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PRODUCT SPECIFICATION

5.0” Semi-Reflective TFT MODULE

Part Number : ET050WV01-Y

Version : 1.0

- < ◇ > Preliminary Specification
< ◆ > Finally Specification

CUSTOMER' S APPROVAL	
CUSTOMER :	
SIGNATURE:	DATE:

APPROVED BY	PM REVIEWED	PD REVIEWED	PREPARED BY

Revision History

Revision	Date	Originator	Detail	Remarks
1.0	20231109		Initial Release	

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1. General Description

The specification is a transmissive type color active matrix liquid crystal display (LCD) which uses amorphous thin film transistor (TFT) as switching devices. This product is composed of a TFT-LCD panel, driver Ics and a backlight unit.

2. Module Parameter

Features	Details	Unit
Display Size(Diagonal)	5.0"	
LCD type	Semi- Reflective TFT	
Display Mode	Normally White/ Transflective/	
Resolution	800 RGB x 480	Pixels
View Direction	Free	Best Image
Gray Scale Inversion Direction	/	
Module Outline	120.7 (H) x 75.8(V) x 2.85(T) (Note1)	mm
Active Area	108 (H) x 64.8(V)	mm
Pixel Size	135 (H) x 135(V)	um
Pixel Arrangement	R.G.B Vertical Stripe	
Polarizer Surface Treatment	Anti- Glare	
Display Colors	16.7M	
Interface	24-bit RGB interface	
Driver IC	JD9165A-B	-
With or Without Touch Panel	Without	
Operating Temperature	-20~70	°C
Storage Temperature	-30~80	°C
Weight	105	g

Note 1: Exclusive hooks, posts, FFC/FPC tail etc.

CTP characteristic

Item	CTP Description		Item	Main layer define	Thickness/materials
IC	ST1633i				
Interface	I2C				
Operation voltage	3.3V				
Interface signal voltage	3.3V				
Surface hardness	≥6H		1	Lens	3mm/Glass
Operation temperature	-20°C~+70°C		2	Optical Glue	0.2mm
Storage temperature	-30°C~+80°C		3	sensor	0.7mm/Glass
Strengthened Type	Chemical		4		
Transmittance	≥85%		5		
Origin of coordinates	Bottom-Right		6		
Resolution Ratio	800480		7		

CTP PIN SYMBOL

1	VDD
2	GND
3	TP-INT
4	TP-RTS
5	TP-SCL
6	TP-SDA

3. Absolute Maximum Ratings

GND=0V, Ta=25°C

Item	Symbol	Min.	Max.	Unit
Supply Voltage	VDD	-0.3	5.0	V
Storage temperature	T _{STG}	-40	+90	°C
Operating temperature	T _{OP}	-30	+85	°C

Note 1: If Ta below 50°C, the maximal humidity is 90%RH, if Ta over 50°C, absolute humidity should be less than 60%RH.

Note 2: The response time will be extremely slow when the operating temperature is around -10°C, and the back ground will become darker at high temperature operating.

4. DC Characteristics

Item	Symbol	Min.	Typ.	Max.	Unit
Supply Voltage	VDD	3.0	3.3	3.6	V
	AVDD	-	-	-	V
	VGH	15	18	20	V
	VGL	-12	-8	-6	V
Digital Supply Current(Black Pattern)	I _{AVDD}	-	--	-	mA
	I _{VGH}	-	470	-	μA
	I _{VGL}	-	-490	-	μA
Input signal voltage	VCOM	2.7	3.8	4.7	V
Logic Low input voltage	V _{IL}	0	-	0.3*DVDD	V
Logic High input voltage	V _{IH}	0.7*DVDD	-	DVDD	V

Note 1: Be sure to apply DVDD and VGL to the LCD first, and then apply VGH.

Note 2: DVDD setting should match the signals output voltage (refer to Note 3) of customer's system board.

Note 3: DCLK, HS, VS, RESET, U/D, L/R, DE, R0~R7, G0~G7, B0~B7, MODE, DITHB.

Note 4: Typical VCOM is only a reference value. It must be optimized according to each LCM. Please use VR and base on below application circuit.

5. Backlight Characteristics

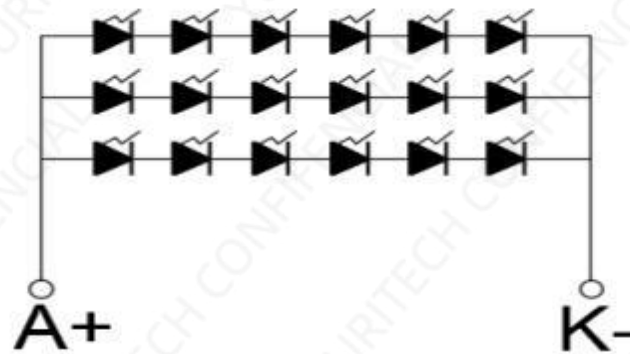
5.1. Backlight Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Backlight Voltage	VLED	Ta=25 °C, I _F =20mA/LED	16.8	18.6	19.2	V
Backlight Current	ILED	Ta=25 °C, V _F =3.2V/LED	-	60	-	mA
Power dissipation	P _D		-	1116	-	mW
Uniformity	Avg			75	-	%
LED working life(25°C)	-		20000	30000	-	Hrs
Drive method	Constant current					
LED Configuration	18 White LEDs(6 LEDs in one string and 3 groups in parallel)					

Note1 : LED life time defined as follows: The final brightness is at 70% of original brightness.

The environmental conducted under ambient air flow, at Ta=25 ± 2 °C, 60%RH ± 5%, I_F=20mA/LED.

5.2. Backlighting circuit



6. Optical Characteristics

6.1. Optical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Note
White Reflectance (with Polarizer)	Rw (%)	$\Theta=0$ Normal viewing angle	—	12.99	—	%	(4) Measuring with HSD polarizer , Reference Only Base on Vop=4.2V
Contrast Ratio	CR		—	12	—	—	(1)(2) Base on Vop=4.2V
NCS	S(%)		—	109	—	%	
Response Time	ms			5			
Viewing Angle	Hor.	Θ_L	—	60	—	—	(1)(4) Measuring with HSD polarizer , Reference Only
		Θ_R	—	60	—		
	Ver.	Θ_U	—	60	—		
		Θ_D	—	60	—		

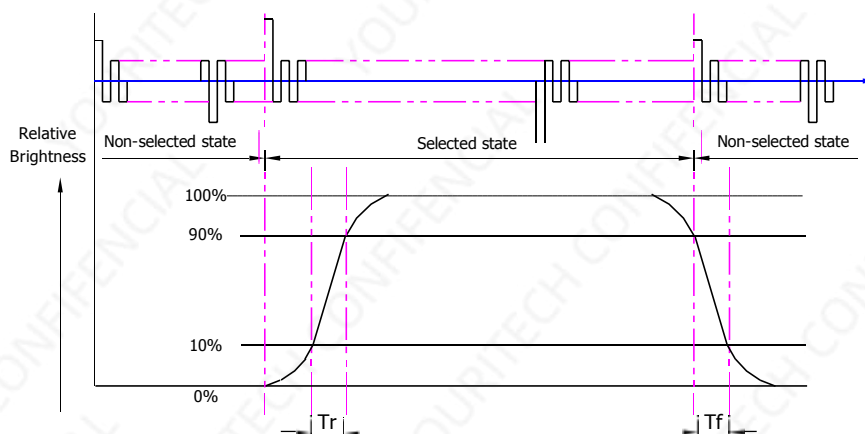
4.2 Optical Specification (Transmissive, w/HSD FOG+D65 light)

