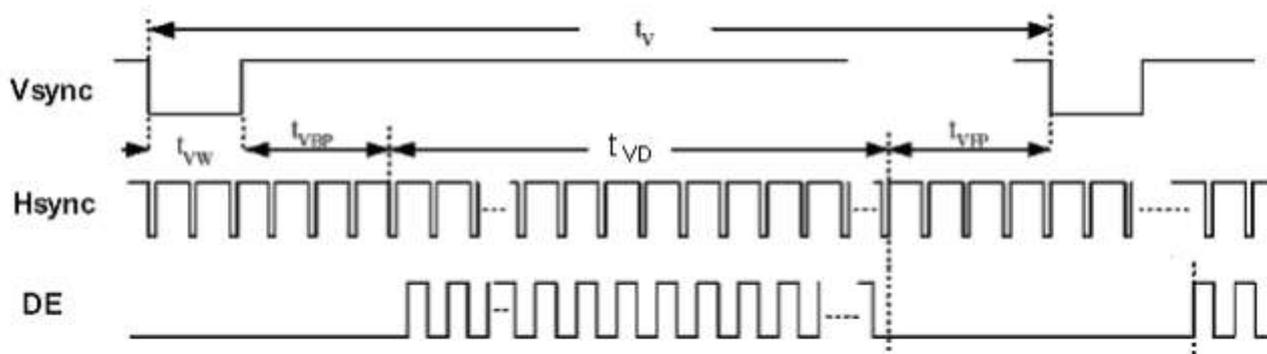
9. POWER SEQUENCE

To prevent the device damage from latch up and Improve subjective display effect,the power ON/OFF sequence shown below must be followed.

a. Power on:

$0.5ms < T_1 < 10ms$

VDD

$100ms < T_5$

LVDS Signal — Normal signal

$T_2 > 0ms$

AVDD

$T_3 > 20m$

VGL

VGH

$T_4 > 0ms$

b. Power off:

VDD

$0.5ms < T_1 < 10ms$

$0 < T_2 < 50ms$

LVDS Signal — Normal signal

AVDD

$T_3 > 0ms$

VGL
VGH
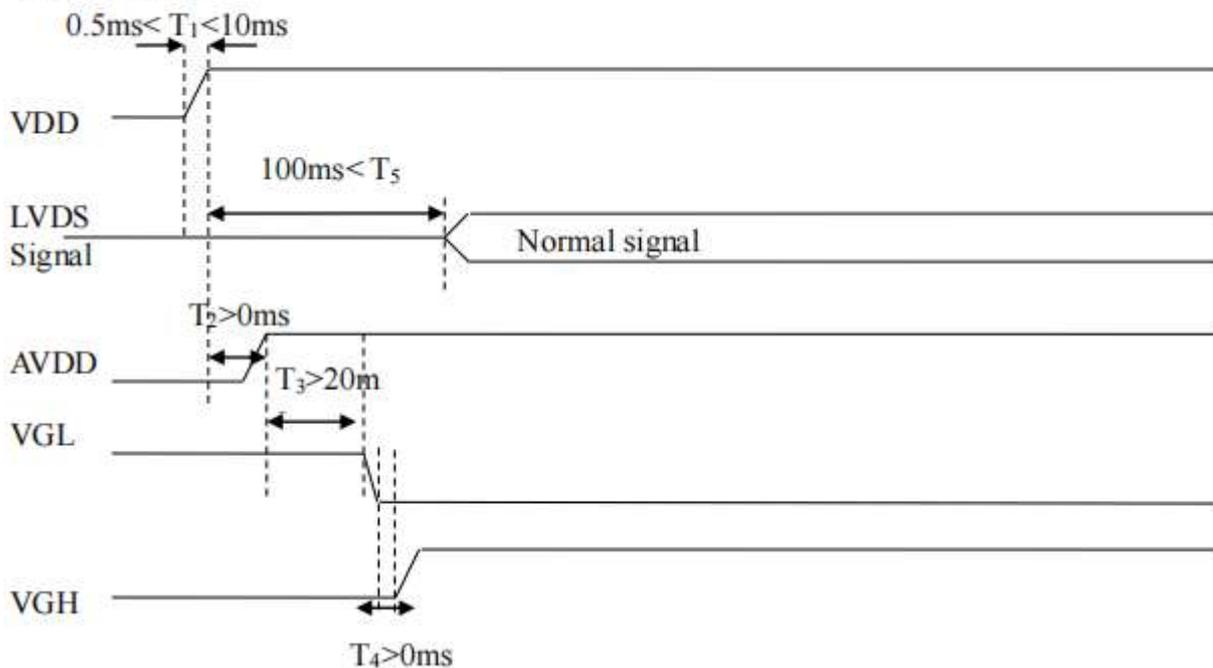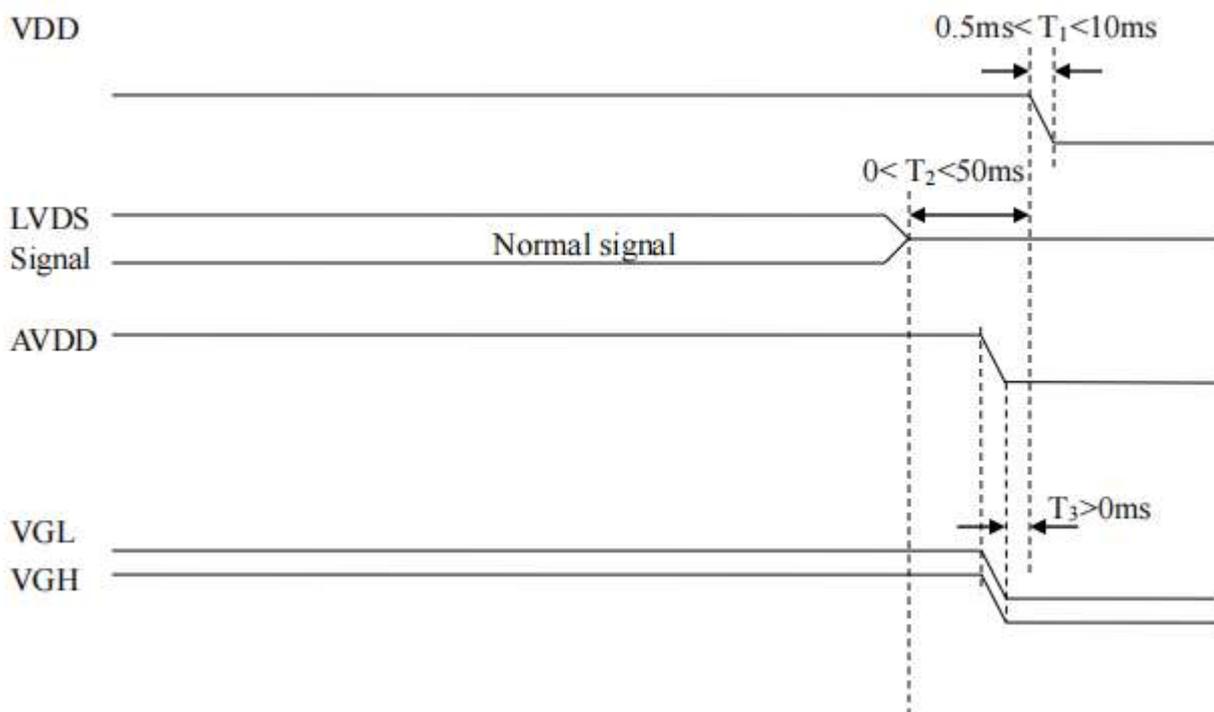
10. RELIABILITY TEST CONDITIONS

No.	Test item	Test condition		Inspection after test
10.1	High temperature storage test	+80℃/240 hours		Inspection after 2~4hours storage at room temperature, the sample should not have following 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 test	-30℃/240 hours		
10.3	High temperature operating test	+70℃/240 hours		
10.4	Low temperature operating test	-20℃/240 hours		
10.5	Thermal Shock (non-operation)	-30℃ ←→ +80℃/10cycles (30min.)(<30sec.) (30min.)		
10.6	High temperature high humidity test	+50℃*90% RH/240 hours		
10.7	Vibration test for Packaging	Frequency : 250 r/min Amplitude : 1 inch Time: 45min		
10.8	Drop test for Packaging	Drop direction: 1 corner/3 edges/6 sides 10 times		
		Packing weight(kg)	Drop height(cm)	
		＜11	80±1.6	
		11≦G＜21	60±1.2	
		21≦G＜31	50±1.0	
		31≦G＜40	40±0.8	
10.9	ESD test	Air discharge: ±12KV, 10times Contact discharge: ±6KV, 10times		

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 High temperature high humidity 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.Failure judgment criterion: Basic specification, Electrical characteristic, Mechanical characteristic, Optical characteristic.
6.After the reliability test, the product only guarantees operation, but don't guarantee all of the cosmetic specification.

11.INSPECTION CRITERION

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

12. HANDLING PRECAUTIONS

12.1 Mounting method

The TFT 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 TFT modules.

12.2 Caution of TFT module 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 TFT 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 TFT 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 TFT module within the specified voltage limit since the higher voltage then the limit cause the shorter TFT module life.
●.An electrochemical reaction due to direct current causes TFT module 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 TFT module how dark color in them. However those phenomena do not mean malfunction or out of order with TFT module, 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℃ to 30℃, 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 TFT module 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.

15. INITIALIZATION CODE
Please consult our technical department for detail information.

16. HSF COMPLIANCE
●.This products complies with ROHS 2011/65/EU and 2015/863/EU、REACH 1907/2006/EC requirements, and the packaging complies with 94-62-EC.