XINNOA(HK) Display Technology Co.,Limited

PRODUCT SPECIFICATION

5.0” IPS TFT MODULE

Part Number:XNY5.0-800480W-F001

Version : 1.0

< ◇> Preliminary Specification

< ◆> Finally Specification

CUSTOMER’S APPROVAL	
CUSTOMER :	
SIGNATURE:	DATE:

APPROVED BY	PM REVIEWED	PD REVIEWED	PREPARED BY

Revision	Date	Originator	Detail	Remarks
Ver 1.0	20250813		Initial Release	

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1. General Description

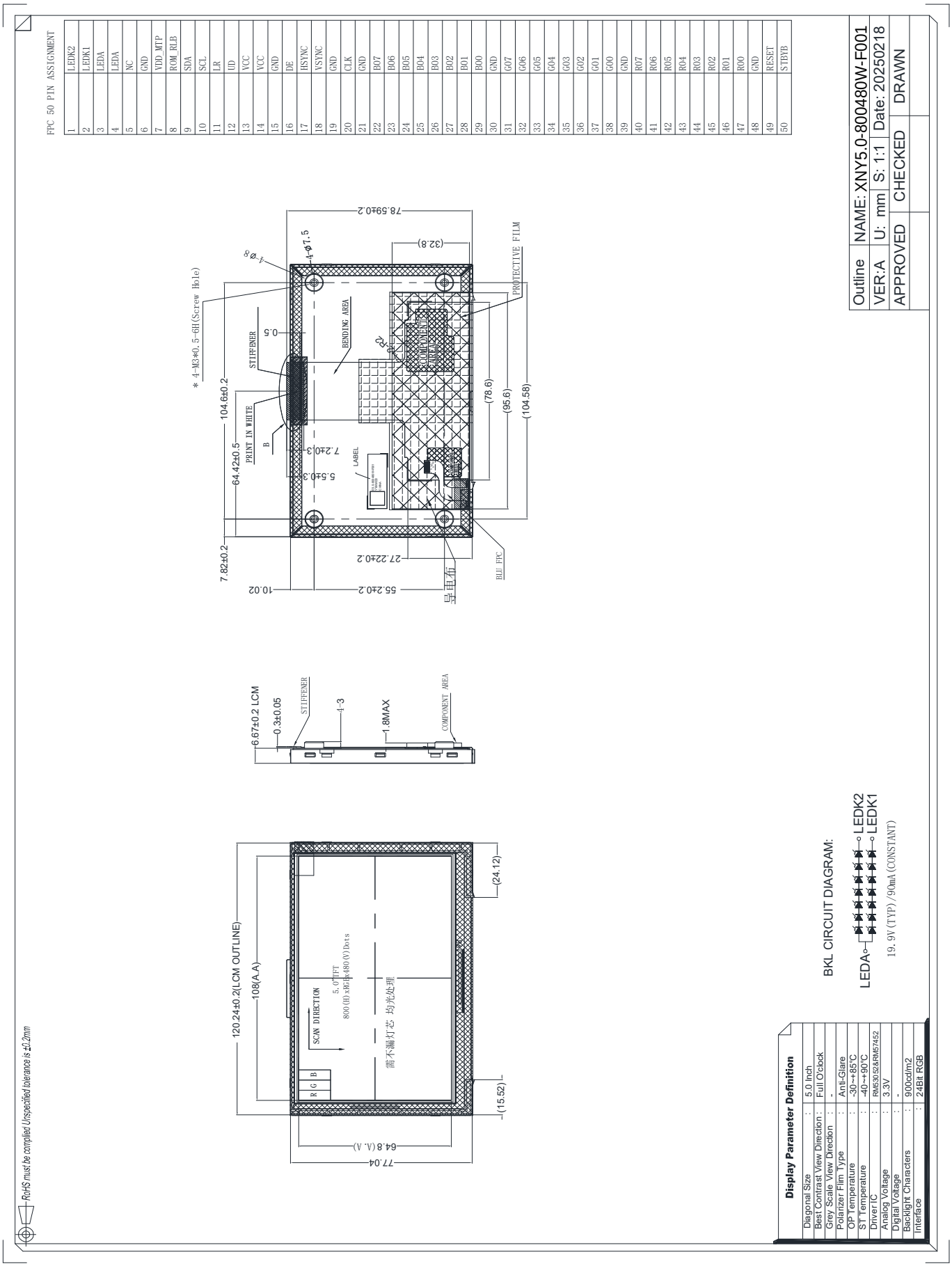
The specification is a transmissive type color active matrix liquid crystal display (LCD) which uses amorphous thin film transistor (TFT) as switching devices. This product is composed of a TFT-LCD panel, driver ICs , and a backlight unit.