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Note
White Transmittance (with Polarizer)	Tr(%)	$\Theta=0$ Normal viewing angle	—	0.53	—	%	(4) Measuring with HSD polarizer , Reference Only Base on Vop=4.2V
Contrast Ratio	CR		—	15	—	—	(1)(2) Base on Vop=4.2V
Color Gamut	S(%)		—	10	—	%	
White chromaticity (CIE1931)	Wx			0.317			
	Wy			0.359			
Response Time	ms			6			
Viewing Angle	Hor.	Θ_L	—	60	—	—	(1)(4) Measuring with HSD polarizer , Reference Only
		Θ_R	—	60	—		
	Ver.	Θ_U	—	60	—		
		Θ_D	—	45	—		

Ta=25°C, DVDD=3.3V

6.2. Definition of Response Time

6.2.1. Normally Black Type (Negative)

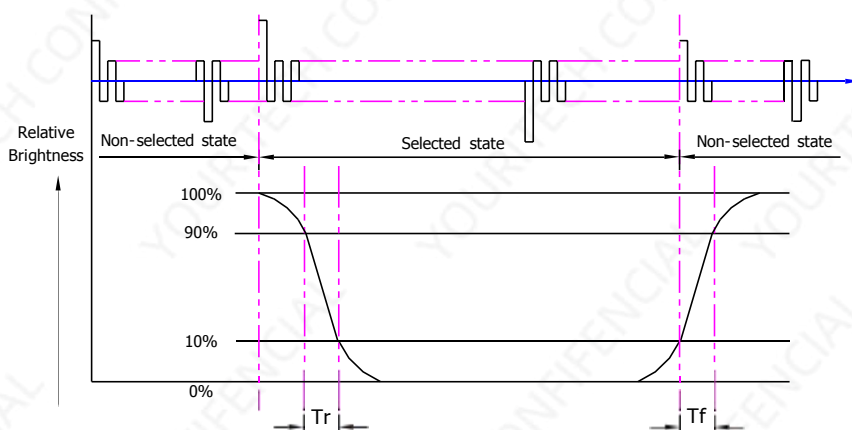


T_r is the time it takes to change from non-selected state with relative luminance 10% to selected state with relative luminance 90%;

T_f is the time it takes to change from selected state with relative luminance 90% to non-selected state with relative luminance 10%

Note: Measuring machine: LCD-5100

6.2.2. Normally White Type (Positive)



T_r is the time it takes to change from non-selected stage with relative luminance 90% to selected state with relative luminance 10%;

T_f is the time it takes to change from selected state with relative luminance 10% to non-selected state with relative luminance 90%;

Note: Measuring machine: LCD-5100 or EQUI

6.3. Definition of Contrast Ratio

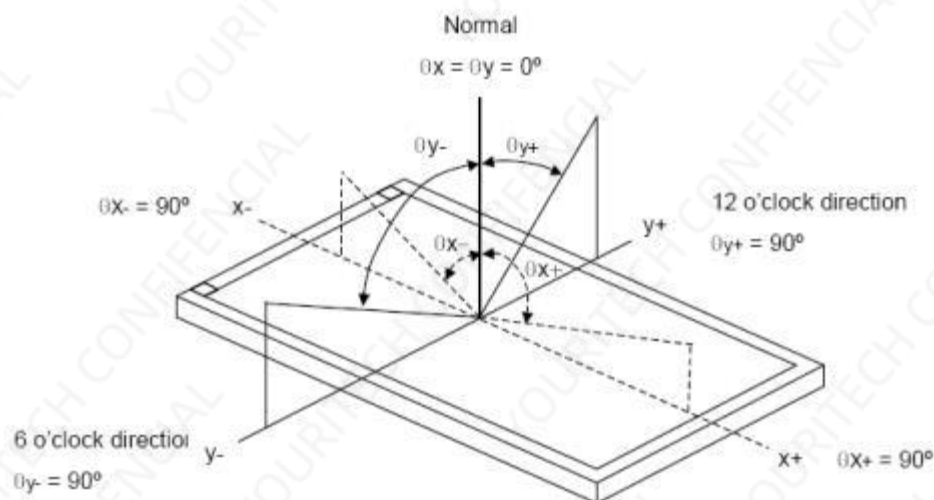
Contrast is measured perpendicular to display surface in reflective and transmissive mode. The measurement condition is:

Measuring Equipment	Eldim or Equivalent
Measuring Point Diameter	3mm//1mm
Measuring Point Location	Active Area centre point
Test pattern	A: All Pixels white
	B: All Pixel black

Contrast setting	Maximum
------------------	---------

Definitions: CR (Contrast) = Luminance of White Pixel / Luminance of Black Pixel

6.4. Definition of Viewing Angles



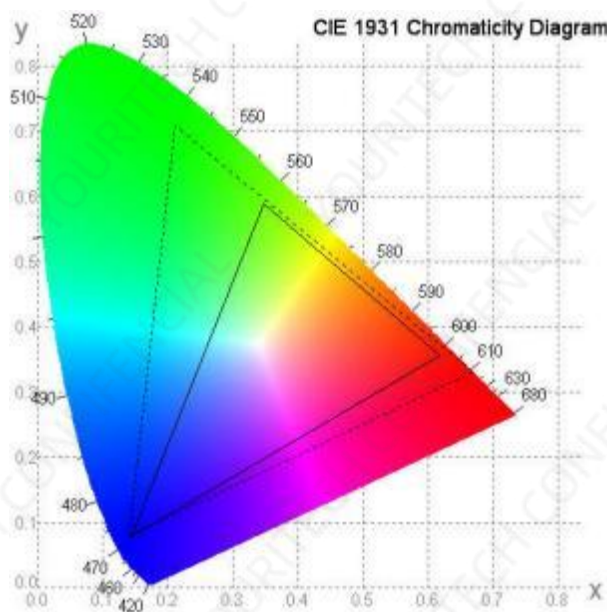
Measuring machine: LCD-5100 or EQUI

6.5. Definition of Color Appearance

R,G,B and W are defined by (x, y) on the IE chromaticity diagram

NTSC=area of RGB triangle/area of NTSC triangleX100%

Measuring picture: Red, Green, Blue and White (Measuring machine: BM-7)



6.6. Definition of Surface Luminance, Uniformity and Transmittance

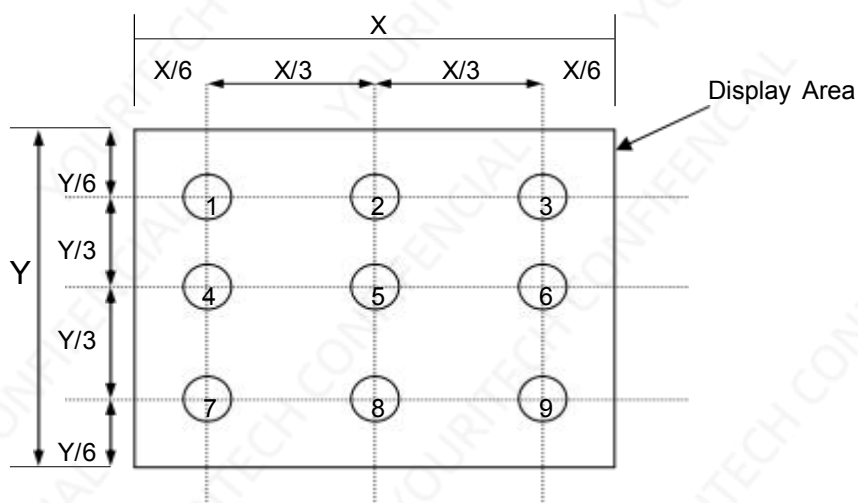
Using the transmissive mode measurement approach, measure the white screen luminance of the display panel and backlight.

