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Production Custom designs Installation

Mechanical design



SPECIFICATION FOR LCM Module

MODULE No:	ET185FH21-K
CUSTOMER:	

YOURITECH	INITIAL	DATE
PREPARED BY		
CHECKED BY		
APPROVED BY		

CUSTOMER	INITIAL	DATE
APPROVED BY		

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常备库存 Stock For Sale	长期供货 Long Time supply	支持小量 NO MOQ	品种齐全 In Full Range	

[illegible]

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1.Basic Specifications

* Description

This is a color active matrix TFT (Thin Film Transistor) LCD (liquid crystal display) that uses amorphous silicon TFT as a switching device. This module is composed of a Transmissive type TFT-LCD Panel, driver circuit, back-light unit. The resolution of a 18.5 " TFT-LCD contains 1920x1080 pixels, and can display up to 16.7M colors.

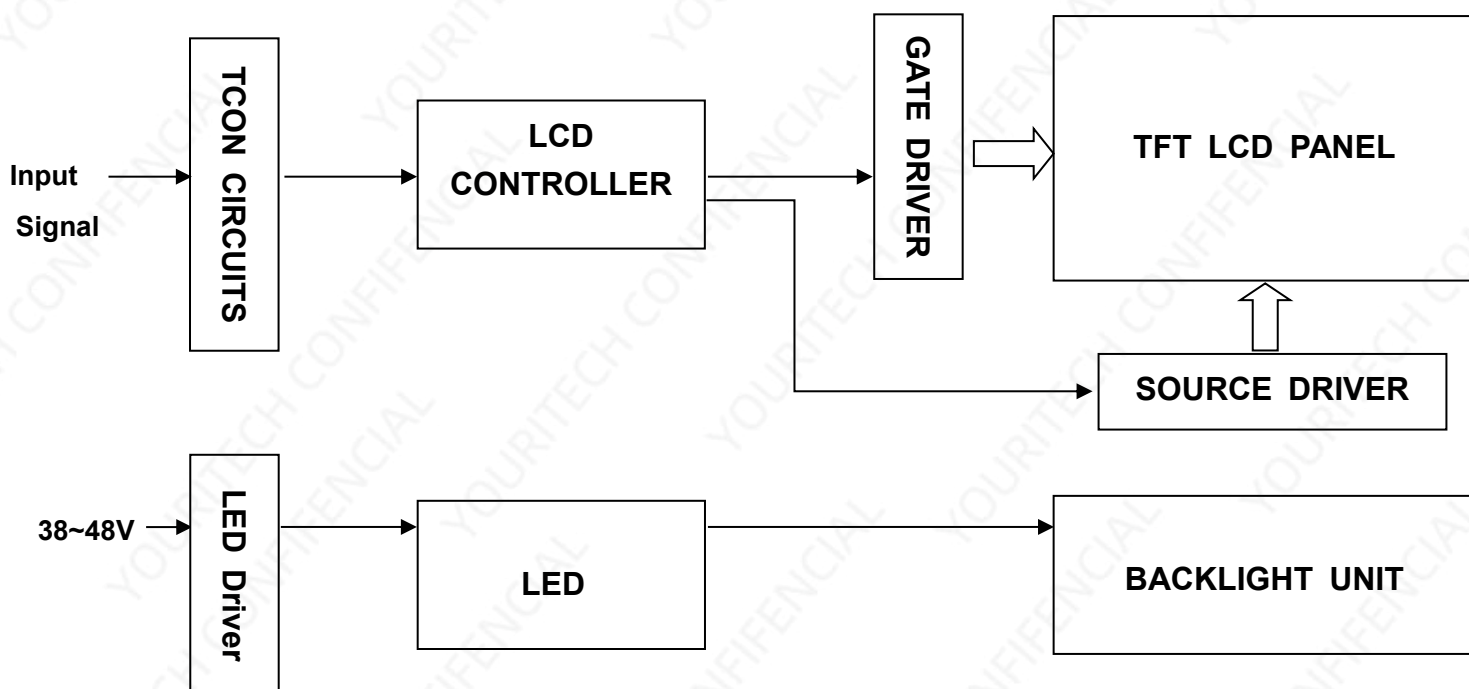
1.1 TFT Features

General Information Items	Specification	Unit	Note
	Main Panel		
Display area(AA)	408.96(H)*230.04(V) (18.5inch)	mm	
Driver element	TFT active matrix	-	
Display colors	16.7M	colors	
Number of pixels	1920(RGB)*1080	dots	
Pixel arrangement	RGB vertical stripe	-	
Pixel pitch	0.213(H)*0.213(V)	mm	
Viewing angle	ALL	o'clock	
LCM Interface	2-Port LVDS	-	
Display mode	Normally Black	-	
Operating temperature	-30~+80	℃	
Storage temperature	-30~+80	℃	

