



ASI-T-700JA2F6/AA

ITEM	STANDARD VALUES	UNITS
LCD type	7.0" TFT	--
Dot arrangement	1024 X 3(RGB) X 600	dots
Color filter array	RGB vertical stripe	--
Display mode	Normally Black, IPS	-
Eyes Viewing Direction	85/85/85/85	
Driver IC	HX8282A+HX8696	--
Module size	165.00(W)×100.00(H)×5.10(T)	mm
Active area	154.21(W)×85.92(H)	mm
Dot pitch	0.1506(W)×0.1432(H)	mm
Interface	RGB 24bit	--
Operating temperature	-20 ~ +70	°C
Storage temperature	-30 ~ +80	°C
Back Light	24 White LEDs	--

Revision Record

Rev No.	Rev Date	Contents	Note
A	2023/12/08	New issue.	

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1. Scope

This specification defines general provisions as well as inspection standards for TFT module. If the event of unforeseen problem or unspecified items may occur, naturally shall negotiate and agree to solution

2. General Information

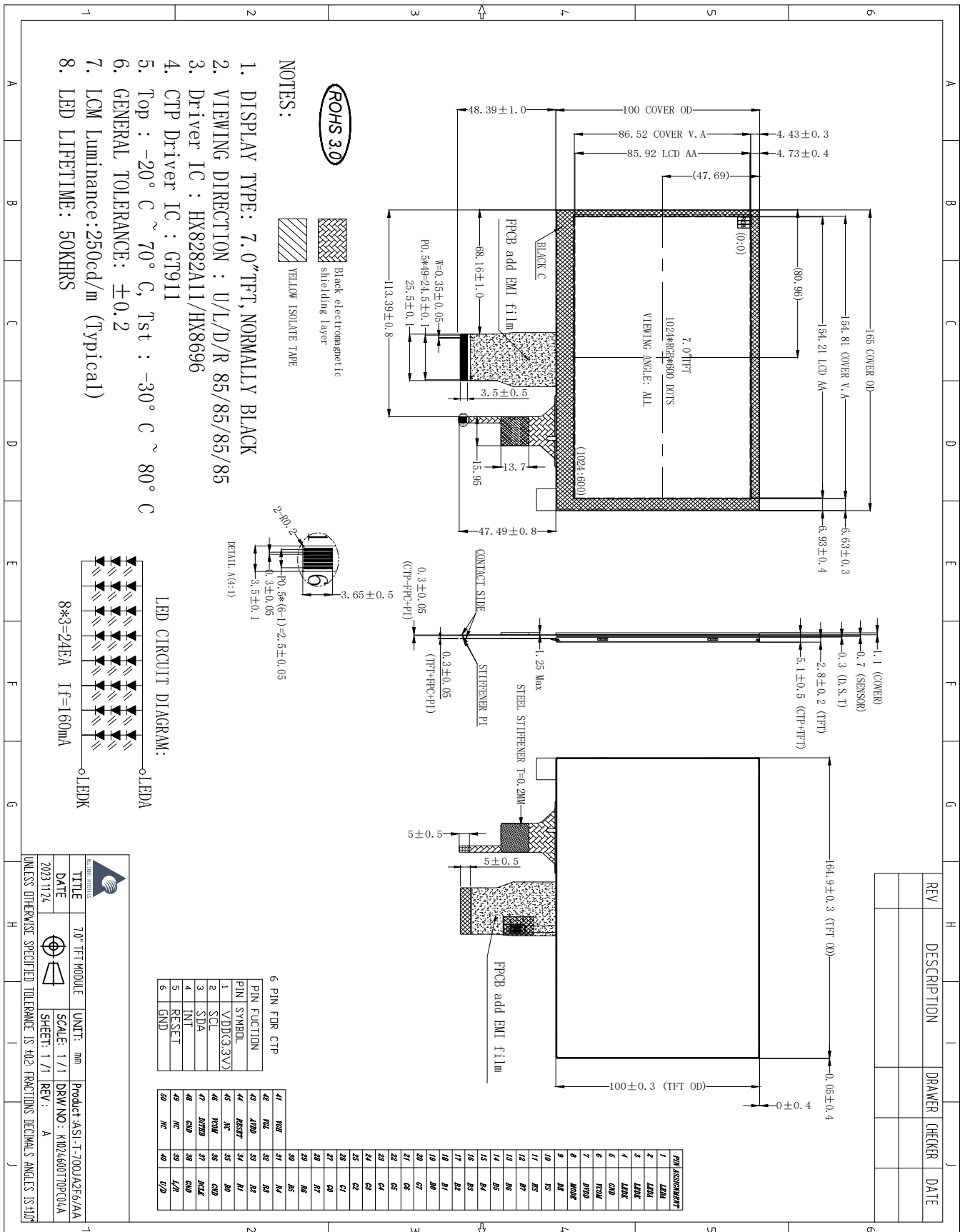
TFT

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Back Light	24 White LEDS	--

CTP

ITEM	STANDARD VALUES	UNITS
CTP type	Glass + Glass + FPC	--
CTP Driver IC	GT911	--
Surface hardness	6H	--
Transmittance	≥85%	--
Operation Voltage	3.0V-3.6 V	--
CTP size	165.00(W)×100.00(H)×2.00(T)	mm
LENS Viewing area	154.91(W)×86.62(H)	mm
Operating temperature	-20 ~ +70	°C
Storage temperature	-30 ~ +80	°C
CTP Interface	I ² C	--
Pointing Stick	5	--

3. External Dimensions



4. Interface Description

TFT

PIN	PIN NAME	DESCRIPTION
1	LEDA	LED backlight (Anode).
2	LEDA	
3	LEDK	LED backlight (Cathode).
4	LEDK	
5	GND	Power ground
6	VCOM	Common Voltage.
7	DVDD	Digital Power.
8	MODE	DE/SYNC mode select. Normally pull high. H: DE mode. L: HSD/VSD mode.
9	DE	Data Enable signal.
10	VS	Vertical sync input. Negative polarity.
11	HS	Horizontal sync input. Negative polarity.
12	B7	Blue Data Input (MSB).
13	B6	Blue Data Input.
14	B5	Blue Data Input.
15	B4	Blue Data Input.
16	B3	Blue Data Input.
17	B2	Blue Data Input.
18	B1	Blue Data Input.
19	B0	Blue Data Input (LSB).
20	G7	Green Data Input (MSB).
21	G6	Green Data Input.
22	G5	Green Data Input.
23	G4	Green Data Input.
24	G3	Green Data Input.
25	G2	Green Data Input.
26	G1	Green Data Input.
27	G0	Green Data Input (LSB).
28	R7	Red Data Input (MSB).
29	R6	Red Data Input.
30	R5	Red Data Input.
31	R4	Red Data Input.

32	R3	Red Data Input.
33	R2	Red Data Input.
34	R1	Red Data Input.
35	R0	Red Data Input (LSB).
36	GND	Power ground.
37	DCLK	Clock input.
38	GND	Power ground.
39	L/R	Left or Right Display Control.
40	U/D	Up / Down Display Control.
41	VGH	Positive Power for TFT.
42	VGL	Negative Power for TFT.
43	AVDD	Analog Power.
44	RESET	Global reset pin. Active low to enter reset state. Suggest to connecting with an RC reset circuit for stability. Normally pull high.(R=10KΩ, C=1μF)
45	NC.	Not connect.
46	VCOM	Common Voltage.
47	DITHB	Dithering function enable control. (Normally pull high) DITHB="L", to enable internal dithering function. DITHB="H", to disable internal dithering function.
48	GND	Power ground.
49	NC.	Not connect.
50	NC.	Not connect.