6.6.1. Surface Luminance: $L_v = \text{average } (L_{P1} : L_{P9})$

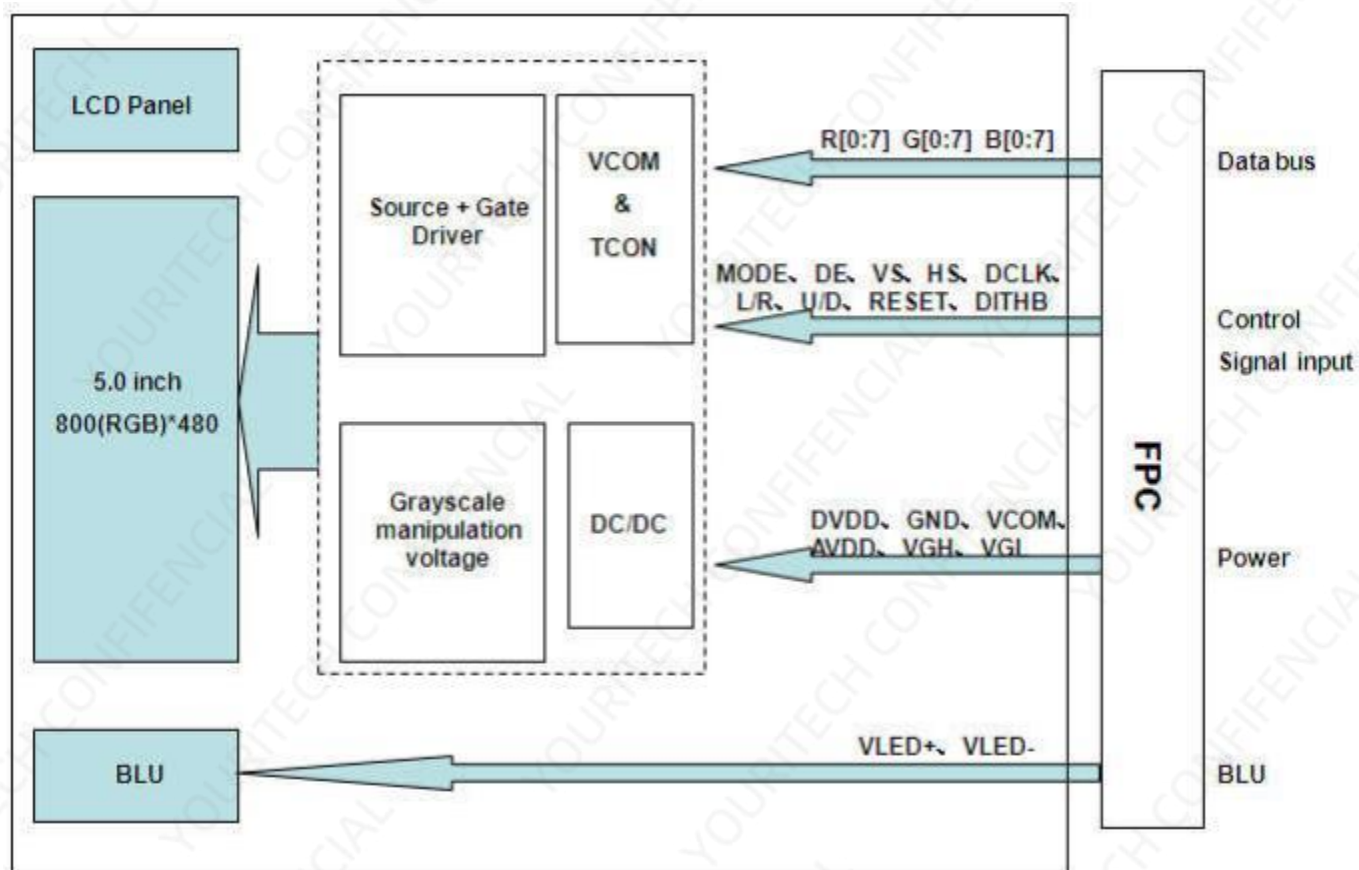
6.6.2. Uniformity = Minimal $(L_{P1} : L_{P9}) / \text{Maximal } (L_{P1} : L_{P9}) * 100\%$

6.6.3. Transmittance = $L_v \text{ on LCD} / L_v \text{ on Backlight} * 100\%$

Note: Measuring machine: BM-7



7. Block Diagram and Power Supply



Note 1: DE/SYNC mode select. Normally pull high.

When select DE mode, MODE="1" , VS and HS must pull high.

When select SYNC mode, MODE="0" , DE must be grounded.

Note 2: When input 18 bits RGB data, the two low bits of R,G and B data must be grounded.

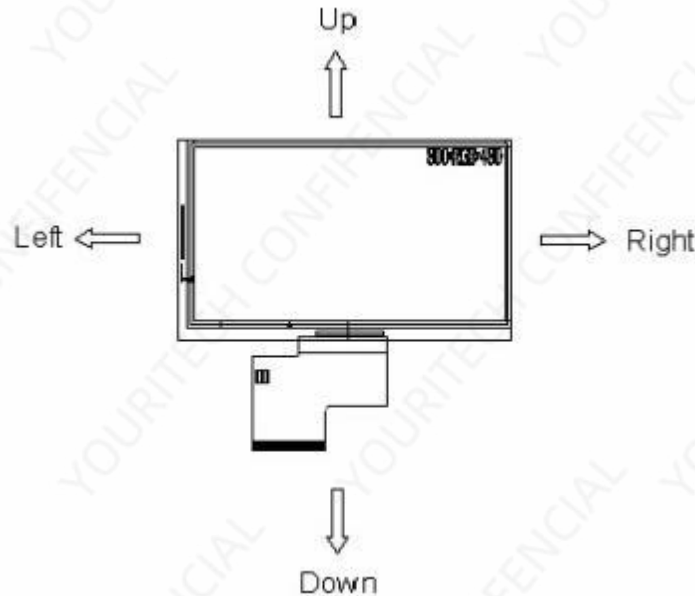
Note 3: Data shall be latched at the falling edge of DCLK.

Note 4: Selection of scanning mode.

Setting of scan control input		Scanning direction
U/D	L/R	
GND	DVDD	Up to down, left to right
DVDD	GND	Down to up, right to left
GND	GND	Up to down, right to left
DVDD	DVDD	Down to up, left to right

Note 5: Definition of scanning direction.

Refer to the figure as follow:



Note 6: Global reset pin. Active low to enter reset state. Suggest to connect with and RC reset circuit for stability.
Normally pull high.

Note 7: Dithering function enable control, normally pull high.

