Shenzhen Leadtek Electronics Co.,Ltd

PRODUCT SPECIFICATION

TFT-LCD MODULE

Module No：LTK156FTICT29-V0

☑ Preliminary Specification

☐ Approval Specification

Designed by	Checked by	Approved by
		

Final Approval by Customer

Approved by	Comment

※The specification of “TBD” should refer to the measured value of sample . If there is difference between the design specification and measured value, we naturally shall negotiate and agree to solution with customer.

1. Document Revision History

Version	Contents	Date	Note
V0	Initial version	2025.06.22	

2.General Description

NO	Item	Specification	Unit
1	LCD Size	TFT"15.6	inch
2	Panel Type	IPS	mm
3	Display Resolution	1920 x RGB x 1080	pixel
4	Display Mode	Normally Black	-
5	Number of Colors	16.7M	-
6	Viewing Direction	ALL	-
7	Pixel arrangement	RGB Vertical stripe	-
8	Color Gamut	72% NTSC	-
9	CTP+LCM Module size	386.80(W)×236.07(H)×13.42(T)	mm
10	Active Area	344.16(W)×193.59(H)	mm
11	Pixel Pitch	0.17925 (H) × 0.17925 (V)	mm
12	LCM Driver	-	
13	Light Source	White LED	
14	LCM Interface	LVDS	bit