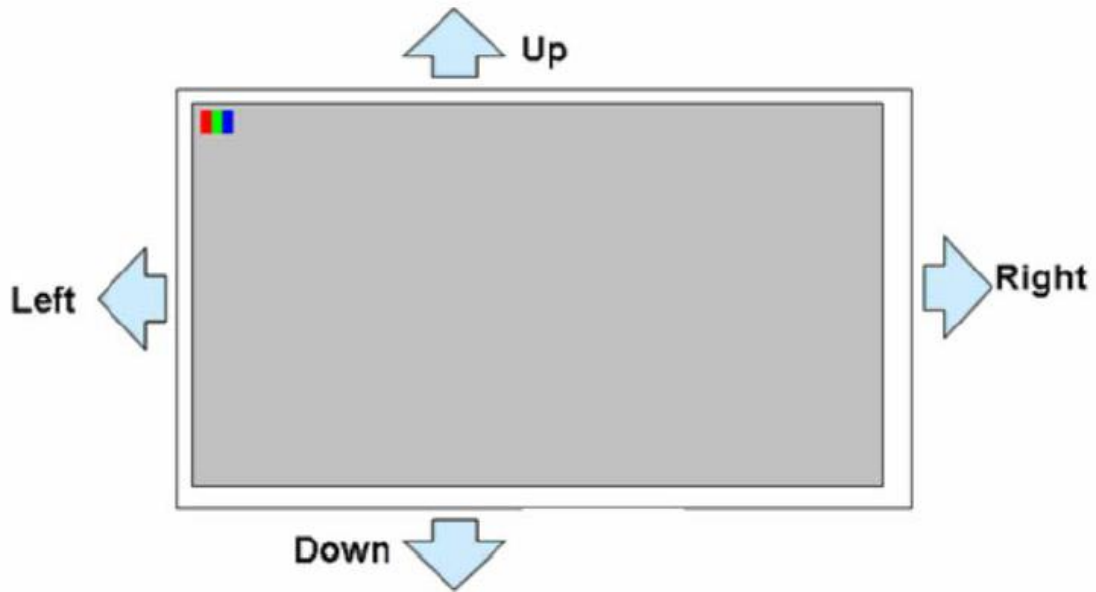
【Note1】 L/R: left or right setting

U/D: up or down setting

L/R	U/D	Data shifting
DVDD	GND	Left → Right, Up → Down(default)
GND	GND	Right → Left, Up → Down
DVDD	DVDD	Left → Right, Down → Up

GND	DVDD	Right → Left, Down → Up
-----	------	-------------------------

Definition of scanning direction:



CTP Pin Assignment

PIN NO.	Pin Name	PIN NAME
1	VDD(3.3V)	CTP Digital Power.
2	SCL	CTP I ² C_clock.
3	SDA	CTP I ² C_data
4	INT	CTP interruption signal.
5	RST	CTP reset pin. Active low to enter reset state.
6	GND	CTP Power ground

5. Absolute Maximum Ratings

Item	Symbol	Min.	Max.	Unit
Digital Supply Voltage	DVDD	-0.5	5.0	V
Analog Supply Voltage	AVDD	-0.5	15	V
Gate On Voltage	VGH	-0.3	40.0	V
Gate Off Voltage	VGL	-20.0	0.3	V
Gate On- Gate Off Voltage	VGH-VGL	-	40.0	V
CTP Digital Power.	VDD(3.3V)	-0.3	3.47	V
Operating Temperature	TOP	-20	70	°C
Storage Temperature	TST	-30	85	°C
Storage Humidity	HD	20	90	%RH

6. DC Characteristics

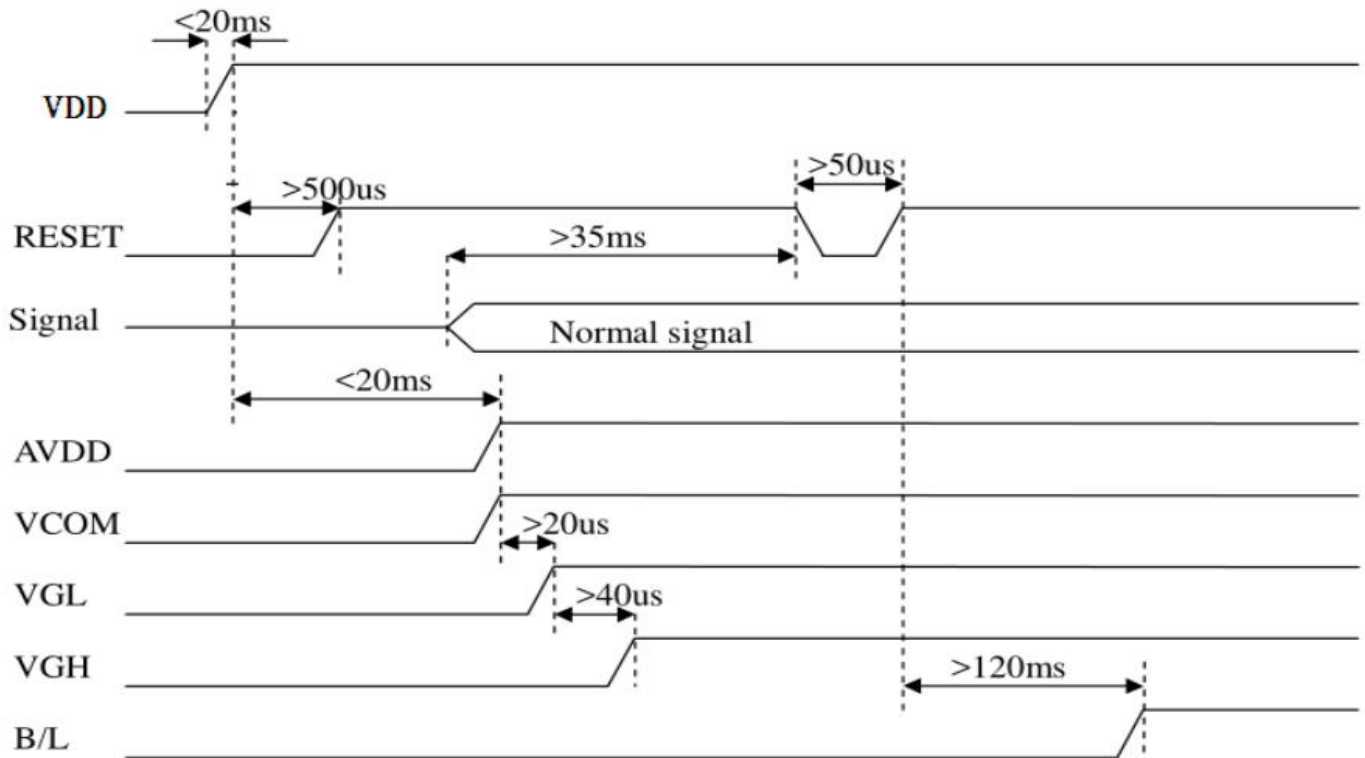
Item	Symbol	Min.	Typ.	Max.	Unit	Remark
Digital Supply Voltage	DVDD	2.3	3.3	4.0	V	-
Digital Supply Current	IDVDD	0.2	0.6	1.0	mA	
Analog Supply Voltage	AVDD	8	9.0	13.5	V	-
Analog Supply Current	I _{AVDD}	10	30	50	mA	
Gate On Voltage	VGH	15.3	18.36	21.5	V	-
Gate Off Voltage	VGL	-7.7	-6.85	-6.3	V	-
Common Voltage	VCOM	3.0	3.5	4.0	V	-
CTP Digital Power	VDD(3.3V)	2.8	-	3.3	V	-
Logic Input Voltage	V _{IH}	0.7DVDD	-	DVDD	V	-
	V _{IL}	GND	-	0.3DVDD	V	-