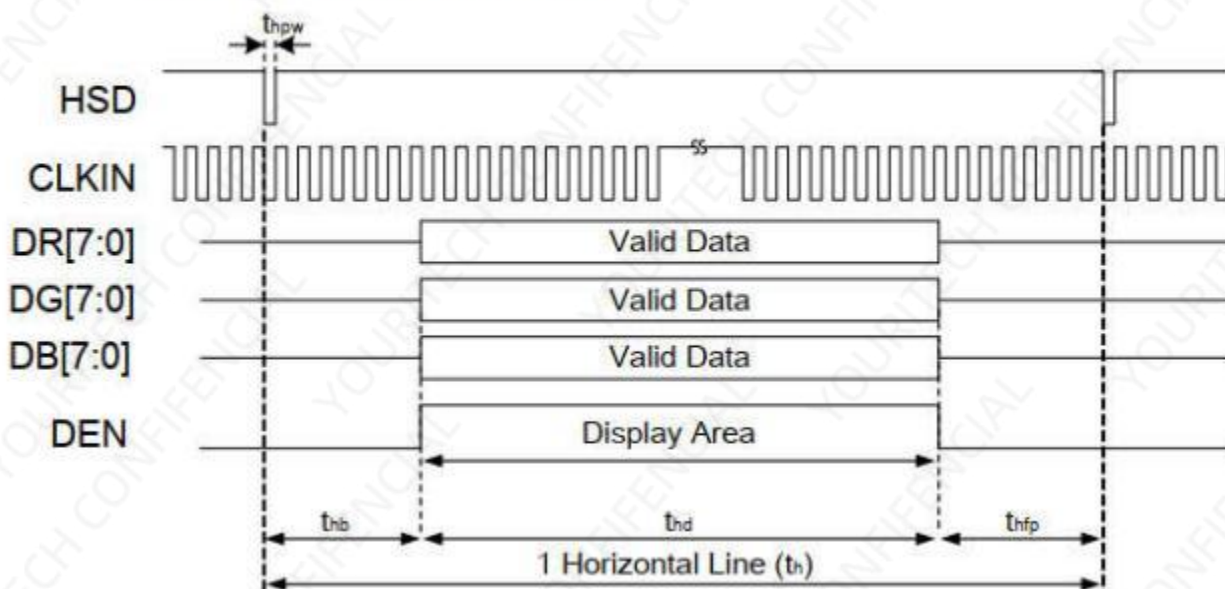
When DITHB="1" , Disable internal dithering function.

When DITHB="0" , Enable internal dithering function.

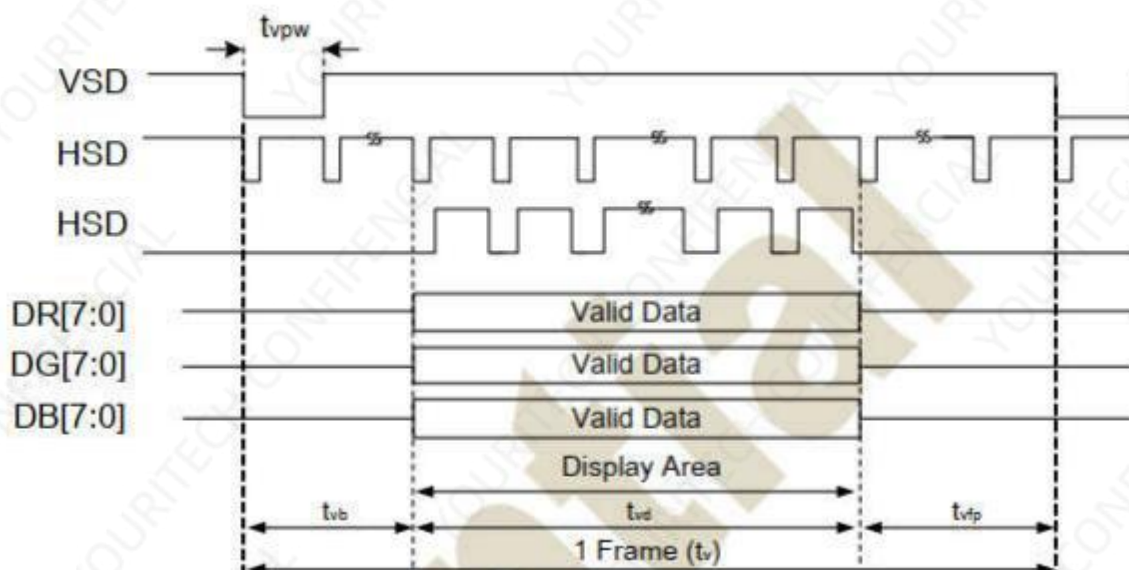
9. AC Characteristics

9.1. AC Timing characteristics

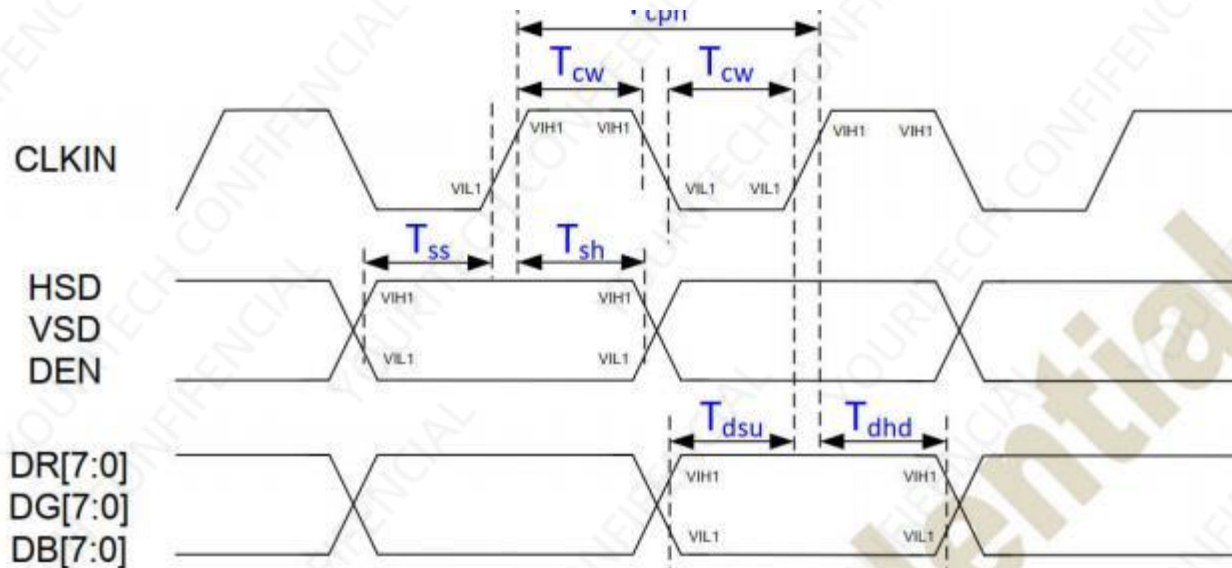
● Horizontal timing



● Vertical timing



9.2. Display Timing characteristics



Input data /sync. parameters

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
CLKIN period	T_{cph}	14	-	-	ns
CLKIN duty ratio	T_{cw}	40	50	60	%
Data setup time	T_{dsu}	5	-	-	ns
Data hold time	T_{dhd}	5	-	-	ns
VSD setup time	T_{ss}	5	-	-	ns
VSD hold time	T_{sh}	5	-	-	ns
HSD setup time	T_{ss}	5	-	-	ns
HSD hold time	T_{sh}	5	-	-	ns
DEN setup time	T_{ss}	5	-	-	ns
DEN hold time	T_{sh}	5	-	-	ns