2. Module Parameter

Features	Details	Unit
Display Size(Diagonal)	5.0”	
LCD type	IPS TFT	
Display Mode	Normally White/Transmissive	
Resolution	800 RGB x 480	Pixels
View Direction	Full O’clock	Best Image
Gray Scale Inversion Direction	-	
Module Outline	120.24 (H) x 77.04(V) x 6.67(T) (Note1)	mm
Active Area	108(H) x 64.8(V)	mm
Pixel Size	135 (H) x 135(V)	um
Pixel Arrangement	RGB Vertical Stripe	
Polarizer Surface Treatment	Anti-Glare	
Display Colors	16.7M	
Interface	24-bit RGB interface	
Driver IC	RM53052&RM57452	-
With or Without Touch Panel	Without	
Operating Temperature	**-30~85**	ºC
Storage Temperature	**-40~90**	ºC
Weight	-	g

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

2.1. Outline Drawing



3. Absolute Maximum Ratings

The followings are maximum values which, if exceed, may cause faulty operation or damage to the unit. The operational and non-operational maximum voltage and current values are listed in Table.

V_{SS}=0V, Ta=25ºC

Item	Symbol	Min.	Max.	Unit
Digital Supply Voltage	DVDD	-0.3	4.6	V
Storage temperature	T_{STG}	-40	90	ºC
Operating temperature	T_{OP}	-30	85	ºC

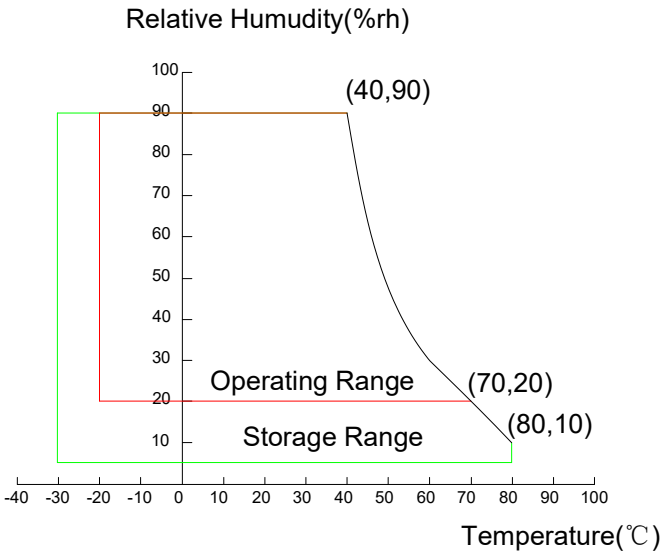
Note 1: If Ta below 50ºC, the maximal humidity is 90%RH, if Ta over 50ºC, absolute humidity should be less than 60%RH.

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

Note 3: These range above is maximum value not the actual operating temperature . Actual Operating temperature is no more than 40℃ and temperature refers to the LCM surface temperature ;

Note 4: GWD is not responsible for product problems beyond the use conditions.

Note 5: Temperature and relative humidity range are shown in the figure below.Wet bulb temperature should be 39 ℃ max. and no condensation of water.



4. DC Characteristics

Item		Symbol	Min.	Typ.	Max.	Unit
		VDD	3.0	3.3	3.6	V
Logic Low input voltage		V_{IL}	0	-	0.3*VDD	V
Logic High input voltage		V_{IH}	0.7*VDD	-	VDD	V
Logic Low output voltage		V_{OL}	GND	-	0.4*VDD	
Logic High output voltage		V_{OH}	VDD-0.4	-	VDD	
Current Consumption All Black	Logic	I_{CC+} I_{IN}	-	(25)	-	mA
	Analog					

Note 1: All of the voltage listed above are with respective to GND = 0v

Note 2:Device is subject to be damaged permanently if stresses beyond those absolute maximum rating listed above

5. Backlight Characteristic

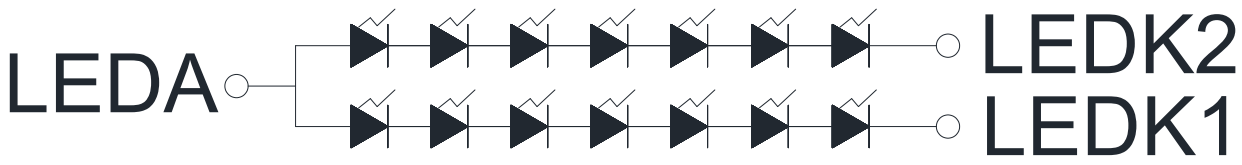
5.1. Backlight Characteristic

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Forward Voltage	V_F	Ta=25 ºC, I_F=45mA/LED	-	19.9	-	V
Forward Current	I_F	Ta=25 ºC, V_F=2.8V/LED	-	90	-	mA
Power dissipation	P_D	-	-	1791	-	mW
Uniformity	Avg	-	-	80	-	%
LED working life(25℃)	-		-	20,000	-	Hrs
Drive method	Constant current					
LED Configuration	2*7 White LEDs in series					

Note1：LED life time defined as follows: The final brightness is at 50% of original brightness.