7. Timing Characteristics

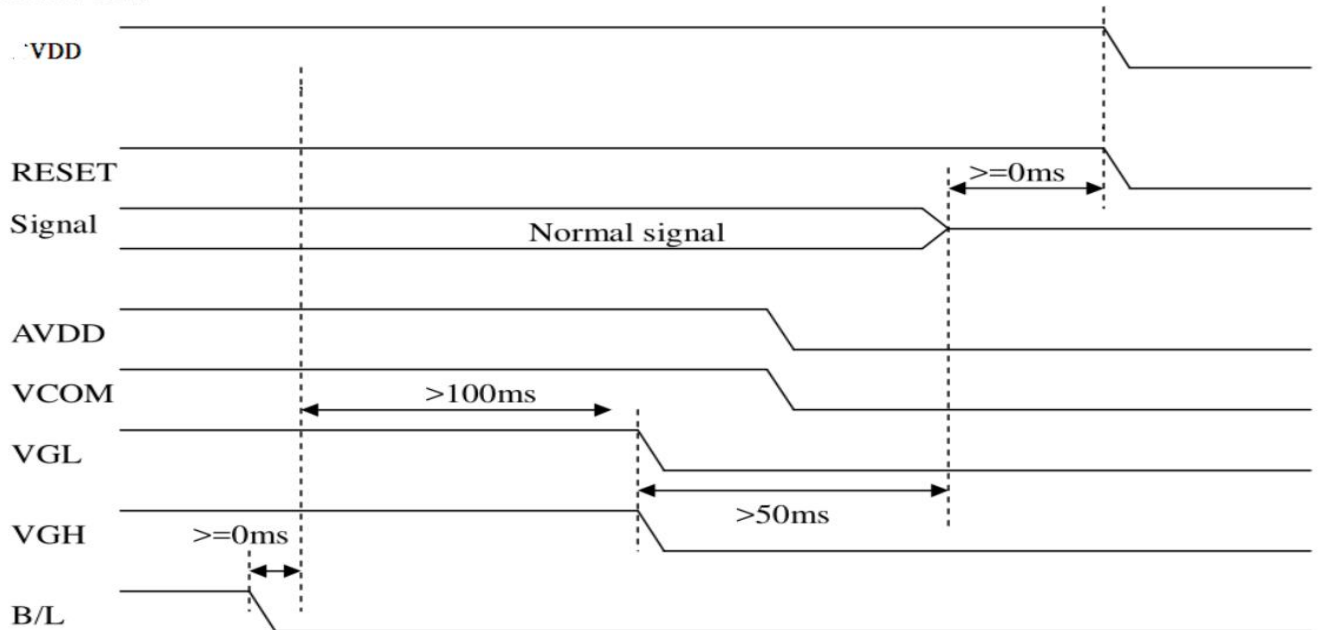
7.1. Power ON/OFF Sequence

Power-On/Off Timing Sequence

a. Power on:



b. Power off:

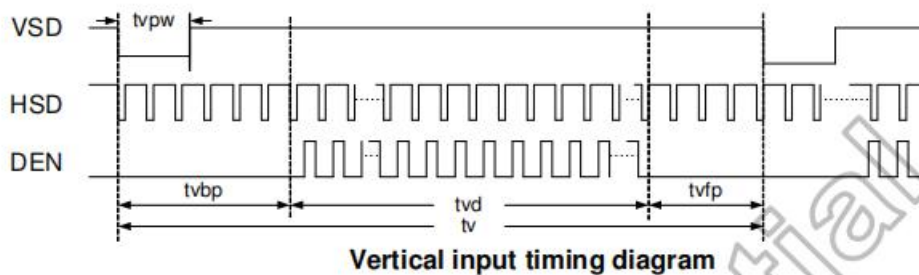


7.2 TTL mode AC electrical characteristics

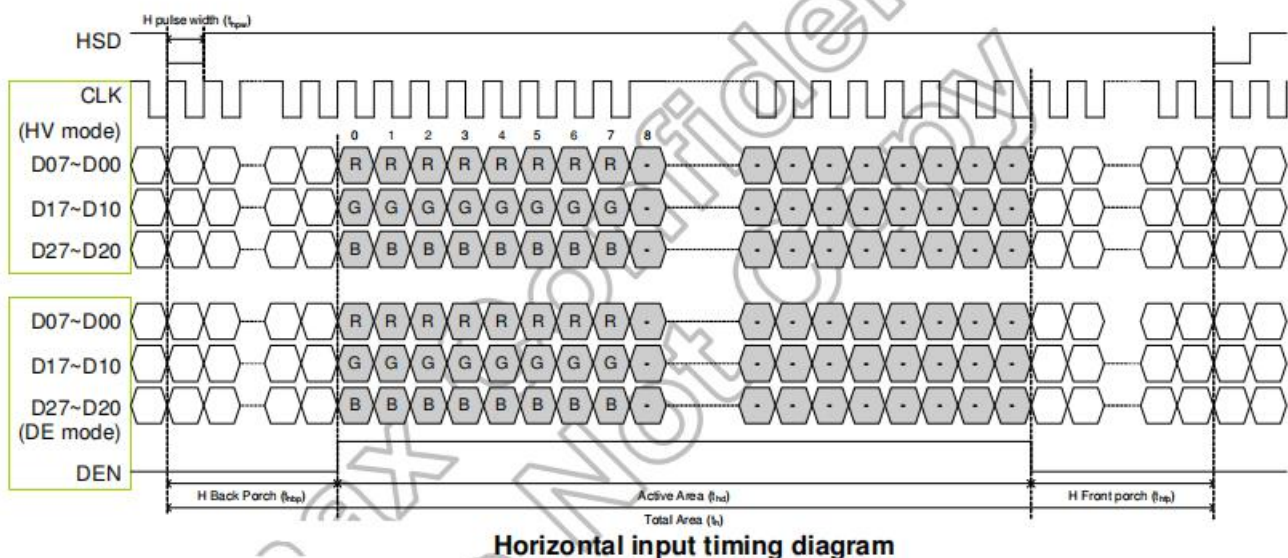
Parameter	Symbol	Spec.			Unit	Condition
		Min.	Typ.	Max.		
VDD Power On Slew rate	T_{POR}	-	-	20	ms	From 0V to 90% VDD
GRB pulse width	T_{GRB}	50	-	-	μ s	-
DCLK cycle time	T_{cph}	14	-	-	ns	-
DCLK pulse duty	T_{cwh}	40	50	60	%	-
VSD setup time	T_{vst}	5	-	-	ns	-
VSD hold time	T_{vhd}	5	-	-	ns	-
HSD setup time	T_{hst}	5	-	-	ns	-
HSD hold time	T_{hhd}	5	-	-	ns	-
Data set-up time	T_{dsu}	5	-	-	ns	D0[7:0], D1[7:0], D2[7:0] to DCLK
Data hold time	T_{dhd}	5	-	-	ns	D0[7:0], D1[7:0], D2[7:0] to DCLK
DE setup time	T_{esu}	5	-	-	ns	-
DE hold time	T_{ehd}	5	-	-	ns	-
Output stable time	T_{sst}	-	-	6	μ s	10% to 90% target voltage. CL=90pF, R=10K ohm (Cascade) Dual gate
				3		