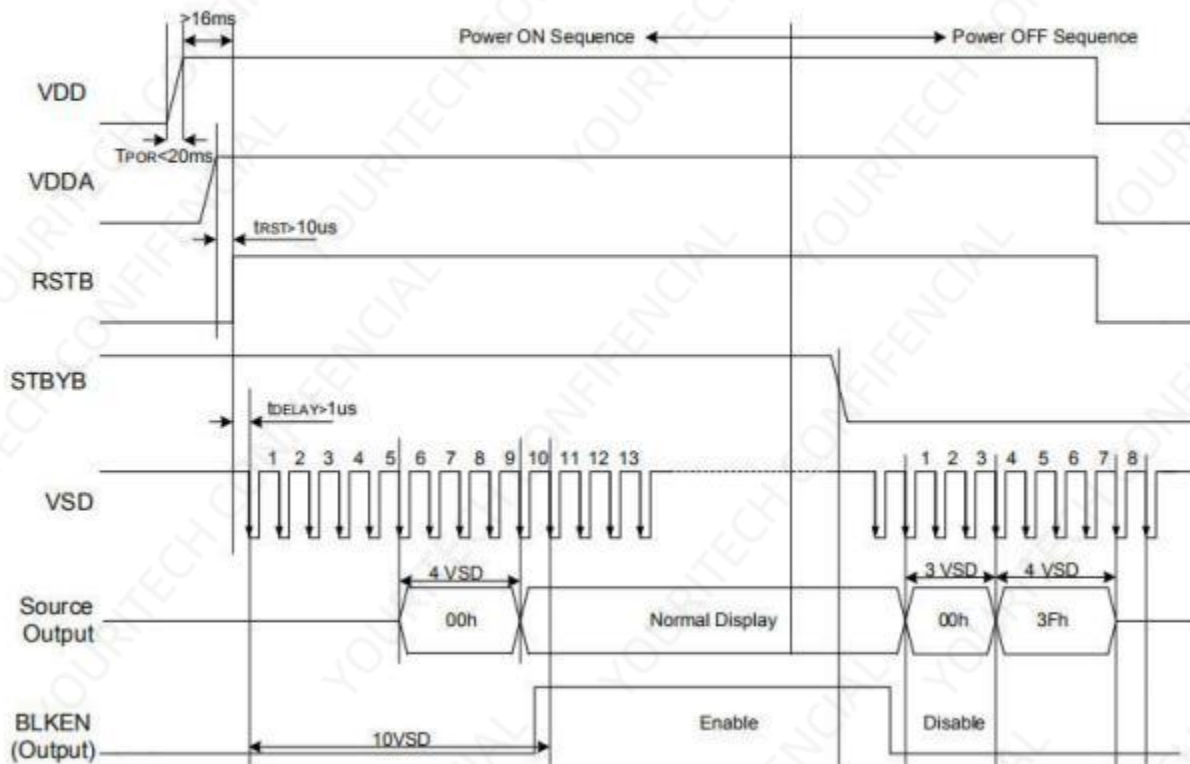
9.3. Power ON/Off Sequence

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

Power ON: VDD, DGND → VDDA, AGND → V1 to V14

Power OFF: V1 to V14 → VDDA, AGND → VDD, DGND

In order to prevent IL16122 from power ON reset fail, the rising time (t_{POR}) of the digital power supply VDD should be maintained within given specifications. The power ON/OFF timing sequence is illustrated as below:



Note: For prevent anormal operation, t_{RST} must be longer than 10us during Power ON sequence.

10. Quality Assurance

10.1.Purpose

This standard for Quality Assurance assures the quality of LCD module products supplied to customer.

10.2.Standard for Quality Test

10.2.1. Sampling Plan:

GB2828. 1-2012

Single sampling, general inspection level II

10.2.2. Sampling Criteria:

Visual inspection: AQL 1.5

Electrical functional: AQL 0.65.

10.2.3. Reliability Test:

Detailed requirement refer to Reliability Test Specification.

10.3.Nonconforming Analysis & Disposition

10.3.1. Nonconforming analysis:

10.3.1.1. Customer should provide overall information of non-conforming sample for their complaints.

10.3.1.2. After receipt of detailed information from customer, the analysis of nonconforming parts usually should be finished in one week.

10.3.1.3. If cannot finish the analysis on time, customer will be notified with the progress status.

10.3.2. Disposition of nonconforming:

10.3.2.1. Non-conforming product over PPM level will be replaced.

10.3.2.2. The cause of non-conformance will be analyzed. Corrective action will be discussed and implemented.

10.4.Agreement Items

Shall negotiate with customer if the following situation occurs:

10.4.1. There is any discrepancy in standard of quality assurance.

10.4.2. Additional requirement to be added in product specification.

10.4.3. Any other special problem.

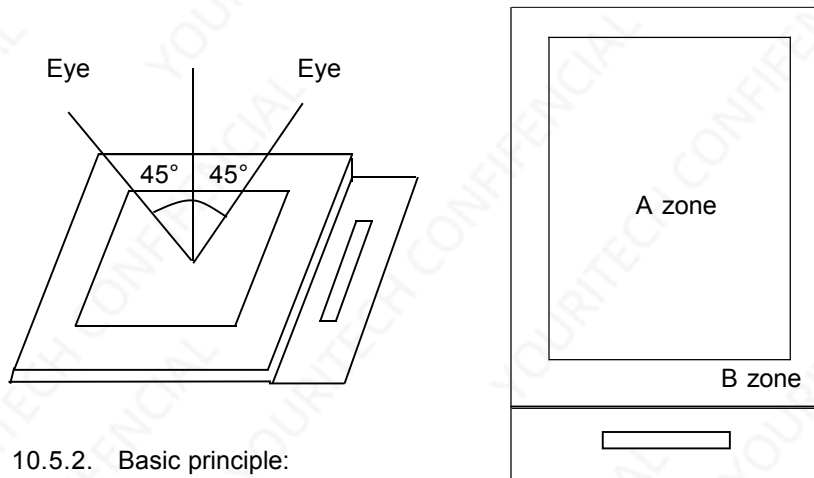
10.5. Standard of the Product Visual Inspection

10.5.1. Appearance inspection:

10.5.1.1. The inspection must be under illumination about 1000 – 1500 lx, and the distance of view must be at 30cm ± 2cm.

10.5.1.2. The viewing angle should be 45° from the vertical line without reflection light or follows customer's viewing angle specifications.

10.5.1.3. Definition of area: A Zone: Active Area, B Zone: Viewing Area,

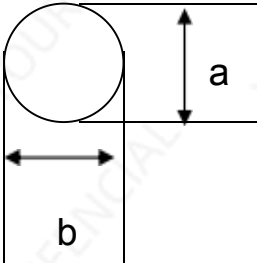


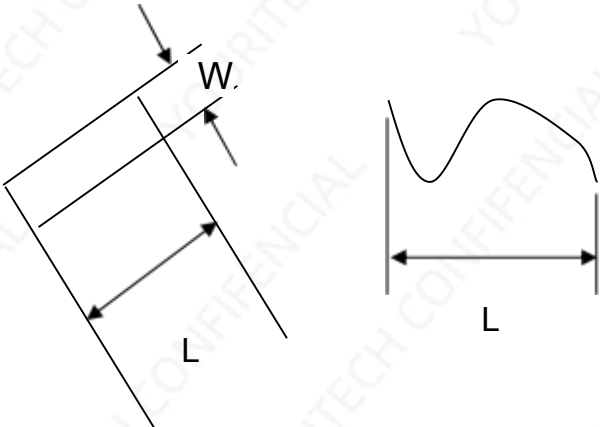
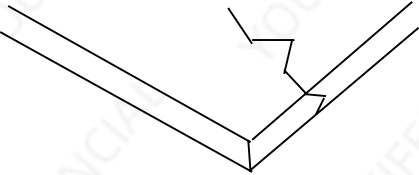
10.5.2. Basic principle:

10.5.2.1. A set of sample to indicate the limit of acceptable quality level must be discussed by both us and customer when there is any dispute happened.