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

5.2. Backlighting circuit



6. Optical Characteristics

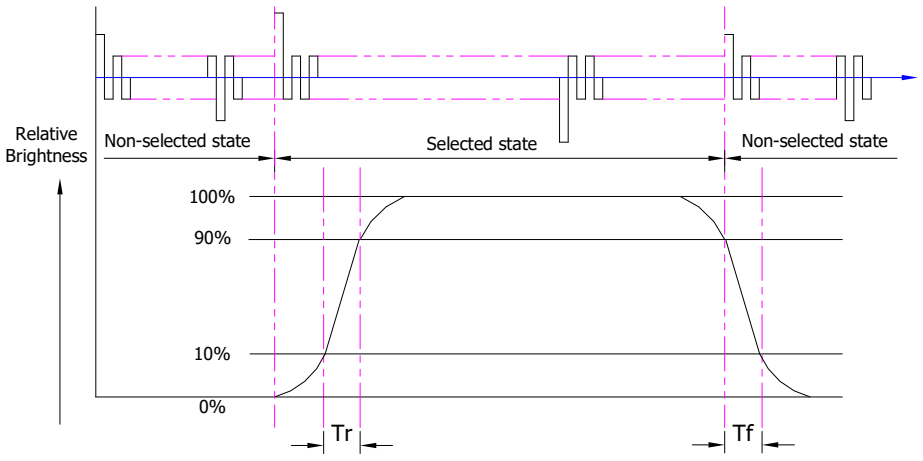
6.1. Optical Characteristics

Ta=25ºC, DVDD=3.3V

	Item		Symbol	Condition	Specification			Unit
					Min.	Typ.	Max.	
Backlight On (Transmissive Mode)	Luminance on TFT(I_f =20mA/LED)		Lv		800	900	-	cd/m²
	Contrast ratio(See 6.3)		CR		1000	1500	-	
	Response time (See 6.2)		TR+TF		-	20	30	ms
	Chromaticity Transmissive (See 6.5)	White	XW		0.222	0.272	0.322	
			YW		0.247	0.297	0.347	
	Viewing Angle (See 6.4)	Horizontal	θX+	Center CR≥10	80	85	-	Deg.
			θX-		80	85	-	
		Vertical	φY+		80	85	-	
			φY-		80	85	-	
	NTSC ratio（Color gamut）				-	-	-	-

6.2. Definition of Response Time

6.2.1. Normally Black Type (Negative)

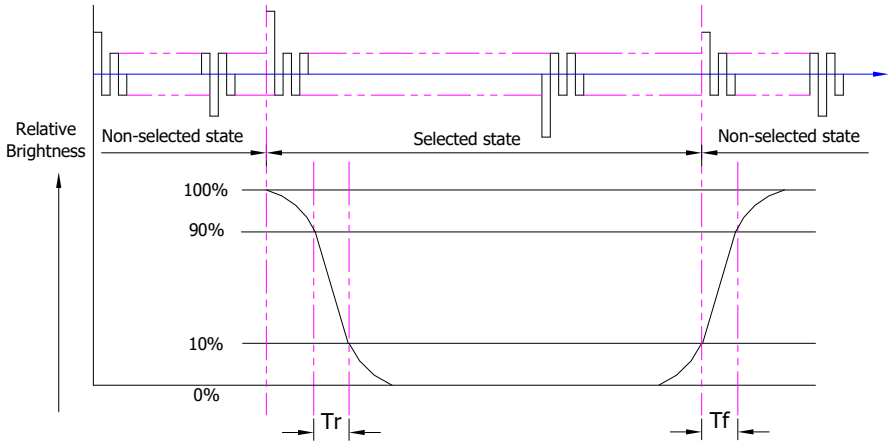


Tr is the time it takes to change form non-selected stage with relative luminance 10% to selected state with relative luminance 90%;

Tf 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)