7.3 TTL mode data input format

Vertical timing



Horizontal timing



7.4 Parallel RGB input timing table

- DE mode

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
DCLK Frequency	fclk	40.8	51.2	67.2	MHz
Horizontal Display Area	thd	1024			DCLK
HSD Period	th	1114	1344	1400	DCLK
HSD Blanking	thb+ thfp	90	320	376	DCLK
Vertical Display Area	tvd	600			T _H
VSD Period	tv	610	635	800	T _H
VSD Blanking	tvbp+ tvfp	10	35	200	T _H

DE mode (1024x600)

- HV mode

Horizontal timing

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
DCLK Frequency	fclk	44.9	51.2	63	MHz
Horizontal Display Area	thd	1024			DCLK
HSD Period	th	1200	1344	1400	DCLK
HSD Pulse Width	thpw	1	-	140	DCLK
HSD Back Porch	thbp	160			DCLK
HSD Front Porch	thfp	16	160	216	DCLK

HV mode horizontal timing (1024x600)

Vertical Timing

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
Vertical Display Area	tvd	600			T _H
VSD Period	tv	624	635	750	T _H
VSD Pulse Width	tvpw	1	-	20	T _H
VSD Back Porch	tvbp	23			T _H
VSD Front Porch	tvfp	1	12	127	T _H

HV Mode Vertical Timing (1024x600)

7.5 Output timing table

Parallel 24-bit RGB mode

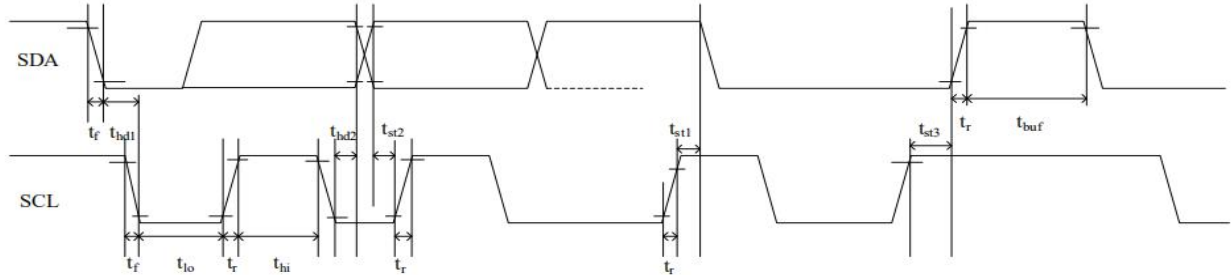
Parameter	Symbol	Spec.			Unit	Conditions
		Min.	Typ.	Max.		
CLKIN Frequency	Fclk	-	65	71	MHz	VDD=3.0V~3.6V
CLKIN Cycle Time	Tclk	14.1	15.4	-	ns	-
CLKIN Pulse Duty	Tcwh	40	50	60	%	Tclk
Time from HSD to Source Output	Thso	64			CLKIN	-
Time from HSD to LD	Thld	64			CLKIN	-
Time from HSD to STV	Thstv	2			CLKIN	-
Time from HSD to CKV	Thckv	20			CLKIN	-
Time from HSD to OEV	Thoev	4			CLKIN	-
LD Pulse Width	Twld	10			CLKIN	-
CKV Pulse Width	Twckv	66			CLKIN	-
OEV Pulse Width	Twoev	74			CLKIN	-

Parallel 24-bit RGB mode

7.6 CTP Power Sequence

7.6.1 I²C Communication

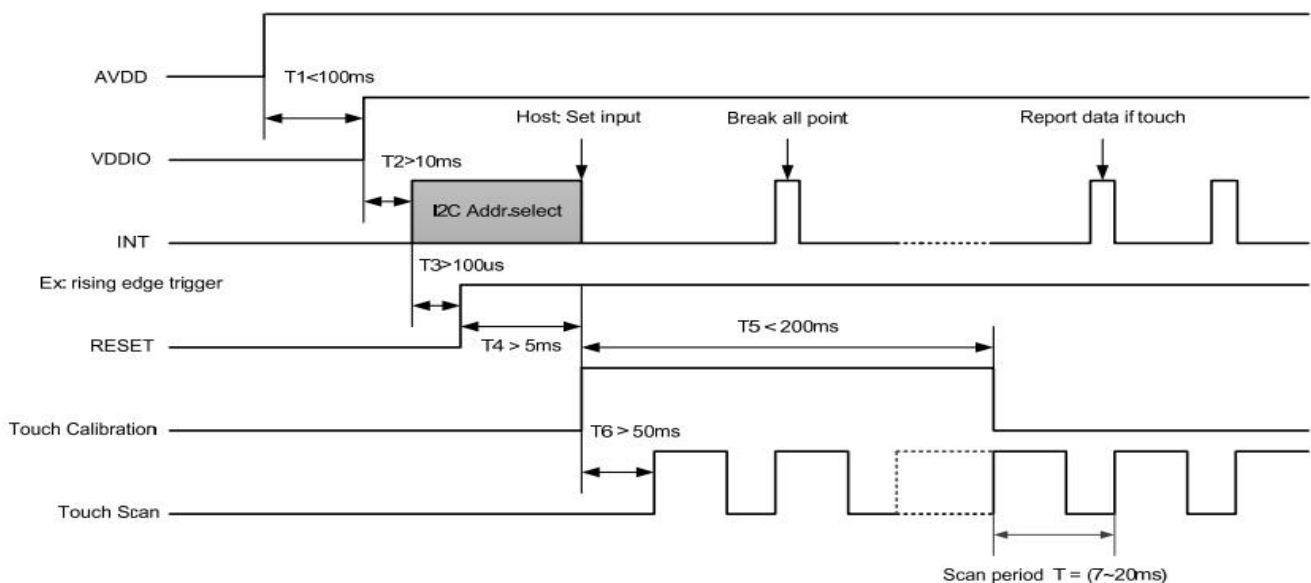
GT911 provides standard I²C interface for communication. In the system, GT911 always works in slave mode, all communications are initiated by master, and the baud rate can be up to 400K bps. The definition of I²C timing is as following:



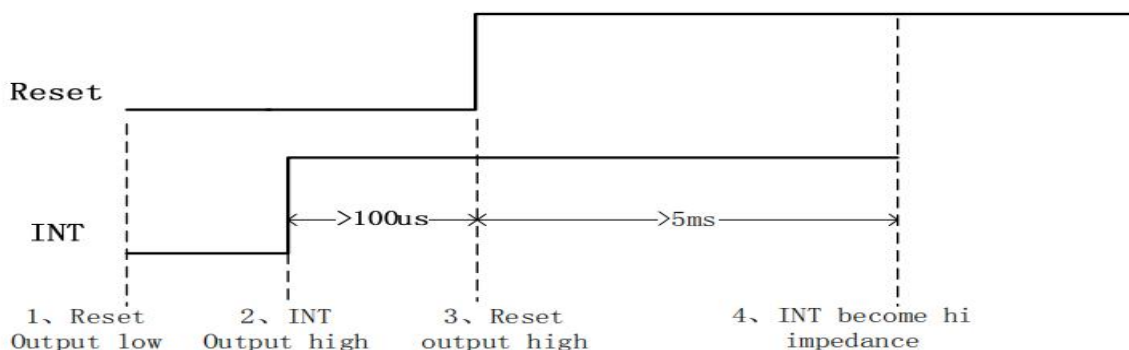
Test condition2: 3.3V communication interface, 400Kbps, pull up resistor is 2K ohm