1.2 Mechanical Information

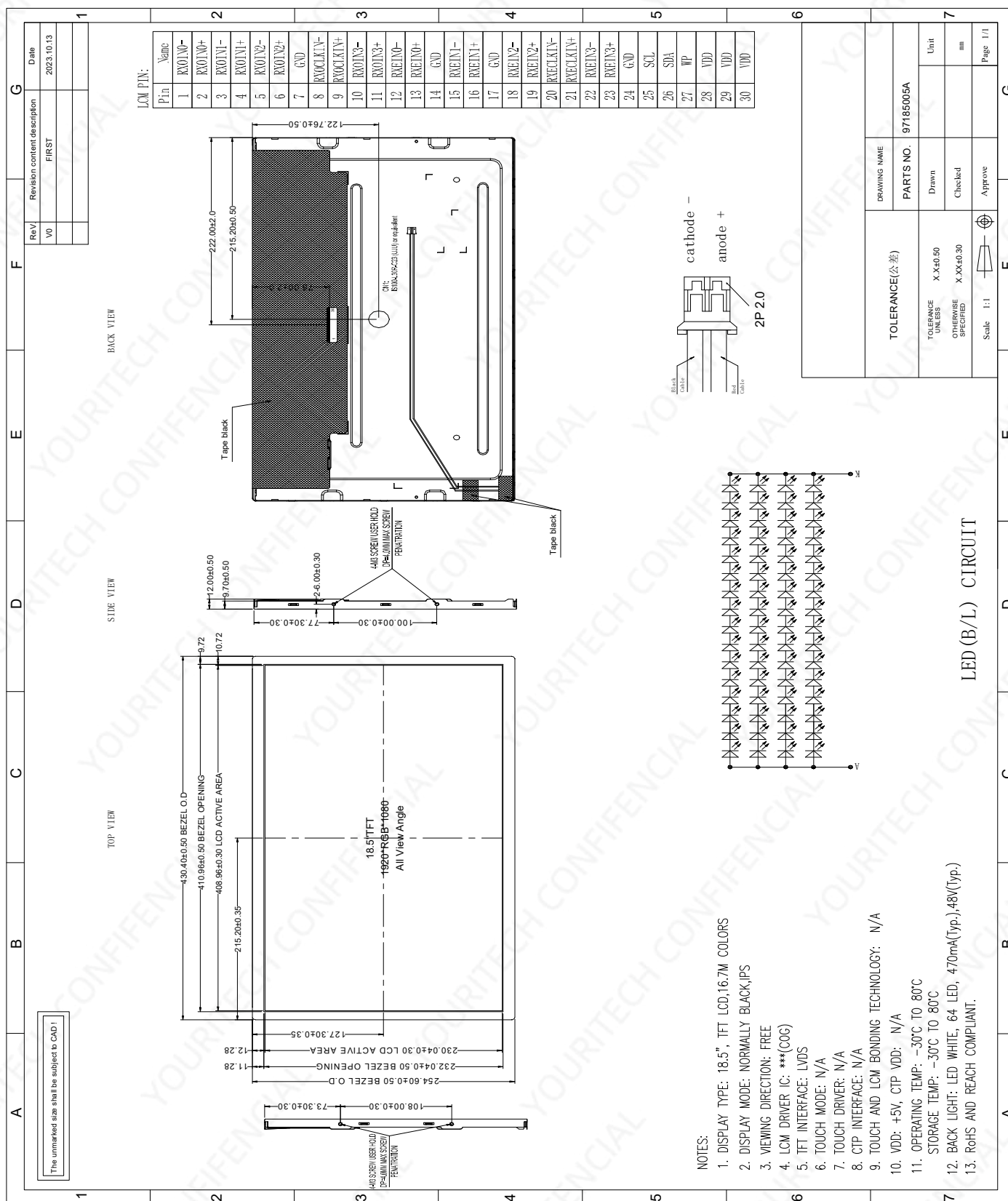
Item		Min.	Typ.	Max.	Unit	Note
Module size	Horizontal(H)	-	430.40	-	mm	
	Vertical(V)	-	254.60	-	mm	
	Depth(D)	-	12.00	-	mm	
Weight		-	1744	-	g	

2. Block Diagram



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3. Outline dimension



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4. Input terminal Pin Assignment

4.1 TFT Pin Assignment

The electronics interface connector IS100-L30R-C23(UJU) or equivalent.

The LED connector is PH2.0-2P or equivalent.

NO.	SYMBOL	DISCRIPTIONs	I/O
1	RXOIN0-	Negative Transmission data of Pixel 0 (ODD)	I
2	RXOIN0+	Positive Transmission data of Pixel 0 (ODD)	I
3	RXOIN1-	Negative Transmission data of Pixel 1 (ODD)	I
4	RXOIN1+	Positive Transmission data of Pixel 1 (ODD)	I
5	RXOIN2-	Negative Transmission data of Pixel 2 (ODD)	I
6	RXOIN2+	Positive Transmission data of Pixel 2 (ODD)	I
7	GND	Power Ground	P
8	RXOCLKIN-	Negative Transmission Clock (ODD)	I
9	RXOCLKIN+	Positive Transmission Clock (ODD)	I
10	RXOIN3-	Negative Transmission data of Pixel 3 (ODD)	I
11	RXOIN3+	Positive Transmission data of Pixel 3 (ODD)	I
12	RXEIN0-	Negative Transmission data of Pixel 0 (EVEN)	I
13	RXEIN0+	Positive Transmission data of Pixel 0 (EVEN)	I
14	GND	Power Ground	P
15	RXEIN1-	Negative Transmission data of Pixel 1 (EVEN)	I
16	RXEIN1+	Positive Transmission data of Pixel 1 (EVEN)	I
17	GND	Power Ground	P
18	RXEIN2-	Negative Transmission data of Pixel 2 (EVEN)	I
19	RXEIN2+	Positive Transmission data of Pixel 2 (EVEN)	I
20	RXECLKIN-	Negative Transmission Clock (EVEN)	I
21	RXECLKIN+	Positive Transmission Clock (EVEN)	I

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22	RXEIN3-	Negative Transmission data of Pixel 3 (EVEN)	I
23	RXEIN3+	Positive Transmission data of Pixel 3 (EVEN)	I
24	GND	Power Ground	P
25	SCL	I2C BUS	I
26	SDA	I2C BUS	I
27	WP	EEPROM write EN	I
28	VDD	Power Supply(5V)	P
29	VDD	Power Supply(5V)	P
30	VDD	Power Supply(5V)	P

Note :

- 1.Pin 24 should be connected with GND.
2. NC(Not Connected) : This pins are only used for internal operations.
3. Input Level of LVDS signal is based on the EIA-644 Standard.
4. Data format: VESA only



4.2 LED Driver Connector Pin Assignment

NO.	SYMBOL	DISCRIPTION	I/O
1	Anode+	Red Cable	P
2	Cathode-	Black Cable	P

5. LCD Optical Characteristics

5.1 Optical specification

[VDD = 5.0V, Frame rate = 60Hz, Ta =25±2℃]

Item		Symbol	Condition	Min.	Typ.	Max.	Unit.	Note
Contrast Ratio		CR	Θ=0 Normal viewing angle	800	1000	--		(1)(2)
Response time	Rising	T _R +T _F		--	30	35	msec	(1)(3)
	Falling							
Color Gamut		S(%)		--	69.30	--	%	
Color Filter Chromaticity	White	W _X	-0.04	0.2747	+0.04		(1)(4) Active area	
		W _Y						0.3079
	Red	R _X						0.6354
		R _Y						0.3433
	Green	G _X						0.2818
		G _Y						0.5890
	Blue	B _X						0.1475
		B _Y						0.0622
Viewing angle	Hor.	Θ _L	CR>10	80	85	--	(1)(4)	
		Θ _R		80	85	--		
	Ver.	Θ _U		80	85	--		
		Θ _D		80	85	--		
Option View Direction		ALL						

Measuring Condition

Measuring surrounding : dark room

Ambient temperature : 25±2℃

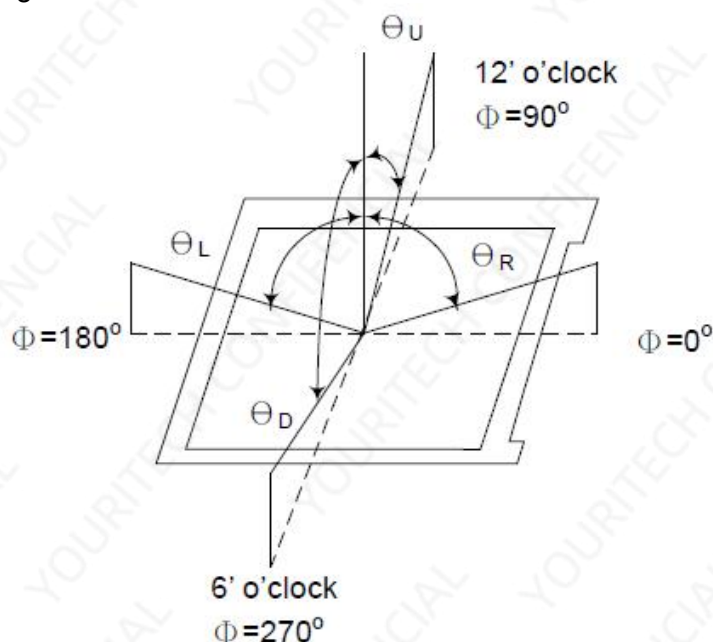
15min. warm-up time.