10.5.2.2. New item must be added on time when it is necessary.

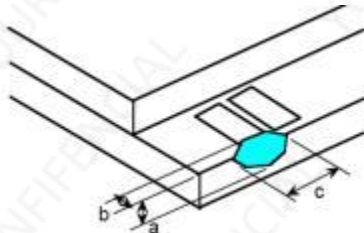
10.6. Inspection Specification

No.	Item	Criteria (Unit: mm)											
01	Black / White spot Foreign material (Round type) Pinholes Stain Particles inside cell. (Minor defect)	 $\phi = (a + b) / 2$ Distance between 2 defects should more than 5mm apart.	<table><tr><th>Size \ Area</th><th>Acc. Qty</th></tr><tr><td>$\phi \leq 0.20$</td><td>Ignore</td></tr><tr><td>$0.20 < \phi \leq 0.50$</td><td>$N \leq 3$</td></tr><tr><td>$0.50 < \phi$</td><td>0</td></tr></table>			Size \ Area	Acc. Qty	$\phi \leq 0.20$	Ignore	$0.20 < \phi \leq 0.50$	$N \leq 3$	$0.50 < \phi$	0
			Size \ Area	Acc. Qty									
$\phi \leq 0.20$	Ignore												
$0.20 < \phi \leq 0.50$	$N \leq 3$												
$0.50 < \phi$	0												
02	Electrical Defect (Minor defect)												
		Bright dot	Display Area	Total	Note1								
			$N \leq 2$	$N \leq 2$									
		Dark dot	$N \leq 4$	$N \leq 4$									
		Total dot	$N \leq 4$	$N \leq 4$									
		Mura	Not visible through 5% ND filters.		Note 2								
		Remark: 1. Bright dot caused by scratch and foreign object accords to item 1.											

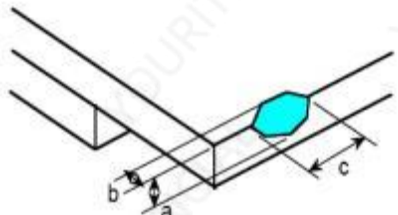
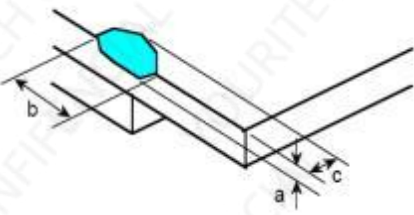
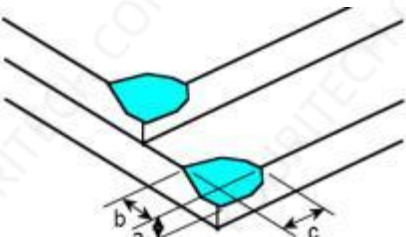
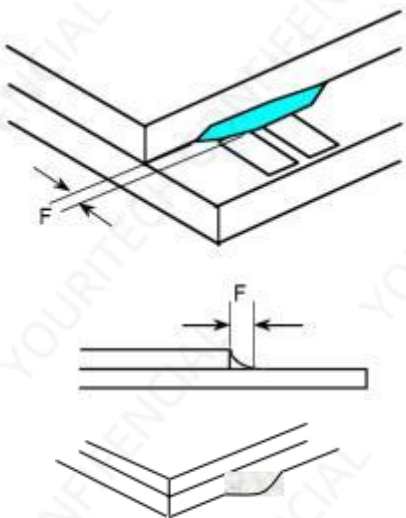
03	Black and White line Scratch Foreign material (Line type) (Minor defect)	 <table border="1"> <thead> <tr> <th>Length</th><th>Width</th><th>Acc. Qty</th></tr> </thead> <tbody> <tr> <td>/</td><td>$W \leq 0.1$</td><td>Ignore</td></tr> <tr> <td>$L \leq 2.5$</td><td>$0.1 < W \leq 0.2$</td><td>3</td></tr> <tr> <td>$L > 2.5$</td><td>$0.2 < W$</td><td>0</td></tr> <tr> <td colspan="2">Total</td><td>3</td></tr> </tbody> </table> Distance between 2 defects should more than 3 mm apart. Scratches not viewable through the back of the display are acceptable.	Length	Width	Acc. Qty	/	$W \leq 0.1$	Ignore	$L \leq 2.5$	$0.1 < W \leq 0.2$	3	$L > 2.5$	$0.2 < W$	0	Total		3
Length	Width	Acc. Qty															
/	$W \leq 0.1$	Ignore															
$L \leq 2.5$	$0.1 < W \leq 0.2$	3															
$L > 2.5$	$0.2 < W$	0															
Total		3															
04	Glass Crack (Minor defect)	 Crack is potential to enlarge, any type is not allowed.															

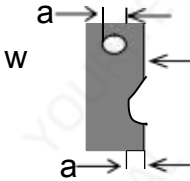
05

Glass Chipping Pad Area:
(Minor defect)

A 3D perspective diagram showing a glass chip on a rectangular pad area. The chip is a small, irregular, light blue object. The pad area is a rectangular block. Dimension 'a' is the thickness of the pad. Dimension 'b' is the width of the pad. Dimension 'c' is the length of the pad. The chip is located on the top surface of the pad, near the corner where the pad meets the glass.

Length and Width	Acc. Qty
$c > 3.0, b < 1.0$	1
$c < 3.0, b < 1.0$	3
$a < \text{Glass Thickness}$	

06	Glass Chipping Rear of Pad Area: (Minor defect) 	<table><tr><th>Length and Width</th><th>Acc. Qty</th></tr><tr><td>$c > 3.0, b < 1.0$</td><td>1</td></tr><tr><td>$c < 3.0, b < 1.0$</td><td>2</td></tr><tr><td>$c < 3.0, b < 0.5$</td><td>4</td></tr><tr><td colspan="2">$a < \text{Glass Thickness}$</td></tr></table>	Length and Width	Acc. Qty	$c > 3.0, b < 1.0$	1	$c < 3.0, b < 1.0$	2	$c < 3.0, b < 0.5$	4	$a < \text{Glass Thickness}$	
Length and Width	Acc. Qty											
$c > 3.0, b < 1.0$	1											
$c < 3.0, b < 1.0$	2											
$c < 3.0, b < 0.5$	4											
$a < \text{Glass Thickness}$												
07	Glass Chipping Except Pad Area: (Minor defect) 	<table><tr><th>Length and Width</th><th>Acc. Qty</th></tr><tr><td>$c > 3.0, b < 1.0$</td><td>1</td></tr><tr><td>$c < 3.0, b < 1.0$</td><td>2</td></tr><tr><td>$c < 3.0, b < 0.5$</td><td>4</td></tr><tr><td colspan="2">$a < \text{Glass Thickness}$</td></tr></table>	Length and Width	Acc. Qty	$c > 3.0, b < 1.0$	1	$c < 3.0, b < 1.0$	2	$c < 3.0, b < 0.5$	4	$a < \text{Glass Thickness}$	
Length and Width	Acc. Qty											
$c > 3.0, b < 1.0$	1											
$c < 3.0, b < 1.0$	2											
$c < 3.0, b < 0.5$	4											
$a < \text{Glass Thickness}$												
08	Glass Corner Chipping: (Minor defect) 	<table><tr><th>Length and Width</th><th>Acc. Qty</th></tr><tr><td>$c < 3.0, b < 3.0$</td><td>Ignore</td></tr><tr><td colspan="2">$a < \text{Glass Thickness}$</td></tr></table>	Length and Width	Acc. Qty	$c < 3.0, b < 3.0$	Ignore	$a < \text{Glass Thickness}$					
Length and Width	Acc. Qty											
$c < 3.0, b < 3.0$	Ignore											
$a < \text{Glass Thickness}$												
09	Glass Burr: (Minor defect) 	<table><tr><th>Length</th><th>Acc. Qty</th></tr><tr><td>$F < 1.0$</td><td>Ignore</td></tr></table> Glass burr don't affect assemble and module dimension.	Length	Acc. Qty	$F < 1.0$	Ignore						
Length	Acc. Qty											
$F < 1.0$	Ignore											