Parameter	Symbol	MIN.	Max.	Unit
SCL low period	t_{lo}	1.3	-	US
SCL high period	t_{hi}	0.6	-	US
SCL setup time for START condition	t_{st1}	0.6	-	US
SCL setup time for STOP condition	t_{st3}	0.6	-	US
SCL hold time for START condition	t_{hd1}	0.6	-	US
SDA setup time	t_{st2}	0.1	-	US
SDA hold time	t_{hd2}	0	-	US

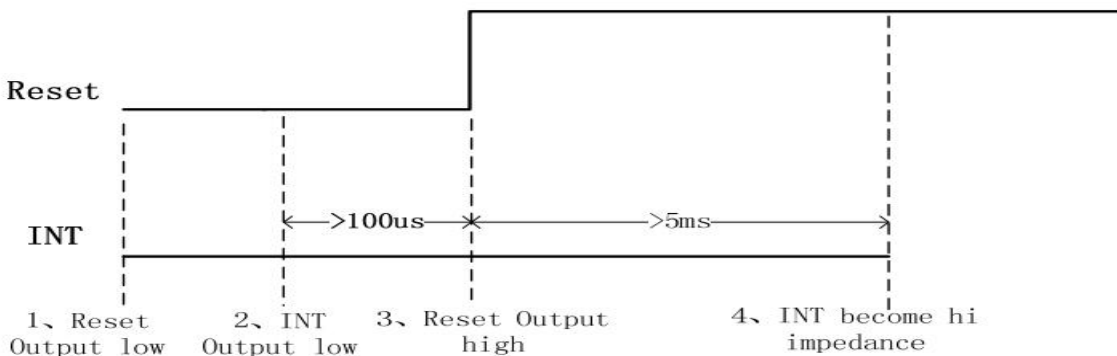
Power on diagram:



Timing of setting slave address to 0x28/0x29:



Timing of setting slave address to 0xBA/0xBB:



7.6.2 CTP AC Characteristic

(Temperature 25°C, AVDD=2.8V)

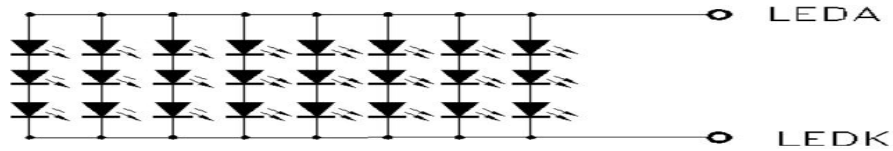
Parameter	Min.	Typical	Max.	Unit
OSC oscillation frequency	59	60	61	MHz
I/O output rise time	-	-	0.5	ns
I/O output fall time	-	-	0.5	ns

7.6.3 CTP DC Characteristic

(Temperature 25°C, VDD=2.8V)

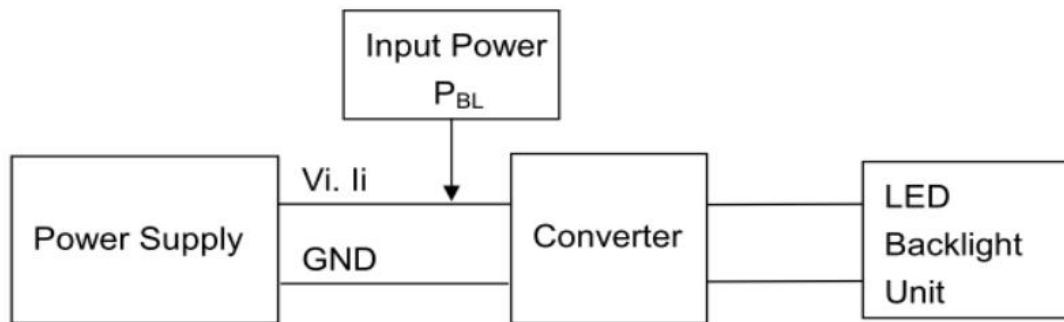
Parameter	MIN.	Typical	Max.	Unit
Operating current (Normal mode)		6.9		mA
Operating current (Green mode)		3.3		mA
Operating current (Sleep mode)	70	-	120	uA
Input voltage in low level(VDDIO=1.8V)	-0.3	0	0.45	V
Input voltage in high level(VDDIO=1.8V)	1.35	1.8	2.1	V

8. Backlight Characteristic



Item	Symbol	MIN	TYP	MAX	UNIT	Test Condition
Supply Voltage	Vf	8.1	9.6	10.5	V	If=160mA
Supply Current	If	-	160	-	mA	
Life Time	-	-	50000	-	Hr	If=160mA
Backlight Color	White					

Note 1: The LED Supply Voltage is defined by the number of LED at Ta=25°C



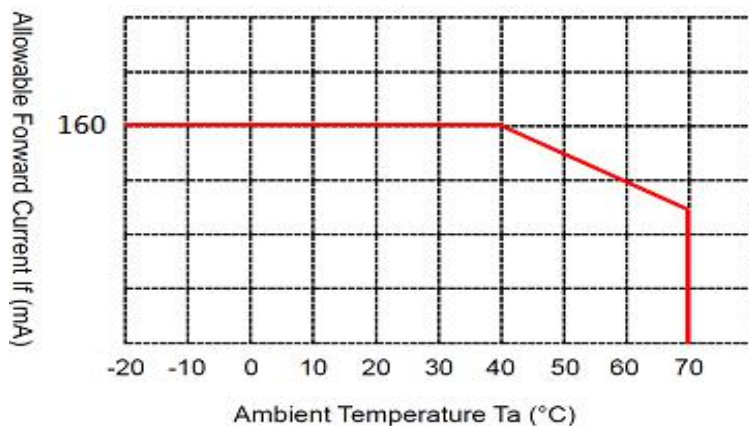
and If

=160mA.

Note 2: LED current is measured by utilizing a high frequency current meter as shown below:

Note 3: The “LED life time” is defined as the module brightness decrease to 50% original brightness at Ta=25°C and If=160mA. The LED lifetime could be decreased if operating If is larger than 160mA.

Note 4: LED light bar circuit:

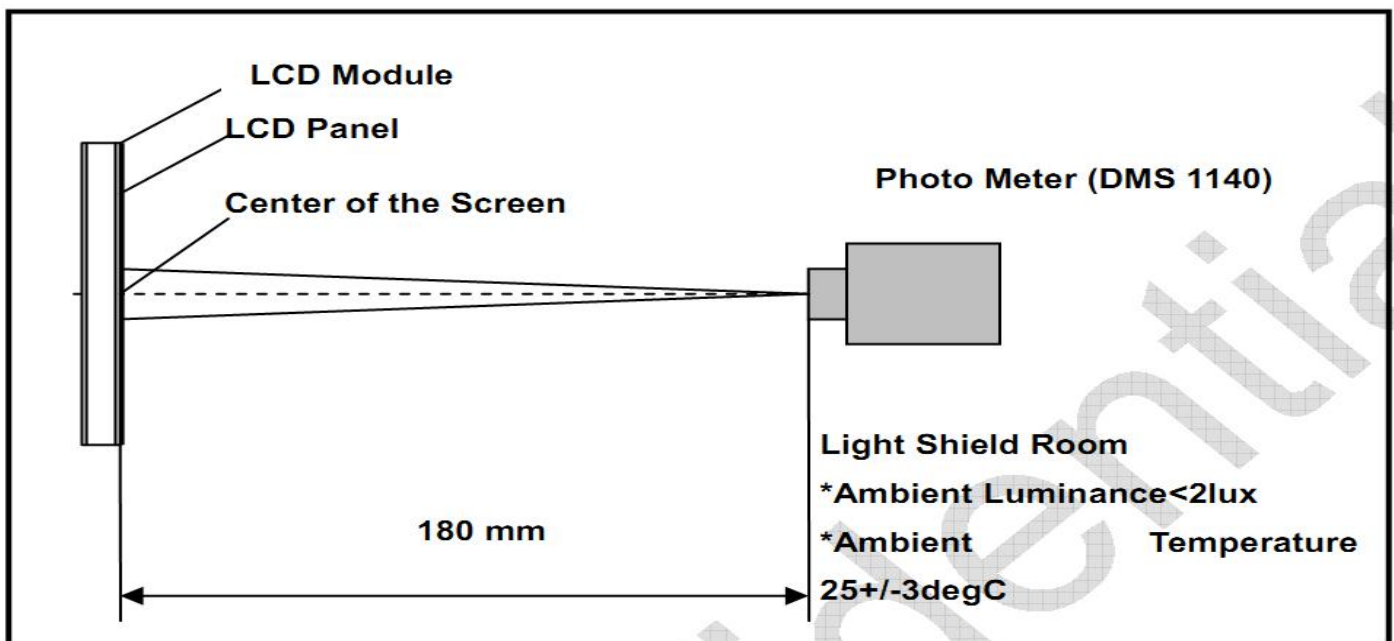


9. Optical Characteristics

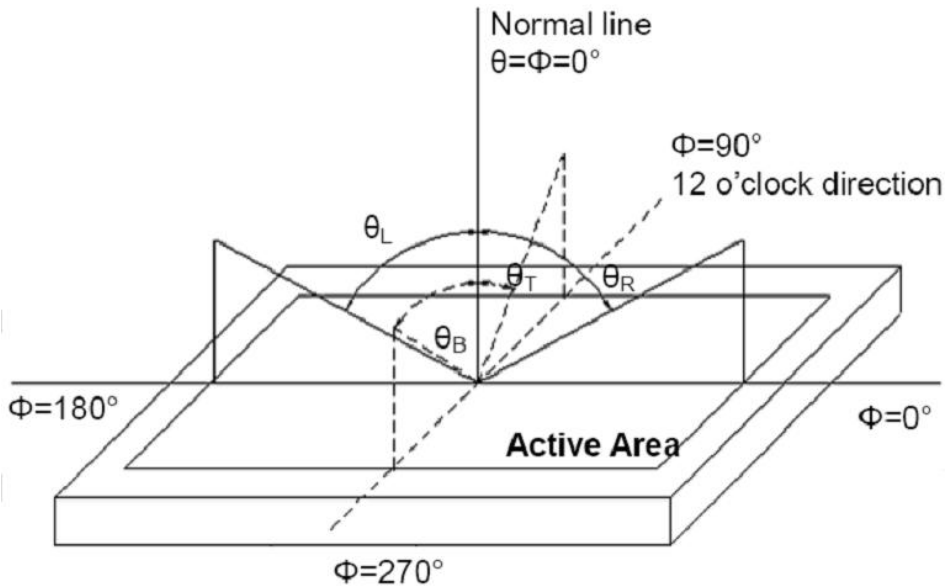
Item	Conditions	Min.	Typ.	Max.	Unit	Note
Viewing Angle (CR>10)	Horizontal	θL	-	85	-	degree (1),(2),(6)
		θR	-	85	-	
	Vertical	θT	-	85	-	
		θB	-	85	-	
Luminous Intensity for LCM	-	200	250	-	cd/m2	If=160mA
Uniformity for LCM	-	75	80	-	%	If=160mA
Contrast Ratio	Center	500	800	-	-	(1),(3),(6)
Response Time	Rising + Falling	-	25	40	ms	(1),(4),(6)
CF Color Chromaticity (CIE1931)	White x	TBD	TBD	TBD	-	(1), (6)
	White y	TBD	TBD	TBD	-	
	Red x	TBD	TBD	TBD	-	
	Red y	TBD	TBD	TBD	-	
	Green x	TBD	TBD	TBD	-	
	Green y	TBD	TBD	TBD	-	
	Blue x	TBD	TBD	TBD	-	
	Blue y	TBD	TBD	TBD	-	

Note (1) Measurement Setup:

The LCD module should be stabilized at given temp. 25°C for 15 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting backlight for 15 minutes in a windless room.



Note (2) Definition of Viewing Angle



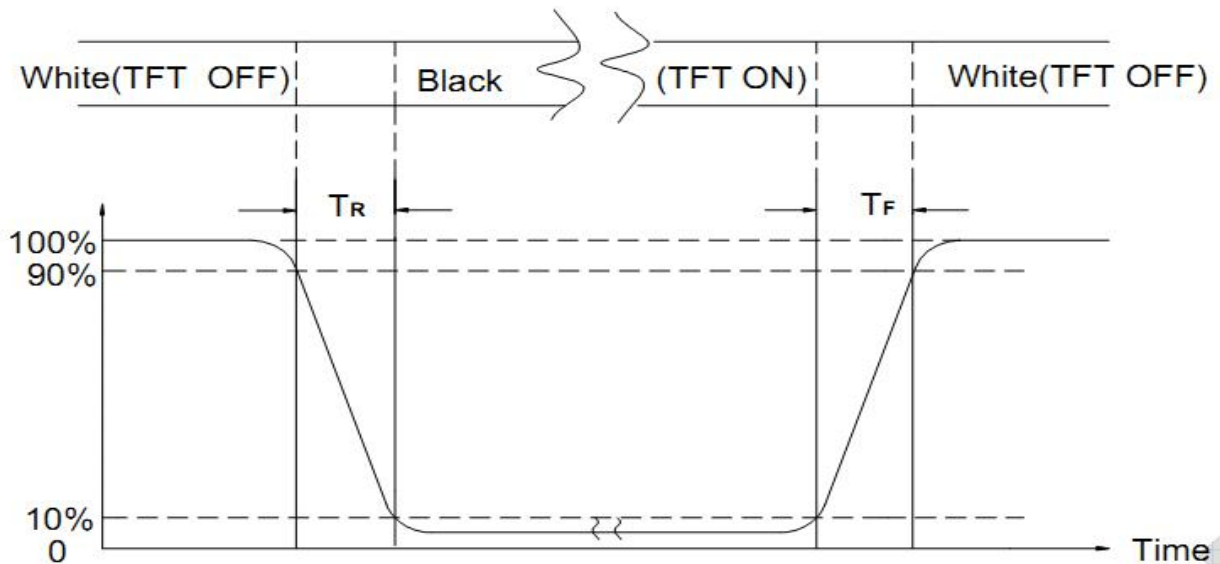
Note (3) Definition of Contrast Ratio (CR)

The contrast ratio can be calculated by the following expression

$$\text{Contrast Ratio (CR)} = L_{255} / L_0$$

L255: Luminance of gray level 255, L0: Luminance of gray level 0

Note (4) Definition of response time



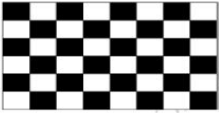

Note (5) Definition of Transmittance (Module is without signal input)

$$\text{Transmittance} = \text{Center Luminance of LCD} / \text{Center Luminance of Back Light} \times 100\%$$