Measuring Equipment

FPM520 of Westar Display technologies, INC., which utilized SR-3 for Chromaticity and BM-5A for other optical characteristics.

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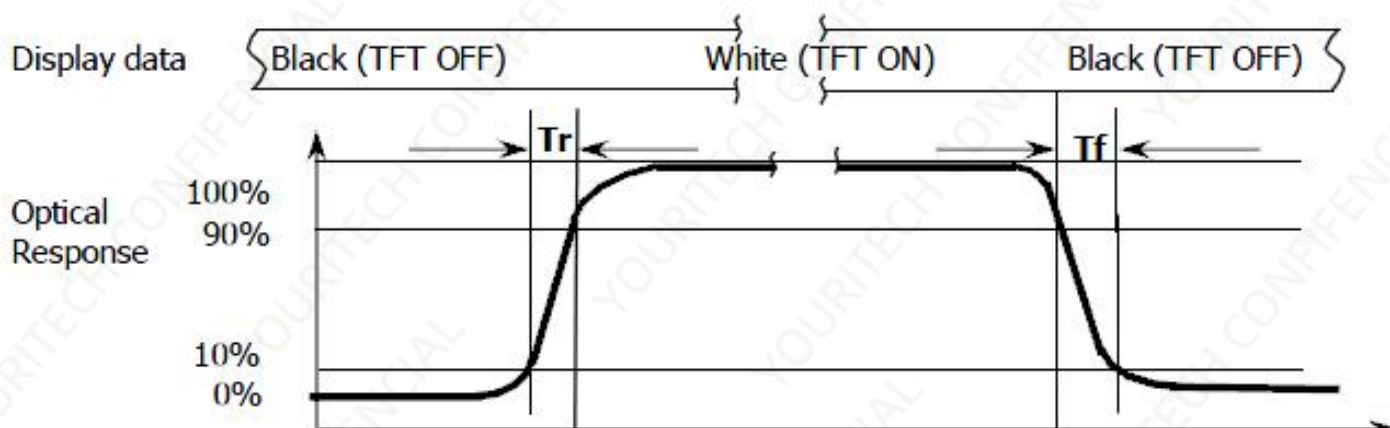
Note (1): Definition of Viewing Angle :



Note (2): Definition of Contrast Ratio(CR) :measured at the center point of panel

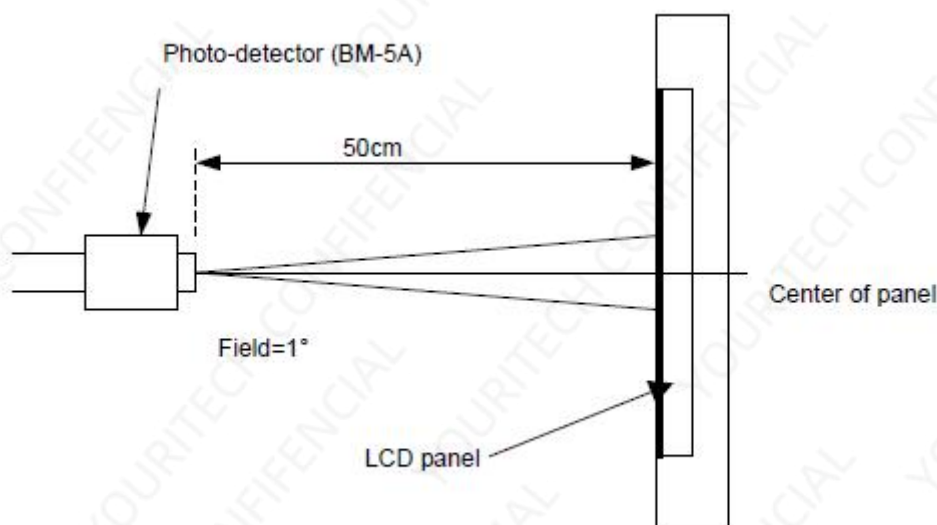
$$CR = \frac{\text{Luminance with all pixels white}}{\text{Luminance with all pixels black}}$$

Note (3): Response Time



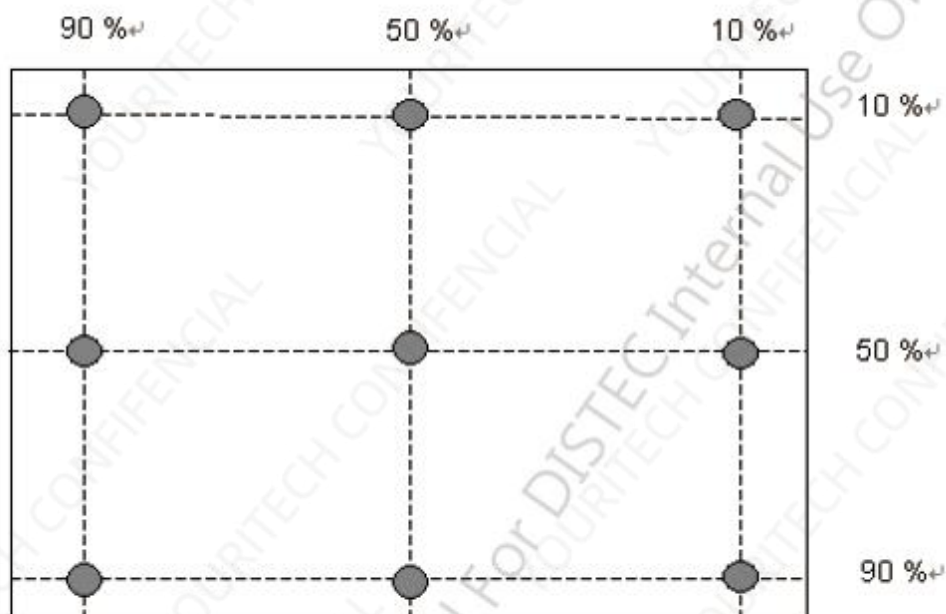
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Note (4): Definition of optical measurement setup