10	FPC Defect: (Minor defect) 	10.1 Dent, pinhole width $a < w/3$. (w: circuitry width.) 10.2 Open circuit is unacceptable. 10.3 No oxidation, contamination and distortion.								
11	Bubble on Polarizer (Minor defect)	<table><tr><th>Diameter</th><th>Acc. Qty</th></tr><tr><td>$\varphi \leq 0.30$</td><td>Ignore</td></tr><tr><td>$0.30 < \varphi \leq 0.50$</td><td>$N \leq 2$</td></tr><tr><td>$0.50 < \varphi$</td><td>$N = 0$</td></tr></table>	Diameter	Acc. Qty	$\varphi \leq 0.30$	Ignore	$0.30 < \varphi \leq 0.50$	$N \leq 2$	$0.50 < \varphi$	$N = 0$
Diameter	Acc. Qty									
$\varphi \leq 0.30$	Ignore									
$0.30 < \varphi \leq 0.50$	$N \leq 2$									
$0.50 < \varphi$	$N = 0$									
12	Dent on Polarizer (Minor defect)	<table><tr><th>Diameter</th><th>Acc. Qty</th></tr><tr><td>$\varphi \leq 0.25$</td><td>Ignore</td></tr><tr><td>$0.25 < \varphi \leq 0.50$</td><td>$N \leq 4$</td></tr><tr><td>$0.50 < \varphi$</td><td>None</td></tr></table>	Diameter	Acc. Qty	$\varphi \leq 0.25$	Ignore	$0.25 < \varphi \leq 0.50$	$N \leq 4$	$0.50 < \varphi$	None
Diameter	Acc. Qty									
$\varphi \leq 0.25$	Ignore									
$0.25 < \varphi \leq 0.50$	$N \leq 4$									
$0.50 < \varphi$	None									
13	Bezel	13.1 No rust, distortion on the Bezel. 13.2 No visible fingerprints, stains or other contamination.								
14	Touch Panel	D: Diameter W: width L: length 14.1 Spot: $D < 0.25$ is acceptable $0.25 \leq D \leq 0.4$ 2 dots are acceptable and the distance between defects should more than 10 mm. $D > 0.4$ is unacceptable 14.2 Dent: $D > 0.40$ is unacceptable 14.3 Scratch: $W \leq 0.03$, $L \leq 10$ is acceptable, $0.03 < W \leq 0.10$, $L \leq 10$ is acceptable Distance between 2 defects should more than 10 mm. $W > 0.10$ is unacceptable.								
15	PCB	15.1 No distortion or contamination on PCB terminals. 15.2 All components on PCB must same as documented on the BOM/ component layout. 15.3 Follow IPC-A-600F.								
16	Soldering	Follow IPC-A-610C standard								
17	Electrical Defect (Major defect)	The below defects must be rejected. 17.1 Missing vertical / horizontal segment,								

		17.2 Abnormal Display. 17.3 No function or no display. 17.4 Current exceeds product specifications. 17.5 LCD viewing angle defect. 17.6 No Backlight. 17.7 Dark Backlight. 17.8 Touch Panel no function.
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Remark: LCD Panel Broken shall be rejected. Defect out of LCD viewing area is acceptable.

10.7. Classification of Defects

- 10.7.1. Visual defects (Except no / wrong label) are treated as minor defect and electrical defect is major.
- 10.7.2. Two minor defects are equal to one major in lot sampling inspection.

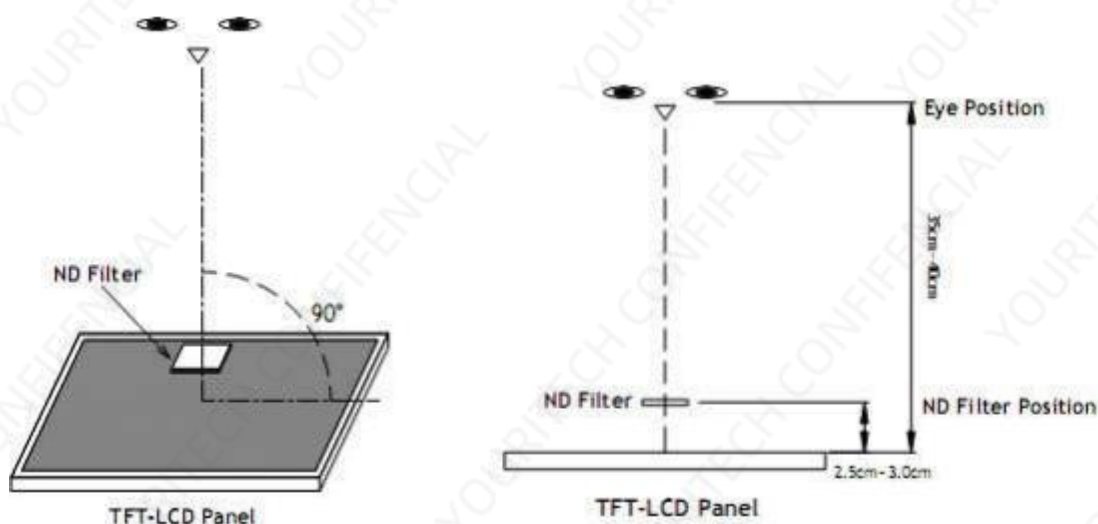
10.8. Identification/marketing criteria

Any unit with illegible / wrong / double or no marking/ label shall be rejected.

10.9. Packing

- 10.9.1. There should be no damage of the outside carton box, each packaging box should have one identical label.
- 10.9.2. Modules inside package box should have compliant mark.
- 10.9.3. All direct package materials shall offer ESD protection.

Note1: Bright dot is defined as the defective area of the dot is larger than 50% of one sub-pixel area.



Bright dot: The bright dot size defect at black display pattern. It can be recognized by 2% transparency of filter when the distance between eyes and panel is $350\text{mm} \pm 50\text{mm}$.

Dark dot: Cyan, Magenta or Yellow dot size defect at white display pattern. It can be recognized by 5% transparency of filter when the distance between eyes and panel is $350\text{mm} \pm 50\text{mm}$.

Note2: Mura on display which appears darker / brighter against background brightness on parts of display area.

11. Reliability Specification

No	Item	Condition	Quantity	Criteria
1	High Temperature Operating	70C, 96 Hrs	2	GB/T2423.2-2008
2	Low Temperature Operating	-20C, 96Hrs	2	GB/T2423.1-2008
3	High Humidity	50C, 90%RH, 96Hrs	2	GB/T2423.3-2016
4	High Temperature Storage	80C, 96 Hrs	2	GB/T2423.2-2008
5	Low Temperature Storage	-30C, 96Hrs	2	GB/T2423.1-2008
6	Thermal Cycling Test	-20C, 60min~70C, 60min, 20 cycles.	2	GB/T2423.22-2012
7	Packing vibration	Frequency range: 10 Hz~50 Hz Acceleration of gravity: 5 G X, Y, Z 30 min for each direction.	2	GB/T5170.14-2009
8	Electrical Static Discharge	Air: $\pm 8KV$ 150pF/330 Ω 5 times Contact: $\pm 4KV$ 150pF/330 Ω 5 times	2	GB/T17626.2-2018
9	Drop Test (Packaged)	Height: 80 cm, 1 corner, 3 edges, 6 surfaces.	2	GB/T2423.8-1995

Note1. No defection cosmetic and operational function allowable.

Note2. Total current Consumption should be below double of initial value

12. Precautions and Warranty

12.1.Safety

- 12.1.1. The liquid crystal in the LCD is poisonous. Do not put it in your mouth. If the liquid crystal touches your skin or clothes, wash it off immediately using soap and water.
- 12.1.2. Since the liquid crystal cells are made of glass, do not apply strong impact on them. Handle with care.