Note (6) Definition of color chromaticity (CIE1931)

Color coordinates measured at the center point of LCD

10. Reliability Test Conditions and Methods

No.	Test Items	Test Condition	Inspection After Test
1	High Temperature Storage	80°C±2°C×96Hours	Inspection after 2~4hours storage at room temperature, the samples should be free from defects: 1, Air bubble in the LCD. 2, Seal leak. 3, Non-display. 4, Missing segments. 5, Glass crack. 6, Current IDD is twice higher than initial value. 7, The surface shall be free from damage. 8, The electric characteristic requirements shall be satisfied.
2	Low Temperature Storage	-30°C±2°C×96Hours	
3	High Temperature Operating	70°C±2°C×96Hours	
4	Low Temperature Operating	-20°C±2°C×96Hours	
5	Temperature Cycle(Storage)	$ \begin{array}{c} -20^{\circ}\text{C} \xleftrightarrow{(30\text{min})} 25^{\circ}\text{C} \xleftrightarrow{(5\text{min})} 70^{\circ}\text{C} \\ \xleftrightarrow{(30\text{min})} \\ \text{1cycle} \\ \text{Total 10cycle} \end{array} $	
6	Damp Proof Test (Storage)	50°C±5°C×90%RH×96Hours	
7	Vibration Test	Frequency:10Hz~55Hz~10Hz Amplitude:1.5mm X,Y,Z direction for total 3hours (packing condition test will be tested by a carton)	
8	Drooping Test	Drop to the ground from 1M height one time every side of carton. (packing condition test will be tested by a carton)	
9	ESD Test	Voltage:±8KV,R:330Ω,C:150PF,Air Mode,10times	
10	Image Sticking Test	25 ± 2°C Operation with test pattern sustained for 2 hrs, then change to gray pattern immediately. After 5 mins, the mura must be disappeared completely  	

REMARK:

- The Test samples should be applied to only one test item.
- Sample side for each test item is 5~10pcs.
- For Damp Proof Test, Pure water(Resistance > 10MΩ)should be used.
- In case of malfunction defect caused by ESD damage, if it would be recovered to normal state after resetting, it would be judge as a good part.
- EL evaluation should be accepted 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.
- Failure Judgment Criterion: Basic Specification Electrical Characteristic, Mechanical Characteristic, Optical Characteristic.

11. Inspection Standard

11.1 Scope

Specifications contain

11.1.1 Display Quality Evaluation

11.1.2 Mechanics Specification

11.2 Sampling Plan

Unless there is other agreement, the sampling plan for incoming inspection shall follow MIL-STD-105E.

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

11.2.2 Sampling type: Normal inspection, single sampling.

11.2.3 Sampling level: Level II.

11.2.4 AQL: Acceptable Quality Level

Major defect: AQL=0.65

Minor defect: AQL=1.5

11.3 Panel Inspection Condition

11.3.1 Environment:

Room Temperature: $25\pm 5^{\circ}\text{C}$.

Humidity: $65\pm 5\%$ RH.

Illumination: 300 ~ 700 Lux.

11.3.2 Inspection Distance:

35 ± 5 cm

11.3.3 Inspection Angle:

The vision of inspector should be perpendicular to the surface of the Module.

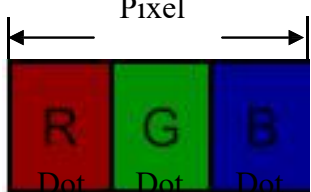
11.3.4 Inspection time:

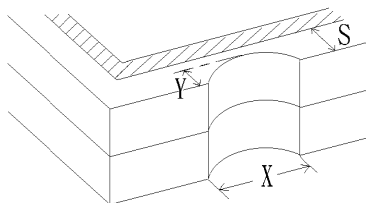
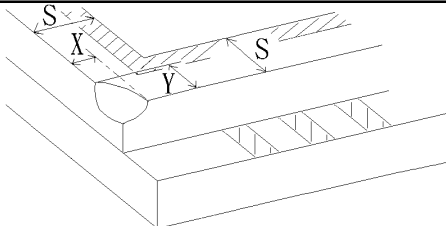
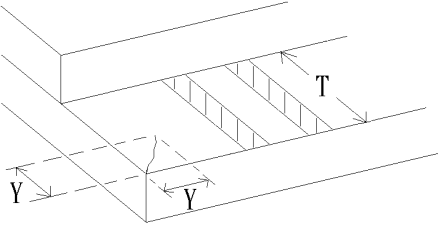
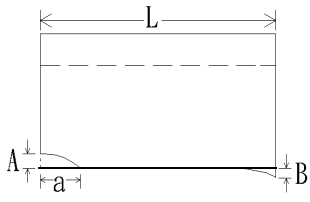
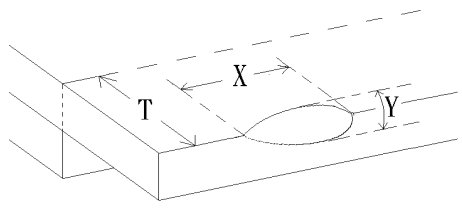
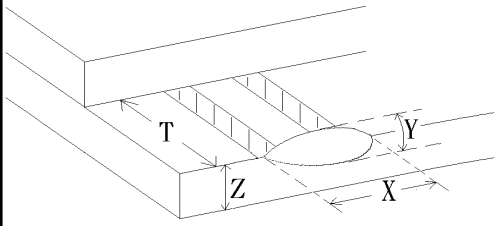
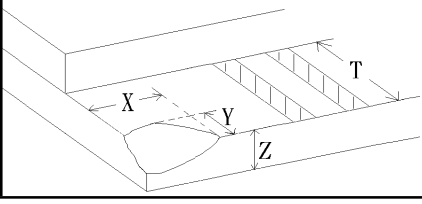
Perceptibility Test Time: 20 seconds max.

11.4 Inspection Plan

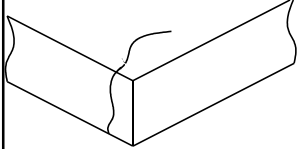
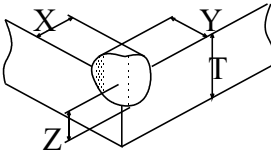
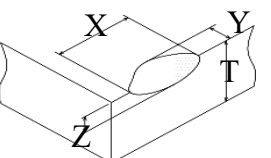
Class	Item	Judgment	Class
Packing & Indicate	1. Outside and inside package.	"MODEL NO.", "LOT NO." and "QUANTITY" should indicate on the package.	Minor
	2. Model mixed and quantity.	Other model mixed Quantity short or over	Major
	3. Product indication.	"MODEL NO." should indicate on the product.	Major
Assembly	4. Dimension, LCD glass scratch and scribe defect.	According to specification or drawing.	Major
Appearance	5. Viewing area.	Polarizer edge or LCD's sealing line is visible in the viewing area.....Rejected.	Minor
	6. Blemish, black spot, white spot in the LCD and LCD glass cracks.	According to standard of visual inspection.(inside viewing area)	Minor
	7. Blemish, black spot, white spot and scratch on the polarizer.	According to standard of visual inspection.(inside viewing area)	Minor
	8. Bubble in polarizer.	According to standard of visual inspection.(inside viewing area)	Minor
	9. LCD's rainbow color.	Strong deviation color (or newton ring) of LCD.....Rejected. Or according to limited sample.(if needed, and inside viewing area)	Minor
Electrical	10. Electrical and optical characteristics.(contrast Vop chromaticity....etc)	According to specification or drawing.(inside viewing area)	Major
	11. Missing line.	Missing dot line character	Major
	12.Short circuit. Wrong pattern display.	No display, wrong pattern display, current consumption. Out of specification	Major
	13. Dot defect.(for color and TFT)	According to standard of visual Inspection.	Minor