Note 5: Central luminance is measured by CA310

Note 6: Luminance uniformity of these 9 points is defined as below and measured by CA310



$$\text{Uniformity} = \frac{\text{Minimum Luminance in 9 points (1 - 9)}}{\text{Maximum Luminance in 9 Points (1 - 9)}}$$

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6. Electrical Characteristics

6.1 Absolute Maximum Rating

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

Characteristics	Symbol	Min.	Max.	Unit
Digital Supply Voltage	VDD	-0.3	6.5	V
Operating temperature	T _{OP}	-30	+80	°C
Storage temperature	T _{ST}	-30	+80	°C

6.2 DC Electrical Characteristics

Characteristics	Symbol	Min.	Typ.	Max.	Unit	Note
Digital Supply Voltage	VDD	3.5	5	5.8	V	
Normal mode Current consumption	IDD	--	500	--	mA	
Level input voltage	V _{IH}	0.7VDD		VDD	V	
	V _{IL}	GND		0.3VDD	V	
Level output voltage	V _{OH}	0.8VDD		VDD	V	
	V _{OL}	GND		0.2VDD	V	

Note:

- The supply voltage is measured and specified at the interface connector of LCM.
The current draw and power consumption specified is for 5V at 25°C
Max value at Black Pattern

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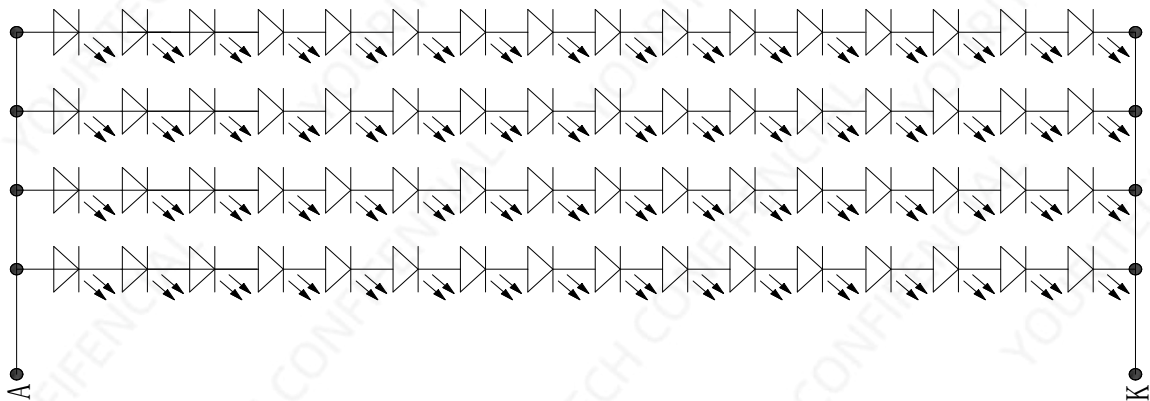
6.3 LED Backlight Characteristics

The back-light system is edge-lighting type with 64 chips White LED

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Forward Current	I_F	--	470	490	mA	
Forward Voltage	V_F	--	48	--	V	
LCM Luminance	L_V	900	1000	--	cd/m ²	$I_F=470\text{mA}$
LED life time	Hr	50000	--	--	Hour	Note1,2
Uniformity	AVg	80	--	--	%	Note3

Notes : 1. Calculator Value for reference $I_{LED} \times V_{LED} = P_{LED}$

2. The LED Life-time define as the estimated time to 50% degradation of initial luminous under the condition of the ambient temperature of 25°C.



LED (B/L) CIRCUIT

7. SIGNAL TIMING SPECIFICATION

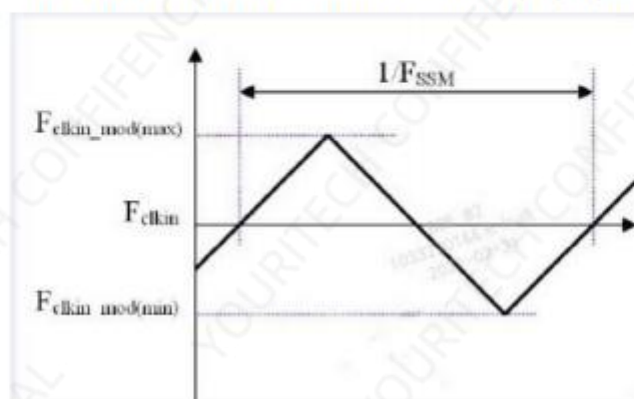
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7.1 Timing Parameters (DE only mode).

Item	Symbols		Min	Typ	Max	Unit	Note
DCLK	Period	tCLK	9.5	-	25	ns	Note 1
	Frequency	-	40	-	105	MHz	
Hsync	Period	tHP	990	1040	-	tCLK	
	Horizontal Valid	tHV	-	960	-	tCLK	
	Horizontal Blank	tHB	30	80	-	tCLK	
Vsync	Period	tVP	1100	1125	1138	tHP	
	Vertical Valid	tVV	-	1080	-	tHP	
	Vertical Blank	tVB	30	45	58	tHP	
	Frequency	fV	45	60	75	Hz	
LVDS Receiver clock	Input spread spectrum ratio	SSr	-	1.5	2	%	Note 2
	spread spectrum modulation frequency	Fssm	-	-	100	KHZ	

Note 1: The DCLK range at last line of V-blanking should be set in 0-H-active/2.

Note 2: The SSGG(spread Spectrum Clock Generator) is defined as following figure:

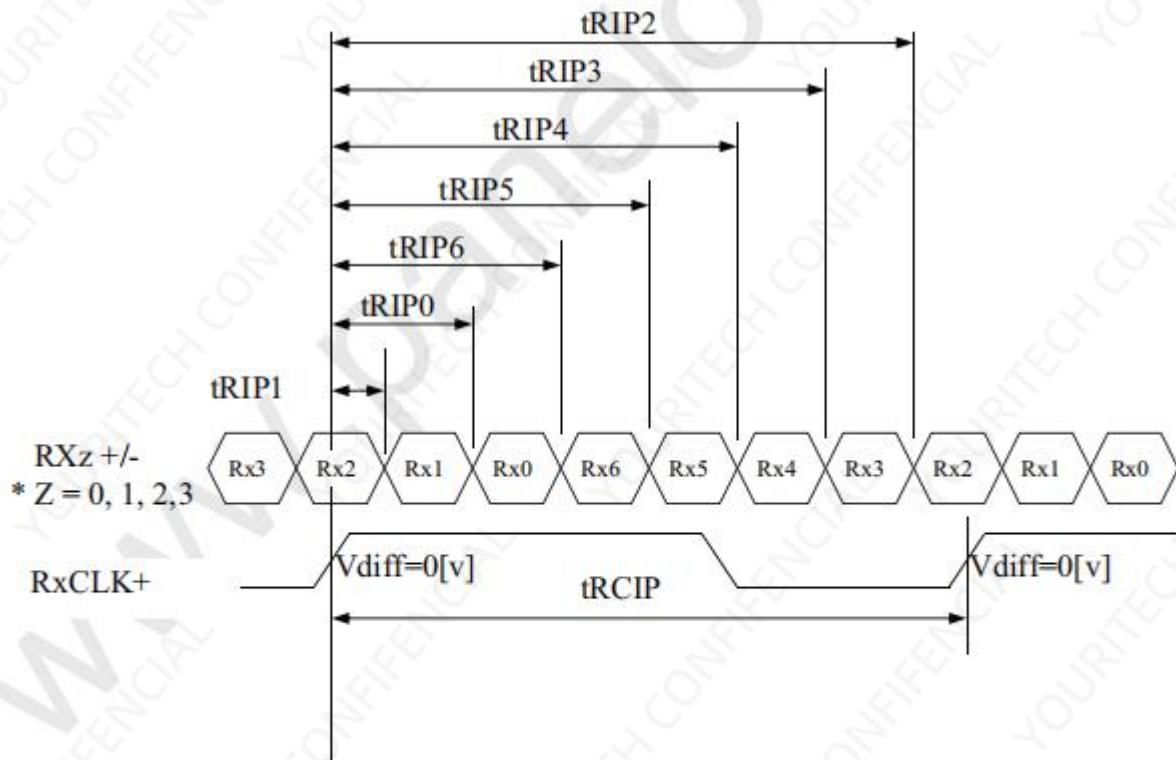


7.2 LVDS Rx Interface Timing Parameter

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The specification of the LVDS Rx interface timing parameter is shown in Table.

Item	Symbol	Min	Typ	Max	Unit	Remark
CLKIN Period	tRCIP	9.5		25	nsec	
Input Data 0	tRIP1	-0.4	0.0	+0.4	nsec	
Input Data 1	tRIP0	tRCIP/7-0.4	tRCIP/7	tRCIP/7+0.4	nsec	
Input Data 2	tRIP6	2 × tRCIP/7-0.4	2 × tRCIP/7	2 × tRCIP/7+0.4	nsec	
Input Data 3	tRIP5	3 × tRCIP/7-0.4	3 × tRCIP/7	3 × tRCIP/7+0.4	nsec	
Input Data 4	tRIP4	4 × tRCIP/7-0.4	4 × tRCIP/7	4 × tRCIP/7+0.4	nsec	
Input Data 5	tRIP3	5 × tRCIP/7-0.4	5 × tRCIP/7	5 × tRCIP/7+0.4	nsec	
Input Data 6	tRIP2	6 × tRCIP/7-0.4	6 × tRCIP/7	6 × tRCIP/7+0.4	nsec	

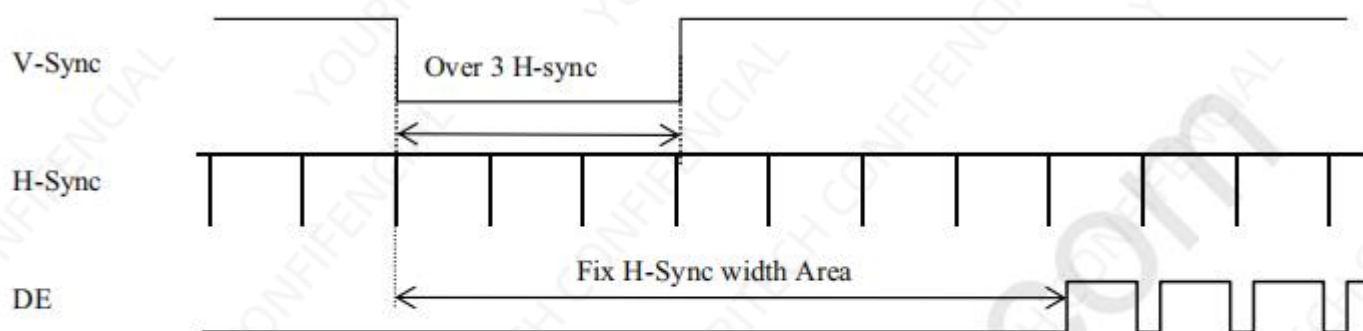


$$* V_{diff} = (RXZ+) - (RXZ-), \dots, (RXCLK+) - (RXCLK-)$$

8. SIGNAL TIMING WAVEFORMS OF INTERFACE SIGNAL

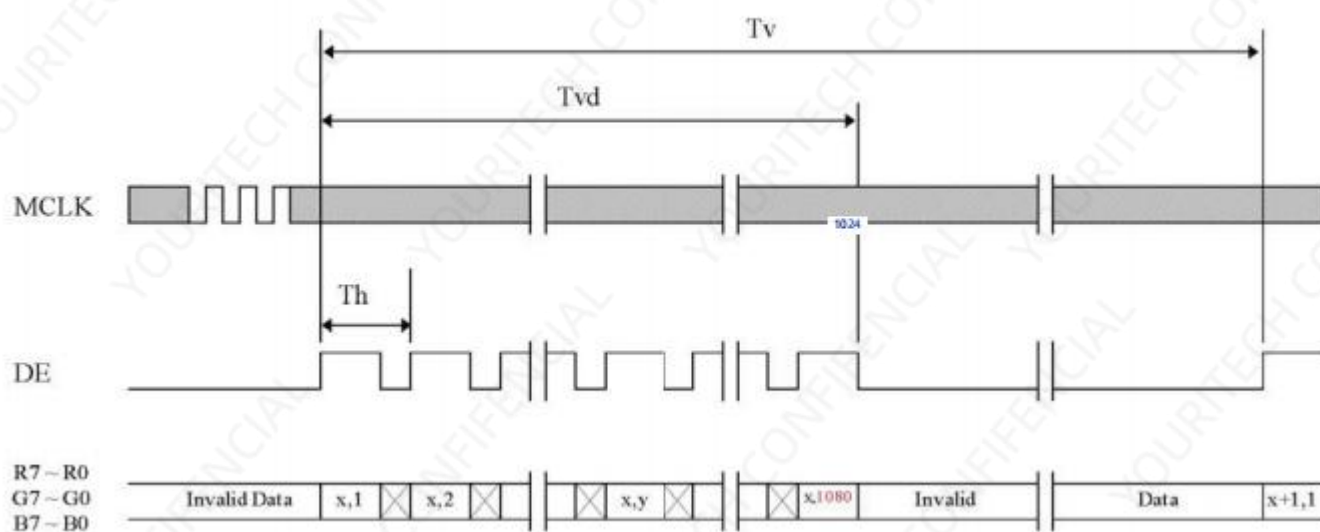
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8.1 Sync Timing Waveforms