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

Tf 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

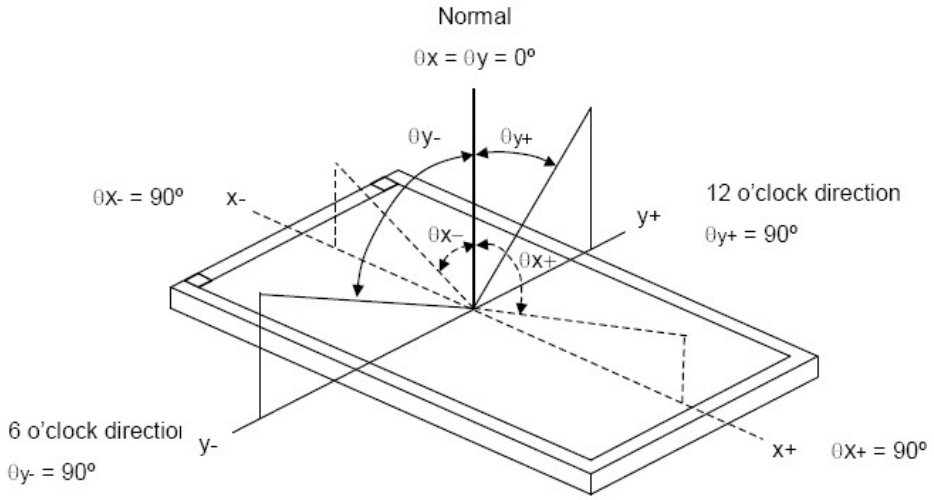
6.3. Definition of Contrast Ratio

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



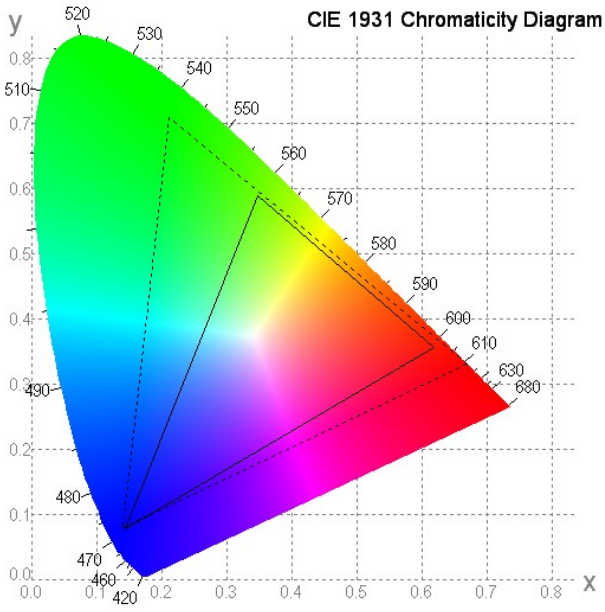
Measuring machine: LCD-5100 or EQUI

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

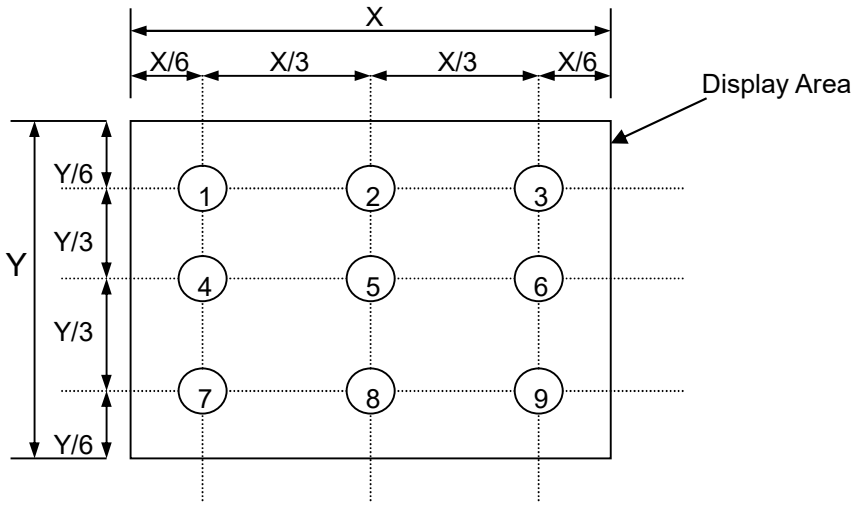
Using the transmissive mode measurement approach, measure the white screen luminance of the display panel and backlight.

6.6.1. Surface Luminance: L_V = average (L_{P1}:L_{P9})

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

6.6.3. Transmittance = L_V on LCD / L_V on Backlight * 100%

Note: Measuring machine: BM-7



7. Interface Pins Definition

No.	Symbol	Function
1	LEDK2	Backlight Cathode
2	LEDK1	Backlight Cathode
3	LEDA	Backlight Anode
4	LEDA	Backlight Anode
5	NC	No Connection
6	GND	Ground
7	VDD_MTP	Power Supply for the MTP
8	ROM_RLB	-
9	SDA	Serial input for SPI interface Serial address and data input/output for I2C interface
10	SCL	Clock signal for SPI interface Clock signal for SPI interface
11	LR	Left / right selection.
12	UD	Up / Down selection.
13	VCC	Power Supply
14	VCC	Power Supply
15	GND	Ground
16	DE	Data Input Enable.
17	HSYNC	Horizontal Sync Input.
18	VSYNC	Vertical Sync Input.
19	GND	Ground
20	CLK	Sample clock.
21	GND	Ground
22	B07	Blue data signal
23	B06	Blue data signal
24	B05	Blue data signal
25	B04	Blue data signal
26	B03	Blue data signal
27	B02	Blue data signal
28	B01	Blue data signal
29	B00	Blue data signal
30	GND	Ground
31	G07	Green data signal
32	G06	Green data signal
33	G05	Green data signal
34	G04	Green data signal
35	G03	Green data signal
36	G02	Green data signal
37	G01	Green data signal

38	G00	Green data signal
39	GND	Ground
40	R07	Red data signal
41	R06	Red data signal
42	R05	Red data signal
43	R04	Red data signal
44	R03	Red data signal
45	R02	Red data signal
46	R01	Red data signal
47	R00	Red data signal
48	GND	Ground
49	RESET	Global reset pin.
50	STBYB	Standby mode, Normally pulled high. STBYB=”1”, normal operation STBYB=”0”, timing controller, source driver will turn off

8. AC Characteristics

(SD Only, TTL mode VDD = 2.9V to 3.6V, AVDD = 8V to 13.6V, AVSS=GND=0V, TA= -30 to +85°C)