2.1 Functional Block Diagram

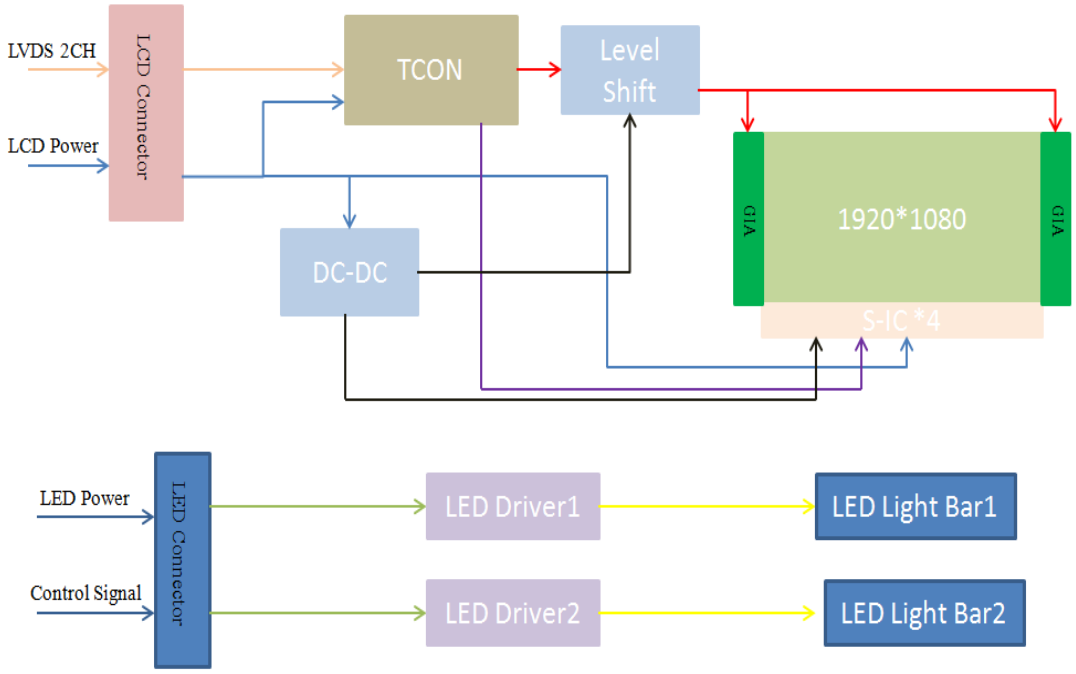


Figure 1 Block Diagram

2.2 Pixel Mapping

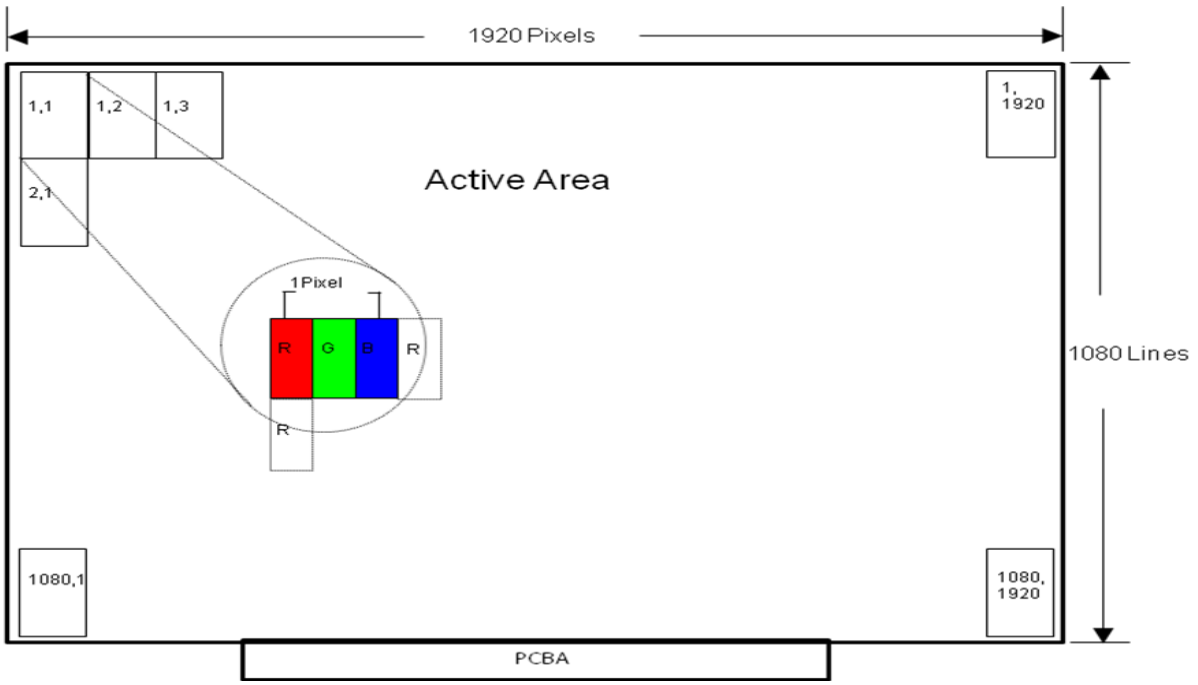


Figure 2 Pixel Mapping

2.3 Absolute Maximum Ratings

Table 1 Electrical & Environment Absolute Rating

Item	Symbol	Min.	Max.	Unit	Note
Logic Supply Voltage	V_{DD}	-0.3	4.0	V	(1),(2), (3),(4)
Operating Temperature	T_{gs}	-30	85	℃	
Storage Temperature	T_a	-30	85	℃	

Note (1) All the parameters specified in the table are absolute maximum rating values that may cause faulty operation or unrecoverable damage, if exceeded. It is recommended to follow the typical value.

Note (2) All the contents of electro-optical specifications and display fineness are guaranteed under Normal Conditions. All the display fineness should be inspected under normal conditions. Normal conditions are defined as follow: Temperature: 25℃, Humidity: 55±10%RH.

Note (3) Unpredictable results may occur when it was used in extreme conditions. T_a= Ambient Temperature, T_{gs}= Panel Surface Temperature. All the display fineness should be inspected under normal conditions.

Note (4) Temperature and relative humidity range are shown in the figure below. Wet bulb temperature should be lower than 38.3 ℃and no condensation of water. Besides, protect the module from static electricity.

3.0 Optical Characteristics

The optical characteristics are measured under stable conditions as following notes.

Table 2 Optical Characteristics

Item	Conditions		Min.	Typ.	Max.	Unit	Note
Viewing Angle （CR≥10）	Horizontal	θ_{x+}	80	85	-	degree	(1),(2),(3),(4),(8)
		θ_{x-}	80	85	-		
	Vertical	θ_{y+}	80	85	-		
		θ_{y-}	80	85	-		
Contrast Ratio	Center		700	1,000	-	-	(1),(2),(4),(8) θx=θy=0°
Response Time	Rising + Falling		-	25	35	ms	(1),(2),(5),(8) θx=θy=0°
Color Chromaticity (CIE1931)	Red x		Typ. -0.05	0.640	Typ. +0.05	-	(1),(2),(3),(8) θx=θy=0°
	Red y			0.326		-	
	Green x			0.312		-	
	Green y			0.647		-	
	Blue x			0.152		-	
	Blue y			0.062		-	
	White x			0.313		-	
	White y			0.329		-	
NTSC	-		67	72	-	%	(1),(2),(3),(8) θx=θy=0°
White CTP+LCM Luminance	Center		-	800	-	cd/m^2	(1),(2),(6),(8) θx=θy=0°
Luminance Uniformity	9 Points		75	80	-	%	(1),(2),(7),(8) θx=θy=0°