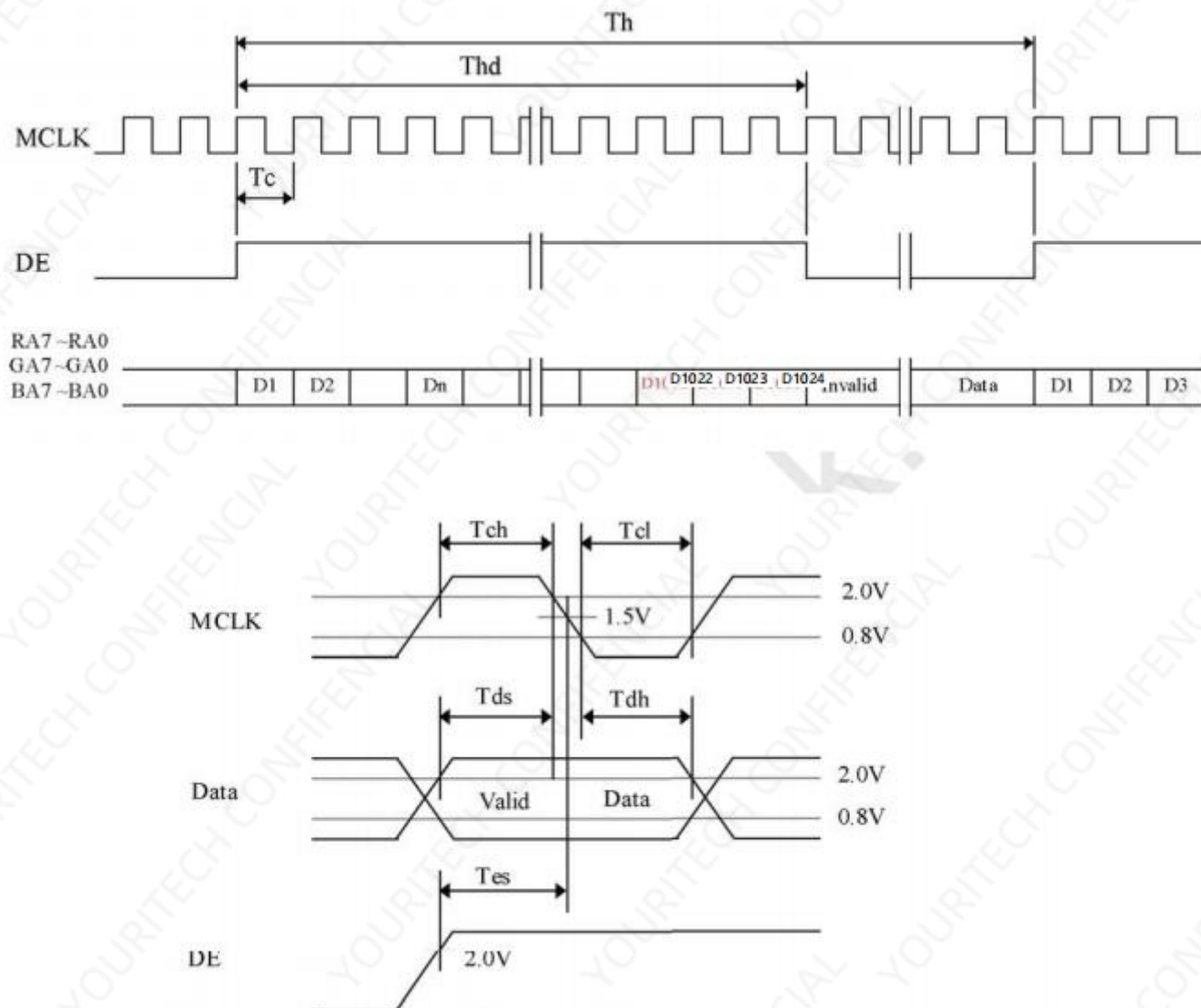
- 1) Need over 3 H-sync during V-Sync Low
- 2) Fix H-Sync width from V-Sync falling edge to first rising edge

8.2 Vertical Timing Waveforms



8.3 Horizontal Timing Waveforms

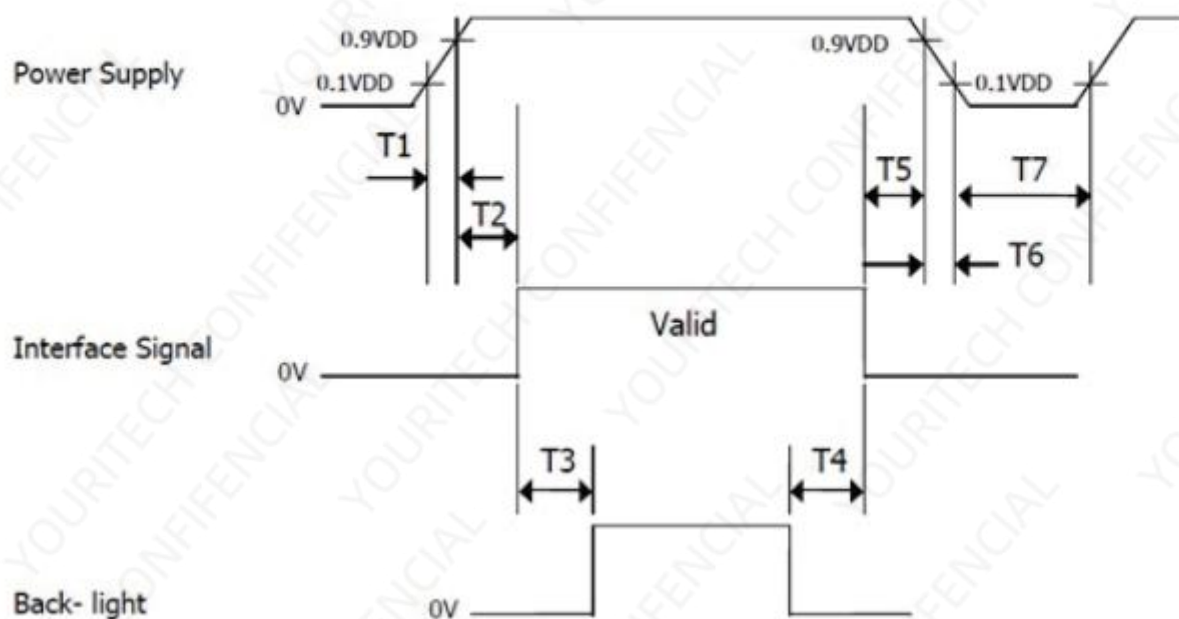
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9. POWER SEQUENCE

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To prevent a latch-up or DC operation of the LCD module, the power on/off sequence shall be as shown in below



Parameter	Values			Units
	Min	Typ	Max	
T1	0.5	-	10	ms
T2	0	-	50	ms
T3	300	-	-	ms
T4	500	-	-	ms
T5	0	-	50	ms
T6	0	-	10	ms
T7	500	-	-	ms

10. LCD Module Out-Going Quality Level

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10.1 VISUAL & FUNCTION INSPECTION STANDARD

10.1.1 Inspection conditions

Inspection performed under the following conditions is recommended.