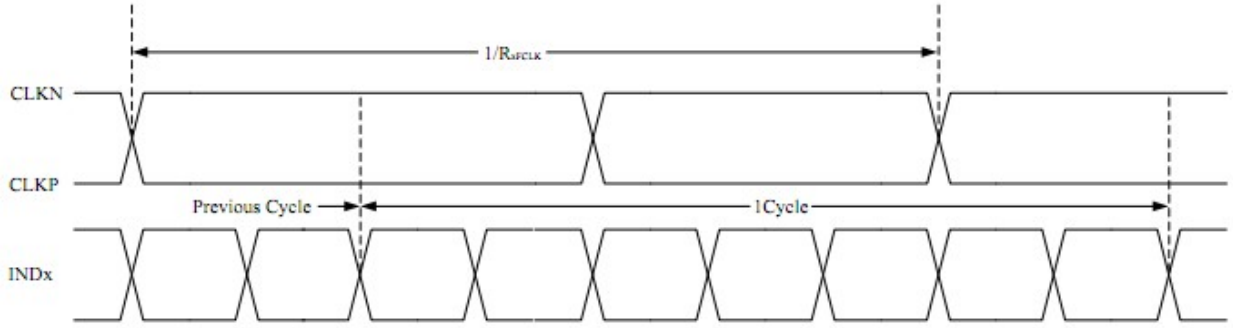
Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
CLK frequency	Fclk	-	50	55	MHz	
CLK pulse width	Tcw	40%	-	60%	Tcph	
Data set-up time	Tsu	8	-	-	ns	D00 ~ D27, REV and DIO1/2 to CLK
Data hold time	Thd	8	-	-	ns	D00 ~ D27, REV and DIO1/2 to CLK
Propagation delay of DIO2/1	Tphl	6	10	15	ns	CL=15pF (Output)
Time that the last data to LD	Tld	5	-	-	Tcph	
Pulse width of LD	Twld	21	-	-	Tcph	
Pulse width of DIO	DPW	-	1	-	Tcph	
Time that LD to DIO1/2	Tlds	5	-	-	Tcph	
POL set-up time	Tpsu	8	-	-	ns	POL to LD
POL hold time	Tphd	8	-	-	ns	POL to LD
Output stable time	Tst	-	-	9	us	10% or 90% target voltage. CL=40pF, R=5Kohm
Repair output delay stable time	Tst1	-	-	20	us	CL=190pF, R=5.5Kohm

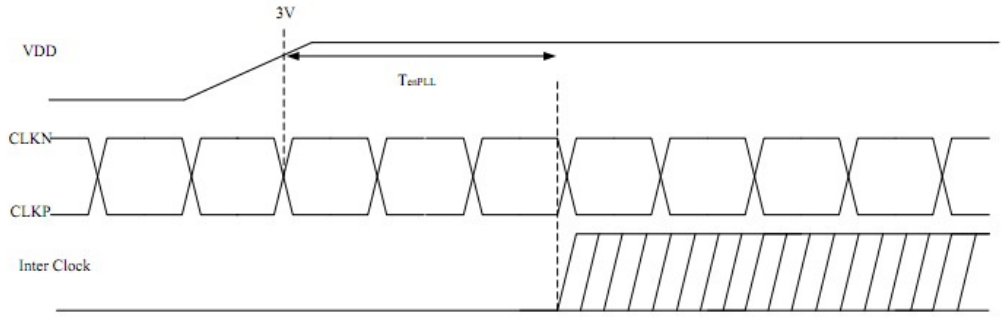
(SD Only, RSDS mode: VDD = 2.9V to 3.6V, AVDD = 8V to 13.6V, AVSS=GND=0V, TA= -30 to +85°C)

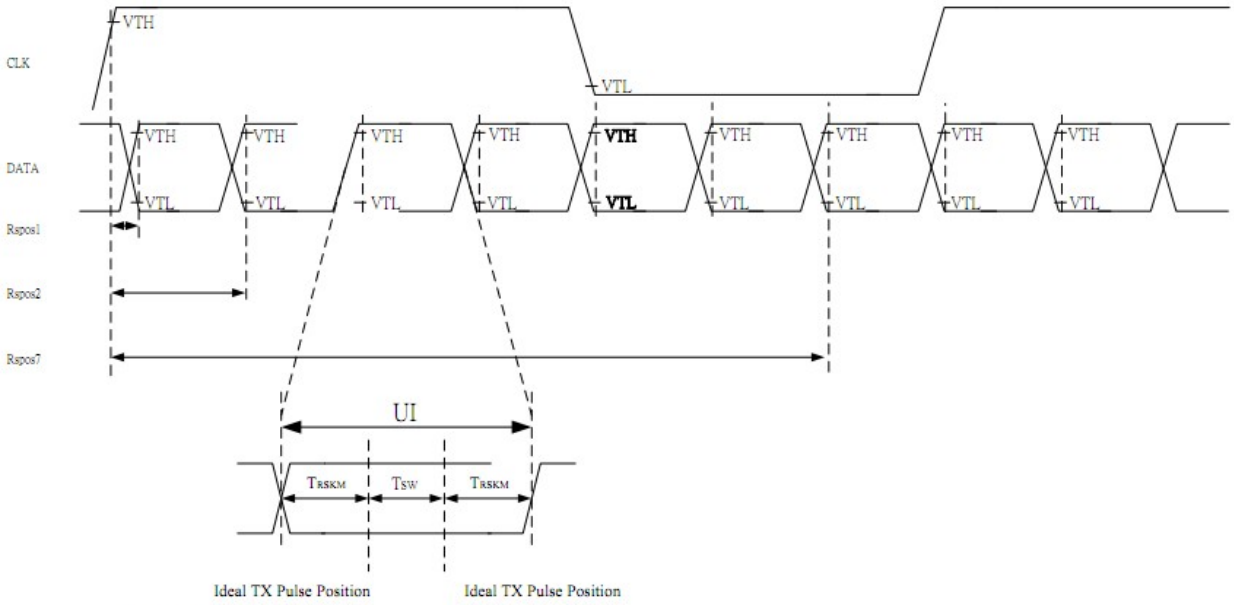
Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
CLK frequency	Fclk	-	65	85	MHz	
CLK pulse width	Tcw	40%	-	60%	Tcph	
Data set-up time	Tsu	2	-	-	ns	D00 ~ D27, REV and DIO1/2 to CLK
Data hold time	Thd	3	-	-	ns	D00 ~ D27, REV and DIO1/2 to CLK
Propagation delay of DIO2/1	Tphl	6	10	15	ns	CL=15pF (Output)
Time that the last data to LD	Tld	7	-	-	Tcph	
Pulse width of LD	Twld	21	-	-	Tcph	
Pulse width of DIO	DPW	-	1	-	Tcph	
Time that LD to DIO1/2	Tlds	5	-	-	Tcph	
POL set-up time	Tpsu	8	-	-	ns	POL to LD
POL hold time	Tphd	8	-	-	ns	POL to LD
Output stable time	Tst	-	-	9	us	10% or 90% target voltage. CL=40pF, R=5Kohm
Repair output delay stable time	Tst1	-	-	20	us	CL=190pF, R=5.5Kohm