Note (1) Measurement Setup:

The LCD module should be stabilized at given temperature(25℃) for 30 minutes to avoid abrupt temperature changing during measuring. In order to stabilize the luminance, the measurement should be executed after lighting backlight for 30 minutes in a windless room.

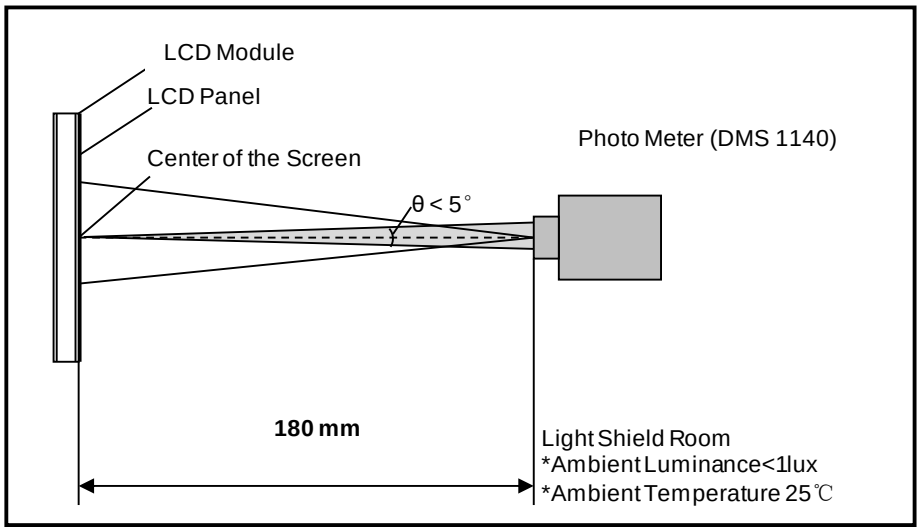


Figure 3 Measurement Setup

Note (2) The LED input parameter setting as:

PWM_LED: Duty 100 %

Note (3) Definition of Viewing Angle

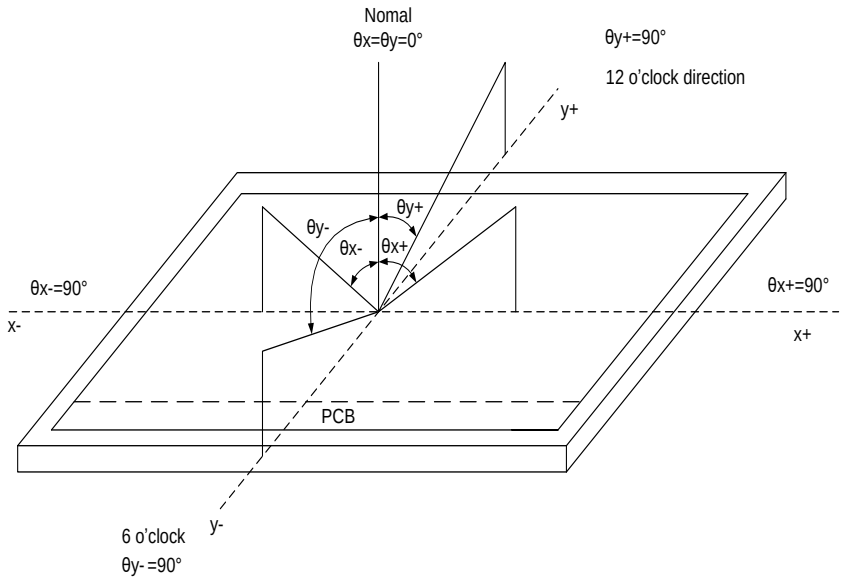


Figure 4 Definition of Viewing Angle

Note (4) Definition of Contrast Ratio (CR)

The contrast ratio can be calculated by the following expression:

Contrast Ratio (CR) = The luminance of White pattern/ The luminance of Black pattern

Note (5) Definition of Response Time (T_R, T_F)

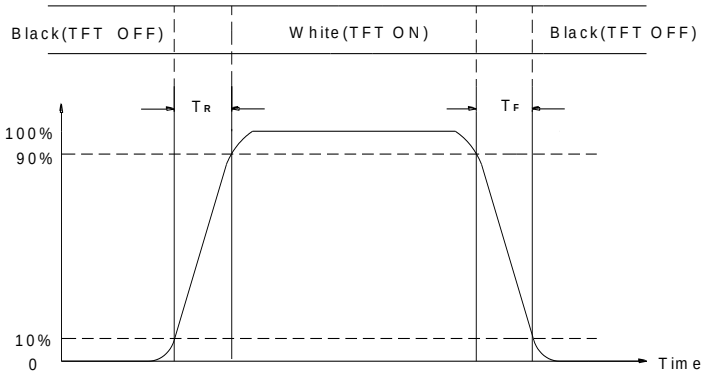


Figure 1 Definition of Response Time

Note (6) Definition of Luminance of White

Measure the luminance of White pattern (Ref.: Active Area)

Display Luminance=L1（center point）

H—Active Area Width, V—Active Area Height, L—Luminance

Note (7) Definition of Luminance Uniformity (Ref.: Active Area)

Measure the luminance of White pattern at 9 points.

Luminance Uniformity= Min.(L1, L2, ... LX) / Max.(L1, L2, ... LX)

H—Active Area Width, V—Active Area Height, L—Luminance

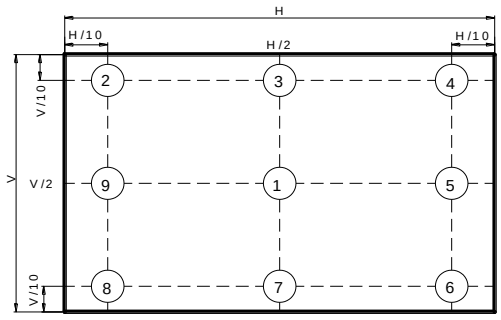


Figure 2 C-Light Spectrum

Note (8) All optical data are based on IVO given system & nominal parameter & testing machine in this document.

4.0 Electrical Characteristics

4.1 Interface Connector

Table 3 Signal Connector Type

Item	Description
Manufacturer / Type	STM MSBKT2407P30HB
Mating Receptacle / Type (Reference)	STM PFSKX10001N30(HOUSING) PF10001PS-00T(TERMINAL)

Table 4 Signal Connector Pin Assignment

Pin No.	Symbol	Description	Remarks
1	RxO0-	Negative LVDS differential data input (Odd data)	-
2	RxO0+	Positive LVDS differential data input (Odd data)	-
3	RxO1-	Negative LVDS differential data input (Odd data)	-
4	RxO1+	Positive LVDS differential data input (Odd data)	-
5	RxO2-	Negative LVDS differential data input (Odd data)	-
6	RxO2+	Positive LVDS differential data input (Odd data)	-
7	GND	Ground	-
8	RxOCLK-	Negative LVDS differential clock input (Odd clock)	-
9	RxOCLK+	Positive LVDS differential clock input (Odd clock)	-
10	RxO3-	Negative LVDS differential data input (Odd data)	-
11	RxO3+	Positive LVDS differential data input (Odd data)	-
12	RxE0-	Negative LVDS differential data input (Even data)	-
13	RxE0+	Positive LVDS differential data input (Even data)	-
14	GND	Ground	-
15	RxE1-	Negative LVDS differential data input (Even data)	-
16	RxE1+	Positive LVDS differential data input (Even data)	-
17	GND	Ground	-
18	RxE2-	Negative LVDS differential data input (Even data)	-

19	RxE2+	Positive LVDS differential data input (Even data)	-
20	RxECLK-	Negative LVDS differential clock input (Even data)	-
21	RxECLK+	Positive LVDS differential clock input (Even data)	-
22	RxE3-	Negative LVDS differential data input (Even data)	-
23	RxE3+	Positive LVDS differential data input (Even data)	-
24	GND	Ground	-
25	Bist	LCD Panel Self Test Enable(3.3V Typ) For IVO use,When it is not used, Connecting to GND or Floating is recommended	-
26	SDA	I2C-Compatible Serial-Data Input For IVO Use, Floating is recommended in the Costumer	-
27	SCL	I2C-Compatible Serial-Clock Input For IVO Use, Floating is recommended in the Costumer	-
28	VDD	Power Supply Input Voltage(3.3V)	-
29	VDD	Power Supply Input Voltage(3.3V)	-
30	VDD	Power Supply Input Voltage(3.3V)	-