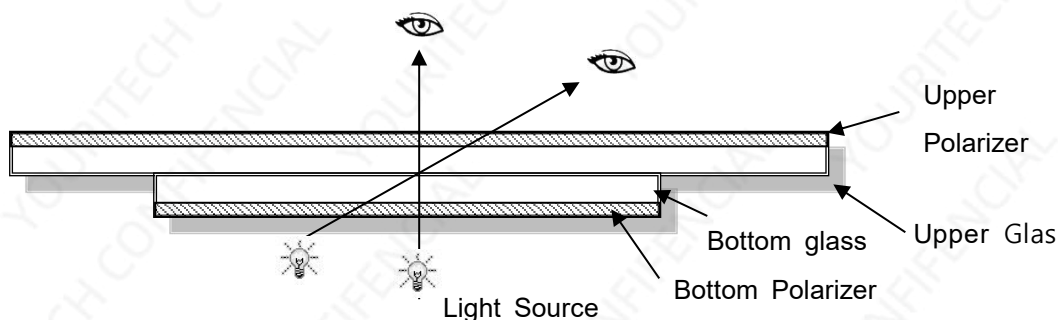
Temperature : $25\pm5^{\circ}\text{C}$

Humidity : $65\%\pm 10\%\text{RH}$

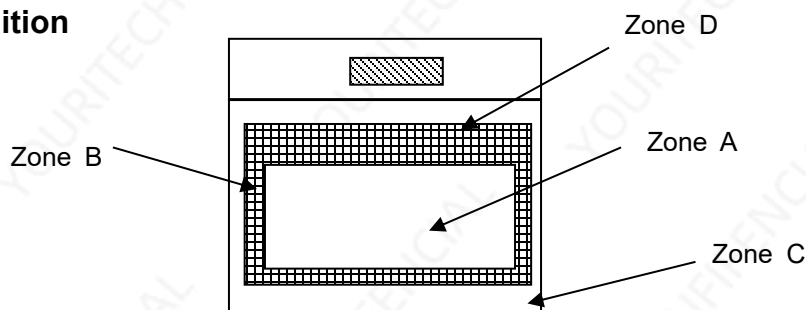
Viewing Angle : Normal viewing Angle.

Illumination: Single fluorescent lamp (300 to 700Lux)

Viewing distance:30-50cm



10.1.2 Definition



Zone A : Effective Viewing Area(Character or Digit can be seen)

Zone B : Viewing Area except Zone A

Zone C Cover (Zone A+Zone B) which can not be seen after assembly by customer .)

Zone D : IC Bonding Area

Note:

As a general rule ,visual defects in Zone C can be ignored when it doesn't effect product function or appearance after assembly by customer

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10.1.3 Sampling Plan

According to GB/T 2828.1-2012 ; , normal inspection, Class II

AQL:

Major defect	Minor defect
0.65	1.5

LCD: Liquid Crystal Display , LCM: Liquid Crystal Module,

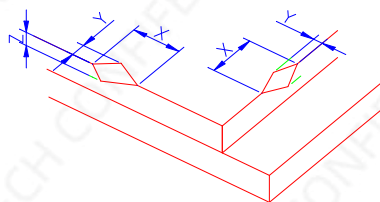
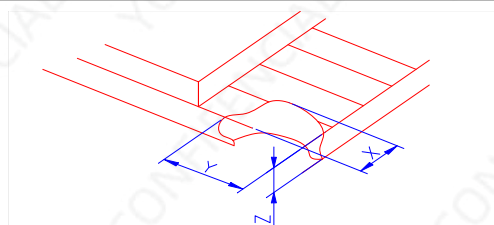
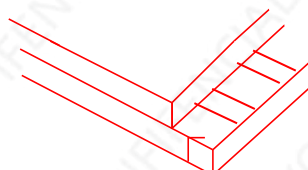
No	Items to be inspected	Criteria	Classification of defects
1	Functional defects	1) No display, Open or miss line 2) Display abnormally, Short 3) Backlight no lighting, abnormal lighting. etc	Major
2	Missing	Missing components and etc	
3	Outline dimension	Overall outline dimension beyond the drawing is not allowed, deformation and etc	
4	Color tone	Color unevenness, refer to limited sample	Minor
5	Spot/Line defect	Light dot, Dim spot, (Note1) Polarizer Air Bubble, Polarizer accidented spot and etc	
6	Soldering appearance	Good soldering , Peeling off is not allowed and etc	
7	LCD/Polarizer	Black/White spot/line, scratch, crack, etc.	

Note1: a) Light dot: Dots appear bright and unchanged in size in which LCD panel is displaying under black pattern.

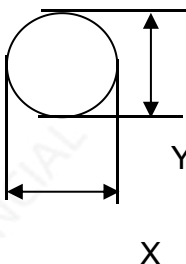
b) Dim dot: Dots appear dark and unchanged in size in which LCD panel is displaying under pure red, green, blue picture.

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10.1.4 Criteria (Visual)

Number	Items	Criteria(mm)						
1.0 LCD Crack/Broken NOTE: X: Length Y: Width Z: Height L: Length of IT O, T: Height of LCD	(1) The edge of LCD broken	 <table><tr><td>X</td><td>Y</td><td>Z</td></tr><tr><td>≤3.0mm</td><td><Inner border line of the seal</td><td>≤T</td></tr></table>	X	Y	Z	≤3.0mm	<Inner border line of the seal	≤T
X	Y	Z						
≤3.0mm	<Inner border line of the seal	≤T						
	(2)LCD corner broken	 <table><tr><td>X</td><td>Y</td><td>Z</td></tr><tr><td>≤3.0mm</td><td>≤L</td><td>≤T</td></tr></table>	X	Y	Z	≤3.0mm	≤L	≤T
X	Y	Z						
≤3.0mm	≤L	≤T						
	(3) LCD crack	 Crack Not allowed						

Spot defect



$\Phi=(X+Y)/2$

① light dot (black/white spot , pinhole, stain, etc.)