(SD+TCON, LVDS mode: VDD = 2.9V to 3.6V, AVDD = 8V to 13.6V, AVSS=GND=0V, TA= -30 to +85°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
Clock frequency	RXFCLK	20	-	75	MHz	Htotal * Vtotal > 330000
Clock frequency	RXFCLK	2	-	30	MHz	500000>Htotal * Vtotal > 34000
1 data bit time	UI		1/7		1/ RXFCLK	
Position 1	Rspos1	-0.21	0	0.21	UI	
Position 2	Rspos2	0.79	1	1.21	UI	
Position 3	Rspos3	1.79	2	2.21	UI	
Position 4	Rspos4	2.79	3	3.21	UI	
Position 5	Rspos5	3.79	4	4.21	UI	
Position 6	Rspos6	4.79	5	5.21	UI	
Position 7	Rspos7	5.79	6	6.21	UI	
Input data skew margin	TRSKM	-	-	0.21	UI	|VID|=400mV RXVCM=1.2V RXFCLK=75MHz
Clock high time	TLVCH	-	4/(7*RXFCLK)	-	ns	
Clock low time	TLVCL	-	3/(7*RXFCLK)	-	ns	
PLL wake-up time	TemPLL	-	-	150	us	





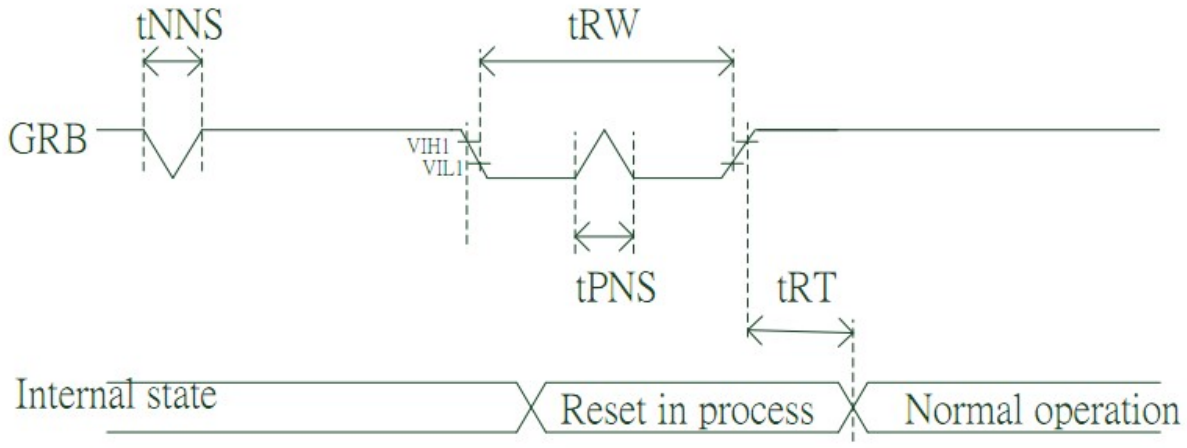


TRSKM: Receiver strobe margin
Tsw : Strobe width (internal data sampling window)

SSC note:

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
Modulation Frequency	SSC_{MF}	23	-	100	KHz	LVDS clock = 20MHz
Modulation Frequency	SSC_{MF}	23		125	KHz	LVDS clock = 40MHz
Modulation Frequency	SSC_{MF}	23		150	KHz	LVDS clock = 60MHz
Modulation Frequency	SSC_{MF}	23		187	KHz	LVDS clock = 75MHz
Modulation Rate	SSC_{MR}	-	-	±3	%	LVDS clock = 75MHz center spread

GRB Timing :



Signal	Parameter	Symbol	Spec.			unit
			min	typ	max	
GRB	GRB pulse width	tRW	40	-	-	us
	GRB complete time	tRT	-	-	40	us
	Positive spike noise width	tPNS	-	-	2	us
	Negative spike noise width	tNNS	-	-	2	us

9. Quality Assurance

9.1. Purpose

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

9.2. Standard for Quality Test

9.2.1. Sampling Plan:

GB2828.1-2012

Single sampling, general inspection level II

9.2.2. Sampling Criteria:

Visual inspection: AQL 1.5%

Electrical functional: AQL 0.65%.