Table 5 LED Connector Name / Designation

Item	Description
Manufacturer / Type	STM MSB24038P8A
Mating Receptacle / Type (Reference)	STM 24038PS-00 (TERMINAL) P24038P8 (HOUSING)

Table 6 LED Connector Pin Assignment

Pin No.	Symbol	Description	Remarks
1	VLED	LED power supply(12V Typ)	-
2	VLED	LED power supply(12V Typ)	-
3	VLED	LED power supply(12V Typ)	-
4	GND	GND	-
5	GND	GND	-

6	GND	GND	-
7	VLED_EN	Backlight On/Off (3.3V Typ)	-
8	VPWM_EN	System PWM signal imput for dimming (3.3V Typ)	-

Note: The type of wire used for BL connector is AWG-28

4.2 Signal Electrical Characteristics

4.2.1 Signal Electrical Characteristics For LVDS Receiver

Table 1 The built-in LVDS receiver is compatible with (ANSI/TIA/TIA-644) standard

LVDS Receiver Electrical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Differential Input High Threshold	Vth	-	-	+100	mV	V_{CM}=1.2V
Differential Input Low Threshold	Vtl	-100	-	-	mV	V_{CM}=1.2V
Magnitude Differential Input Voltage	$\|V_{ID}\|$	150	-	600	mV	-
Common Mode Voltage	V_{CM}	0.7	-	1.6	V	-

Note (1) Input signals shall be low or Hi- resistance state when VDD is off.

Note (2) All electrical characteristics for LVDS signal are defined and shall be measured at the interface connector of LCD.

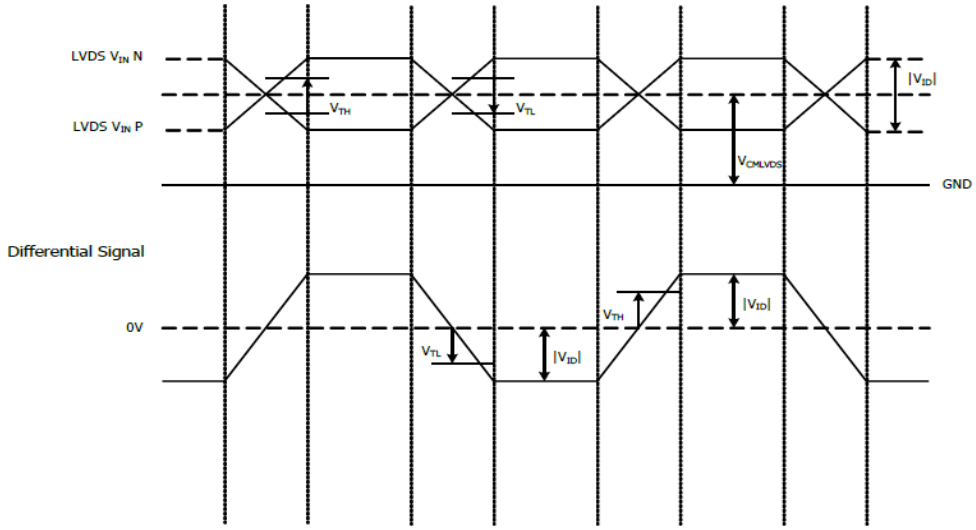


Figure 7 Voltage Definitions

Table 8 LVDS AC Electrical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit
Clock Period	TLVCP	-	T	-	ns
Clock High Time	TLVCH	-	4T/7	-	ns
Clock Low Time	TLVCL	-	3T/7	-	ns