Zone Size (mm)	Acceptable Qty		
	A	B	C
$\Phi \leq 0.5$	Ignore		
$0.5 < \Phi \leq 0.7$			
$0.7 < \Phi \leq 0.9$			
$\Phi > 0.9$			

② Dim spot (light leakage、dent、dark spot, etc)

Zone Size (mm)	Acceptable Qty		
	A	B	C
$\Phi \leq 0.5$	Ignore		
$0.5 < \Phi \leq 0.7$			
$0.7 < \Phi \leq 0.9$			
$\Phi > 0.9$			

③ Polarizer accidented spot

Zone Size (mm)	Acceptable Qty		
	A	B	C
$\Phi \leq 0.5$	Ignore		
$0.5 < \Phi \leq 0.8$			
$\Phi > 0.8$			

④ Polarizer Bubble

Zone Size (mm)	Acceptable Qty		
	A	B	C
$\Phi \leq 0.5$	Ignore		
$0.5 < \Phi \leq 0.8$			
$\Phi > 0.8$			

3.0	LCD Pixel defect	Pixel bad points
-----	------------------	------------------

Item	Zone A	Acceptable Qt
Bright dot	Random	$N \leq 2$
	2 dots adjacent	$N \leq 0$
	3 dots adjacent	$N \leq 0$
Dark dot	Random	$N \leq 3$
	2 dots adjacent	$N \leq 0$
	3 dots adjacent	$N \leq 0$
Distance	1. Minimum Distance Between Bright dots. 2. Minimum Distance Between dark dots 3. Minimum Distance Between dark and bright dot.	5mm
Total bright and dark dot		$N \leq 4$

Note:

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

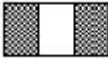
Picture:



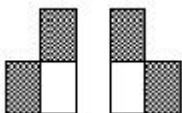
2 dot adjacent



2 dot adjacent (vertical)



2 dot adjacent



2 dot adjacent (slant)

4.0	Line defect (LCD /Polarizer backlight black/white line, scratch, stain)  W: width, L : length N : Count	Width(mm)	Length(m)	Acceptable Qty		
				A	B	C
		$\Phi \leq 0.2$	Ignore	Ignore		Ignore
		$0.2 < W \leq 0.3$	$L \leq 10.0$	$N \leq 3$		
		$0.3 < W \leq 0.4$	$L \leq 10.0$	$N \leq 2$		
		$W > 0.4$	Define as spot defect			
5.0	Electronic Components SMT.	Not allow missing parts, solderless connection, cold solder joint, mismatch, The positive and negative polarity opposite				
6.0	Display color& Brightness.	1. Color: Measuring the color coordinates, The measurement standard according to the datasheet or samples. 2. Brightness: Measuring the brightness of White screen, The measurement standard according to the datasheet or Samples.				
7.0	LCD Mura/Waving/ Hot spot	Not visible through 5% ND filter in 50% gray or judge by limit sample if necessary.				

Criteria (functional items)

Number	Items	Criteria (mm)
1	No display	Not allowed
2	Missing segment	Not allowed
3	Short	Not allowed
4	Backlight no lighting	Not allowed

11. Reliability Test Result

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Item	Condition	Inspection after test
High Temperature Operating	80°C,96H	Inspection after 2~4hours storage at room temperature, the sample shall be free from defects: 1.Air bubble in the LCD; 2.Non-display; 3.Missing segments/line; 4.Glass crack; 5.Current IDD is twice higher than initial value.
Low Temperature Operating	-30°C, 96H	
High Temperature Storage	80°C, 96H	
Low Temperature Storage	-30°C, 96H	
High Temperature & High Humidity Operating	+80°C, 80% RH ,96 hours.	
Thermal Shock (Non-operation)	-20°C,30 min ↔ 60°C,30 min, Change time:5min 20CYC.	
ESD test	C=150pF, R=330,5points/panel Air:±6KV, 5times; Contact:±4KV, 5 times; (Environment: 15°C~35°C, 30%~60%).	
Vibration (Non-operation)	Frequency range:10~55Hz, Stroke:1.5mm Sweep:10Hz~55Hz~10Hz 2 hours for each direction of X.Y.Z. (6 hours for total) (Package condition).	
Box Drop Test	1 Corner 3 Edges 6 faces,80cm(MEDIUM BOX)	

Remark:

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

12. Cautions and Handling Precautions

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12.1 Handling and Operating the Module

(1) When the module is assembled, it should be attached to the system firmly.

Do not warp or twist the module during assembly work.

(2) Protect the module from physical shock or any force. In addition to damage, this may cause improper operation or damage to the module and back-light unit.

(3) Note that polarizer is very fragile and could be easily damaged. Do not press or scratch the surface.

(4) Do not allow drops of water or chemicals to remain on the display surface.

If you have the droplets for a long time, staining and discoloration may occur.

(5) If the surface of the polarizer is dirty, clean it using some absorbent cotton or soft cloth.

(6) The desirable cleaners are water, IPA (Isopropyl Alcohol) or Hexane.

Do not use ketene type materials (ex. Acetone), Ethyl alcohol, Toluene, Ethyl acid or Methyl chloride. It might permanent damage to the polarizer due to chemical reaction.

(7) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, legs, or clothes, it must be washed away thoroughly with soap.

(8) Protect the module from static; it may cause damage to the CMOS ICs.

(9) Use finger-stalls with soft gloves in order to keep display clean during the incoming inspection and assembly process.

(10) Do not disassemble the module.

(11) Protection film for polarizer on the module shall be slowly peeled off just before use so that the electrostatic charge can be minimized.

(12) Pins of I/F connector shall not be touched directly with bare hands.

(13) Do not connect, disconnect the module in the "Power ON" condition.

12.2 Storage and Transportation.

(1) Do not leave the panel in high temperature, and high humidity for a long time.

It is highly recommended to store the module with temperature from 0 to 35 °C and relative humidity of less than 70%

(2) Do not store the TFT-LCD module in direct sunlight.

(3) The module shall be stored in a dark place. When storing the modules for a long time, be sure to adopt effective measures for protecting the modules from strong ultraviolet radiation, sunlight, or fluorescent light.

(4) It is recommended that the modules should be stored under a condition where no condensation is allowed. Formation of dewdrops may cause an abnormal operation or a failure of the module.

In particular, the greatest possible care should be taken to prevent any module from being operated where condensation has occurred inside.

(5) This panel has its circuitry FPC on the bottom side and should be handled carefully in order not to be stressed.

13. Packing

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