12.2.Handling

- 12.2.1. Reverse and use within ratings in order to keep performance and prevent damage.
- 12.2.2. Do not wipe the polarizer with dry cloth, as it might cause scratch. If the surface of the LCD needs to be cleaned, wipe it swiftly with cotton or other soft cloth soaked with petroleum IPA, do not use other chemicals.

12.3.Storage

- 12.3.1. Do not store the LCD module beyond the specified temperature ranges.
- 12.3.2. Strong light exposure causes degradation of polarizer and color filter.

12.4.Metal Pin (Apply to Products with Metal Pins)

12.4.1. Pins of LCD and Backlight

- 12.4.1.1. Solder tip can touch and press on the tip of Pin LEAD during the soldering

12.4.1.2. Recommended Soldering Conditions

Solder Type: Sn96.3~94-Ag3.3~4.3-Cu0.4~1.1

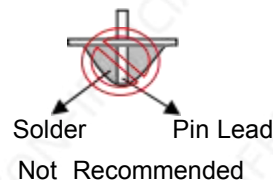
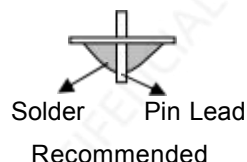
Maximum Solder Temperature: 370℃

Maximum Solder Time: 3s at the maximum temperature

Recommended Soldering Temp: 350±20℃

Typical Soldering Time: ≤3s

12.4.1.3. Solder Wetting



12.4.2. Pins of EL

- 12.4.2.1. Solder tip can touch and press on the tip of EL leads during soldering.

- 12.4.2.2. No Solder Paste on the soldering pad on the motherboard is recommended.

12.4.2.3. Recommended Soldering Conditions

Solder type: Nippon Alimit Leadfree SR-34, size 0.5mm

Recommended Solder Temperature: 270~290℃

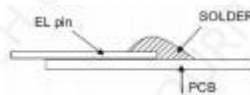
Typical Soldering Time: ≤2s

Minimum solder distance from EL lamp (body):2.0mm

- 12.4.2.4. No horizontal press on the EL leads during soldering.

- 12.4.2.5. 180° bend EL leads three times is not allowed.

12.4.2.6. Solder Wetting

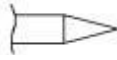


Recommended



Not Recommended

12.4.2.7. The type of the solder iron:



Recommended



Not Recommended

12.4.2.8. Solder Pad



12.5. Operation

- 12.5.1. Do not drive LCD with DC voltage
- 12.5.2. Response time will increase below lower temperature
- 12.5.3. Display may change color with different temperature
- 12.5.4. Mechanical disturbance during operation, such as pressing on the display area, may cause the segments to appear "fractured".
- 12.5.5. Do not connect or disconnect the LCM to or from the system when power is on.
- 12.5.6. Never use the LCM under abnormal condition of high temperature and high humidity.
- 12.5.7. Module has high frequency circuits. Sufficient suppression to the electromagnetic interface shall be done by system manufacturers. Grounding and shielding methods may be important to minimize the interference.
- 12.5.8. Do not display the fixed pattern for long time (we suggest the time not longer than half of one hour) because it may develop image sticking due to the TFT structure.

12.6. Static Electricity

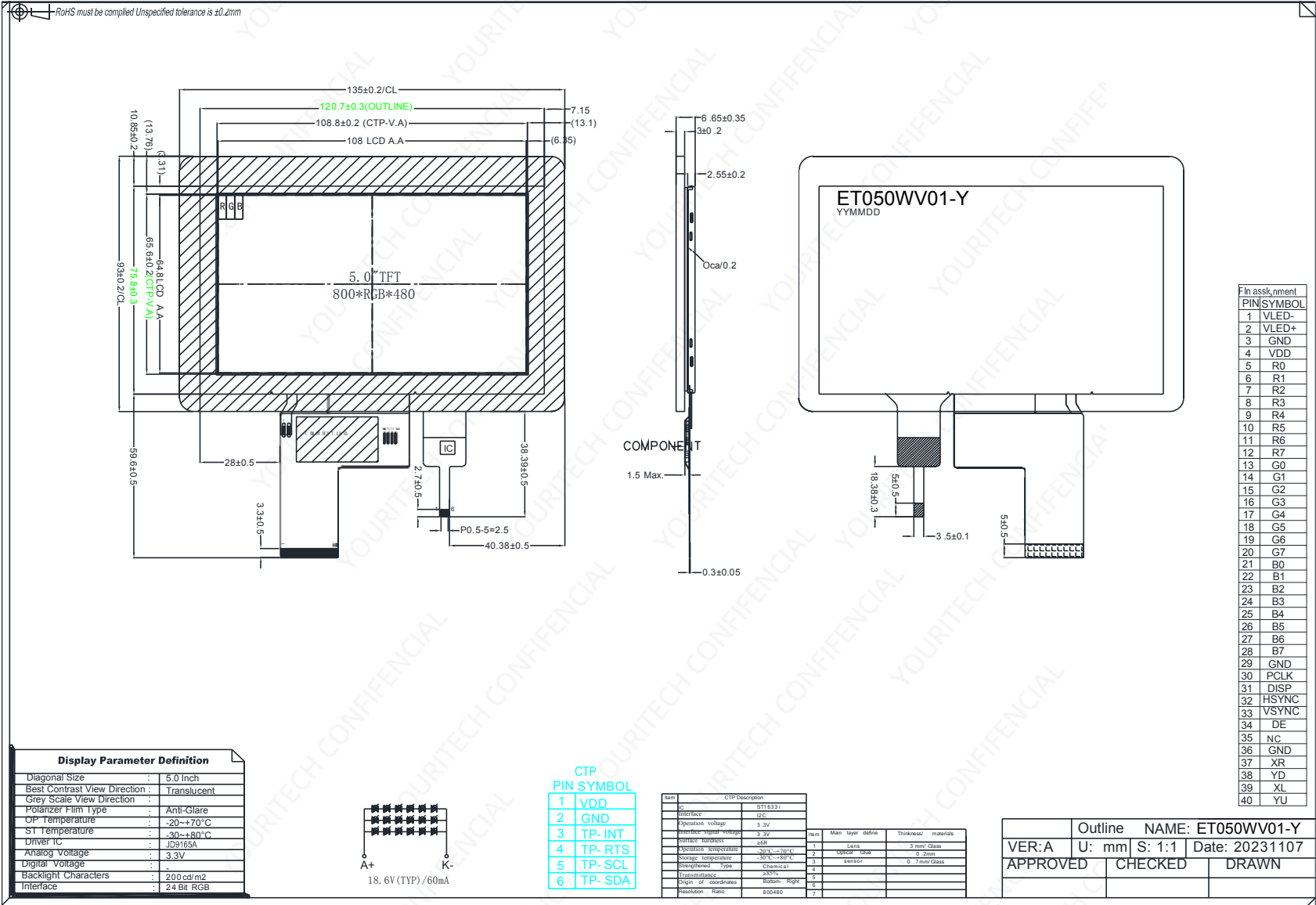
- 12.6.1. CMOS LSIs are equipped in this unit, so care must be taken to avoid the electro-static charge, by ground human body, etc.
- 12.6.2. The normal static prevention measures should be observed for work clothes and benches.
- 12.6.3. The module should be kept into anti-static bags or other containers resistant to static for storage.

12.7. Limited Warranty

- 12.7.1. Our warranty liability is limited to repair and/or replacement. We will not be responsible for any consequential loss.
- 12.7.2. If possible, we suggest customer to use up all modules in six months. If the module storage time over twelve months, we suggest that recheck it before the module be used.
- 12.7.3. After the product shipped, any product quality issues must be feedback within three months, otherwise, we will not be responsible for the subsequent or consequential events.

13. Packaging

TBD



14. Outline Drawing