11.5 Standard Of Visual Inspection

No.	Class	Item	Judgment																				
11.5.1	Minor	Black and white spot. Foreign materiel. Dust. Blemish. Scratch.	<p>(A) Round type: Unit: mm</p> <table border="1"> <thead> <tr> <th>Diameter (mm.)</th> <th>Acceptable O'ty</th> </tr> </thead> <tbody> <tr> <td>$\Phi \leq 0.2$</td> <td>Disregard</td> </tr> <tr> <td>$0.2 < \Phi \leq 0.25$</td> <td>2(Distance>5mm)</td> </tr> <tr> <td>$0.25 < \Phi$</td> <td>0</td> </tr> </tbody> </table> <p>Note: $\Phi = (\text{length} + \text{width}) / 2$</p> <p>(B) Linear type: Unit: mm</p> <table border="1"> <thead> <tr> <th>Length</th> <th>Width (mm.)</th> <th>Acceptable O'ty</th> </tr> </thead> <tbody> <tr> <td>--</td> <td>$W \leq 0.03$</td> <td>Disregard</td> </tr> <tr> <td>$L \leq 5.0$</td> <td>$0.03 < W \leq 0.07$</td> <td>2(Distance>5mm)</td> </tr> <tr> <td>--</td> <td>$0.07 < W$</td> <td>FOLLOW ROUND</td> </tr> </tbody> </table>	Diameter (mm.)	Acceptable O'ty	$\Phi \leq 0.2$	Disregard	$0.2 < \Phi \leq 0.25$	2(Distance>5mm)	$0.25 < \Phi$	0	Length	Width (mm.)	Acceptable O'ty	--	$W \leq 0.03$	Disregard	$L \leq 5.0$	$0.03 < W \leq 0.07$	2(Distance>5mm)	--	$0.07 < W$	FOLLOW ROUND
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11.5.4	Minor	Dot defect	<table border="1"> <thead> <tr> <th>Items</th> <th>Acceptable O'ty</th> </tr> </thead> <tbody> <tr> <td>Bright dot</td> <td>$N \leq 2$</td> </tr> <tr> <td>Dark dot</td> <td>$N \leq 3$</td> </tr> <tr> <td>Total dot</td> <td>$N \leq 4$</td> </tr> </tbody> </table> <p>Pixel define :</p>  <p>Note1: The definition of dot: The size of a defective dot over 1/2 of whole dot is regarded as one defective dot. Note 2: Bright dot: Dots appear bright and unchanged in size in which LCD panel is displaying under black pattern. Note 3: The bright dot defect must be visible through 2% ND filter Note 4: Dark dot: Dots appear dark and unchanged in size in which LCD panel is displaying under pure red, green, blue pattern.</p>	Items	Acceptable O'ty	Bright dot	$N \leq 2$	Dark dot	$N \leq 3$	Total dot	$N \leq 4$												
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11.5.5	Minor	Mura	ND 5% (In 50% gray screen)																				

No.	Class	Item	Judgment
11.5.6	Minor	LCD glass chipping.	 $Y > S$ Reject
11.5.7	Minor	LCD glass chipping.	 $X \text{ or } Y > S$ Reject
11.5.8	Major	LCD glass crack.	 $Y > (1/2) T$ Reject
11.5.9	Major	LCD glass scribe defect.	 <p>1. $a > L/3, A > 1.5\text{mm}$ Reject 2. B : According to dimension</p>
11.5.10	Minor	LCD glass chipping. (on the terminal area)	 $\Phi = (x+y)/2 > 2.5\text{mm}$ Reject
11.5.11	Minor	LCD glass chipping. (on the terminal surface)	 $Y > (1/3)T$ Reject
11.5.12	Minor	LCD glass chipping.	 $Y > T$ Reject

11.6. Inspection Standard Of Touch Panel

No.	Class	Items	Judgment
11.6.1	Major	Touch panel crack.	 <p>Reject</p>
11.6.2	Minor	Touch panel chipping.	<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="border: 1px solid black; padding: 5px;"> $X \leq 1\text{mm}, Y \leq 1\text{mm}, Z \leq 1/2T$ </div> <div style="border: 1px solid black; padding: 5px;">Accept</div> </div>  <p>1) Corner fragment in the golden finger that seriously affects the product function is regarded as a defect. 2) Corner fragment in the circuit that seriously affects product function is regarded as a defect.</p>
		Edge.	<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="border: 1px solid black; padding: 5px;"> $X \leq 1\text{mm}, Y \leq 1\text{mm}, Z \leq 1/2T$ </div> <div style="border: 1px solid black; padding: 5px;">Accept</div> </div>  <p>1) Side fragment in the golden finger that seriously affects the product function is regarded as a defect. 2) Side fragment in the circuit that seriously affects product function is regarded as a defect.</p>
11.6.3	Minor	Scratch. Dust and foreign materiel. (linear type)	$W \leq 0.03$ Accept
			$0.03\text{mm} < W \leq 0.07\text{mm}, L \leq 5.0\text{mm}$ (Distance > 5mm) Accept 3 ea Max.
			$W > 0.07\text{mm}$ Reject
11.6.4	Minor	Scratch. Dust and foreign materiel (round type: $\phi = (\text{length} + \text{width})/2$)	$\Phi \leq 0.2\text{mm}$ Accept
			$0.2\text{mm} < \Phi \leq 0.3\text{mm}$ (Distance > 5mm) Accept 3 ea Max.
			$\Phi > 0.3\text{mm}$ Reject
11.6.5	Minor	Touch panel dent / fish eyes.	$\Phi \leq 0.2\text{mm}$ Accept
			$0.2\text{mm} < \Phi \leq 0.5\text{mm}$ (Distance > 5mm) Accept 3 ea Max.
			$\Phi > 0.5\text{mm}$ Reject
11.6.6	Minor	Touch panel air bubble.	$\Phi \leq 0.2\text{mm}$ Accept
			$0.2\text{mm} < \Phi \leq 0.5\text{mm}$ (Distance > 5mm) Accept 3 ea Max.
			$\Phi > 0.5\text{mm}$ Reject
11.6.7	Minor	Touch panel printing area scratch.	$W \leq 0.03\text{mm}$ Accept
			$0.03\text{mm} < W \leq 0.05\text{mm}, L \leq 5.0\text{mm}$ (Distance > 5mm) Accept 2 ea Max.
			$W > 0.05$ (W > 0.05 follow 11.6.4 round type) Reject
11.6.8	Minor	Touch panel white haze mark / dust.	Can not be removed Reject

12. Handling Precautions

12.1 Mounting Method

The LCD panel of ALL SHORE TFT module consists of two thin glass plates with polarizers which easily be damaged. And since the module is 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 happens 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 power or ground, do not input any signals before power is turned on, and ground your body, work/assembly areas, and assembly equipment to protect against static electricity.

12.4 Packing

- Module employs 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 than 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 than the operating temperature range and on the other hand at higher temperature LCD's show 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.
- 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.

12.6 Storing

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.

- Storage 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 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 ALL SHORE TFT , 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.