9.2.3. Reliability Test:

Detailed requirement refer to Reliability Test Specification.

9.3. Nonconforming Analysis & Disposition

9.3.1. Nonconforming analysis:

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

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

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

9.3.2. Disposition of nonconforming:

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

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

9.4. Agreement Items

Shall negotiate with customer if the following situation occurs:

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

9.4.2. Additional requirement to be added in product specification.

9.4.3. Any other special problem.

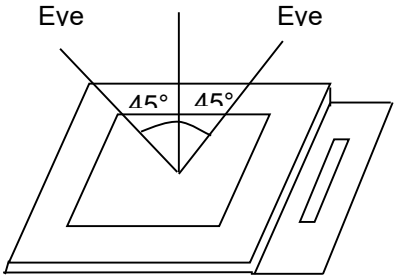
9.5. Standard of the Product Visual Inspection

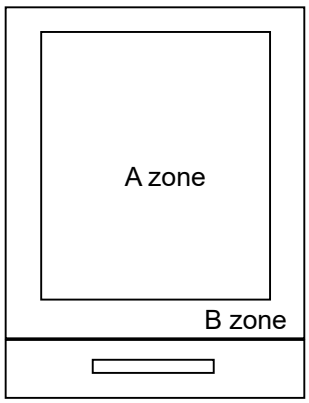
9.5.1. Appearance inspection:

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

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

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





9.5.2. Basic principle:

9.5.2.1. 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.

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

9.6. Inspection Specification

These inspection standards shall be applied to LCD Module supplied by INNOLUX Optoelectronics Corporation. This model is only used in CE product, if it is used in other product applications; it still adopts this copy of specification. If there are any other product applications such as handwriting recognition, Industrial use, Medical use, Aerospace usage and so on, the specifications should be negotiated separately.

01 Definition of dot defect induced from the panel inside

a) Bright dot：Dots appear bright and unchanged in size in which LCD panel is displaying under black pattern.

b) Dark dot：Dots appear dark and unchanged in size in which LCD panel is displaying under pure red, green, blue picture.

c) 2 dot adjacent = 1 pair = 2 dots

Picture:



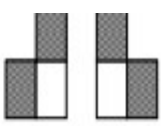
2 dot adjacent



2 dot adjacent



2 dot adjacent (vertical)



2 dot adjacent(slant)

More Detail: Pls comply with follow criterial*(PDF)* file. Name “5.0-IIS” 5.0 IIS.pdf

Remark: LCD Panel Broken shall be rejected. Defect out of LCD viewing area is acceptable.

9.7. Classification of Defects

9.7.1. Visual defects (Except no / wrong label) are treated as minor defect and electrical defect is major.

9.7.2. Two minor defects are equal to one major in lot sampling inspection.

9.8. Identification/marking criteria

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

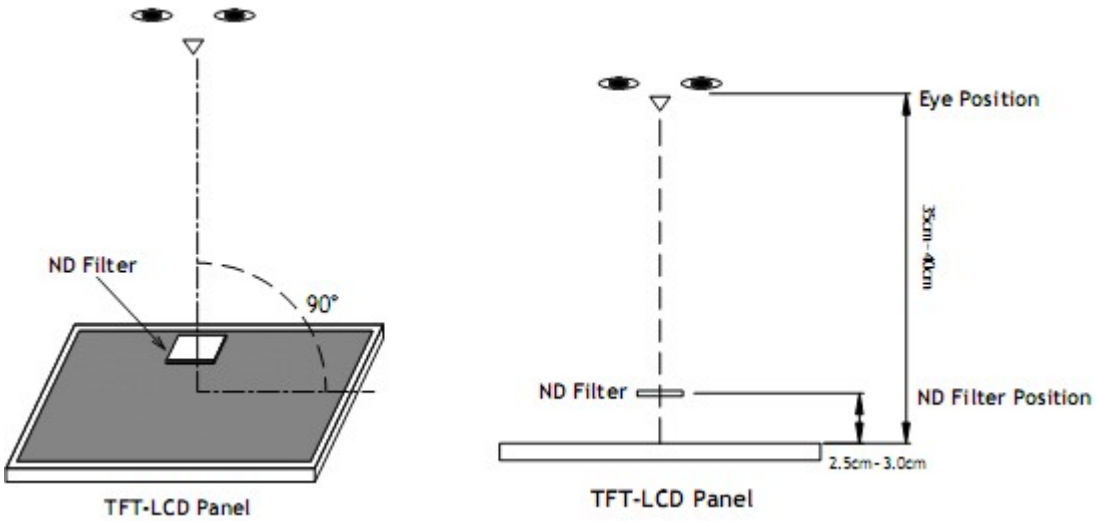
9.9. Packing

9.9.1. There should be no damage of the outside carton box, each packaging box should have one identical label.

9.9.2. Modules inside package box should have compliant mark.

9.9.3. 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 350mm±50mm.

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 350mm±50mm.

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

10. Reliability Specification

No	Item	Condition	Quantity	Criteria
1	High Temperature Operating	85℃, 240Hrs	2	GB/T2423.2 -2008
2	Low Temperature Operating	-30℃, 240Hrs	2	GB/T2423.1 -2008
3	High Humidity	60℃， 90%RH , 240Hrs	2	GB/T2423.3 -2006
4	High Temperature Storage	90℃, 240Hrs	2	GB/T2423.2 -2008
5	Low Temperature Storage	-40℃, 240Hrs	2	GB/T2423.1 -2008
6	Thermal Cycling Test	-30℃, 60min~85℃, 60min, 20 cycles.	2	GB/T2423.22 -2012
7	Packing vibration	Frequency range:10Hz~50Hz Acceleration of gravity:5G X,Y,Z 30 min for each direction.	2	GB/T5170.14 -2009
8	Electrical Static Discharge	Air:±8KV 150pF/330Ω 5 times Contact:±4KV 150pF/330Ω 5 times	2	GB/T17626.2 -2006
9	Drop Test (Packaged)	Height:80 cm,1 corner, 3 edges, 6 surfaces.	2	GB/T2423.8 -1995

Note1. After the reliability test, the product only guarantee function normally without any fatal defect (non-display, line defect, abnormal display). All the cosmetic specification is judged before the reliability test.

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

Note3. One product only can borne one item of reliability test. Can not take same single one product to do different reliability test .

Note4. All adjustment of display are performed after temperature of product back to room temperature and under static situation for 2 hrs.

Note5. Under no condensation of dew

11. Precautions and Warranty

11.1. Safety

11.1.1. 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.

11.1.2. Since the liquid crystal cells are made of glass, do not apply strong impact on them. Handle with care.

11.2. Handling

11.2.1. Reverse and use within ratings in order to keep performance and prevent damage.

11.2.2. 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.

11.3. Storage

11.3.1. Do not store the LCD module beyond the specified temperature ranges.

11.3.2. Strong light exposure causes degradation of polarizer and color filter

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

11.4.1. Pins of LCD and Backlight

13.4.1.1 Solder tip can touch and press on the tip of Pin LEAD during the soldering

13.4.1.2 Recommended Soldering Conditions

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

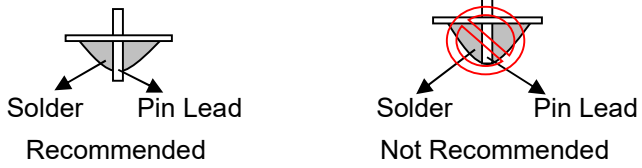
Maximum Solder Temperature: 370℃

Maximum Solder Time: 3s at the maximum temperature

Recommended Soldering Temp: 350±20℃

Typical Soldering Time: ≤3s

13.4.1.3 Solder Wetting



11.4.2. Pins of EL

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

13.4.2.2 No Solder Paste on the soldering pad on the motherboard is recommended.

13.4.2.3 Recommended Soldering Conditions

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

Recommended Solder Temperature: 270～290℃

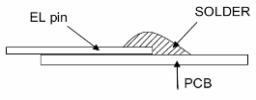
Typical Soldering Time: ≤2s

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

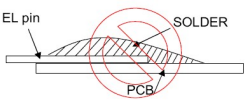
13.4.2.4 No horizontal press on the EL leads during soldering.

13.4.2.5 180° bend EL leads three times is not allowed.

13.4.2.6 Solder Wetting

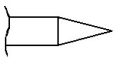


Recommended

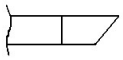


Not Recommended

13.4.2.7 The type of the solder iron:

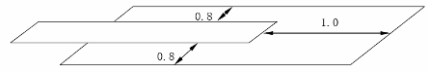


Recommended



Not Recommended

13.4.2.8 Solder Pad



11.5. Operation

11.5.1. Do not drive LCD with DC voltage

11.5.2. Response time will increase below lower temperature

11.5.3. Display may change color with different temperature

11.5.4. Mechanical disturbance during operation, such as pressing on the display area, may cause the segments to appear “fractured”.

11.5.5. Do not connect or disconnect the LCM to or from the system when power is on.

11.5.6. Never use the LCM under abnormal condition of high temperature and high humidity.

11.5.7. 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.

11.5.8. Do not display the fixed pattern for long time（we suggest the duration time not longer than half an hour）because it may develop image sticking due to the TFT structure.

11.6. Static Electricity

11.6.1. CMOS LSIs are equipped in this unit, so care must be taken to avoid the electro-static charge, by ground human body, etc.

11.6.2. The normal static prevention measures should be observed for work clothes and benches.

11.6.3. The module should be kept into anti-static bags or other containers resistant to static for storage.

11.7. Limited Warranty

11.7.1. Our warranty liability is limited to repair and/or replacement. We will not be responsible for any consequential loss.

11.7.2. 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.

11.7.3. 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.

12. Packaging

TBD