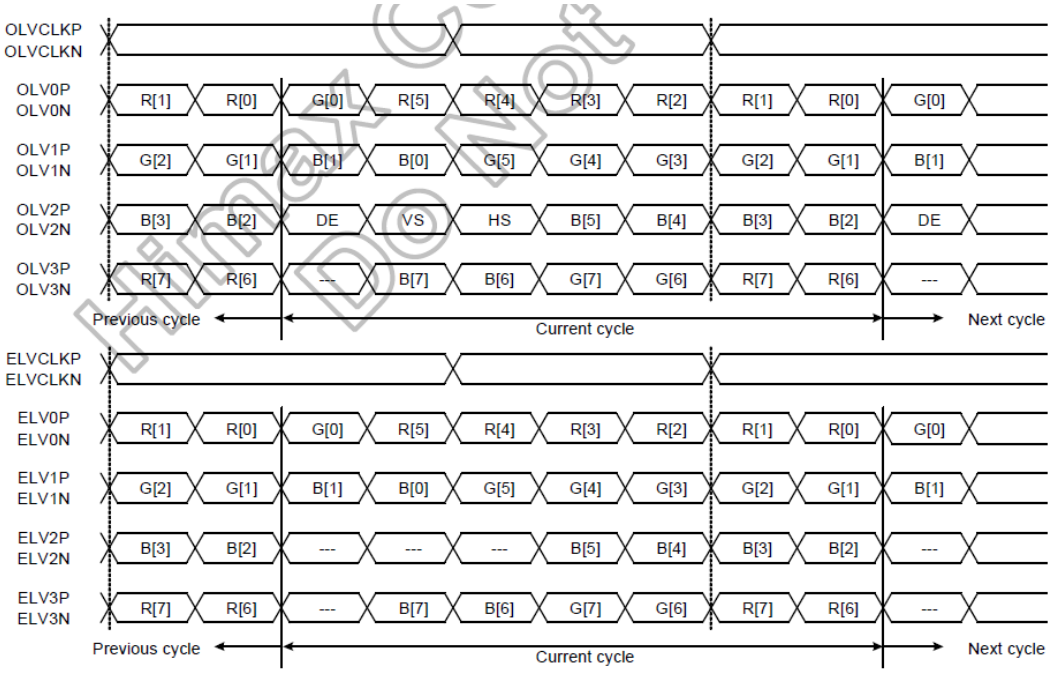


Figure 8 Data Mapping

4.2.2 LVDS Receiver Internal Circuit

Figure 11 shows the internal block diagram of the LVDS receiver. This LCD module equips termination resistors for LVDS link

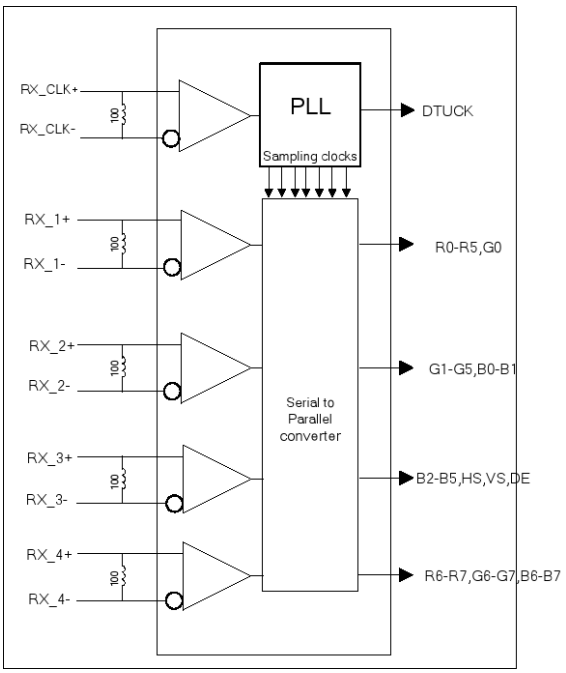


Figure 9 LVDS Receiver Internal Circuit

4.3 Interface Timings

Table 2 Interface Timings

Parameter	Symbol	Min.	Typ.	Max.	Unit
LVDS Clock Frequency	Fclk	69.5	70.5	73	MHz
V Total Time	VT	1104	1116	1080+A	Clocks
VActive Time	VA		1080		-
H Total Time	HT	1050	1052	960+B	Lines
H Active Time	HA		960		-
Frame Rate	FV	-	60	-	Hz

Note (1) SSC can only be driven to 2%

Note (2) The maximum clock frequency=[(960+B)*(1080+A)*60]<73MHz

4.4 Input Power Specifications

Input power specifications are as follows.

Table 3 Input Power Specifications

Parameter		Symbol	Min.	Typ.	Max.	Unit	Note
System Power Supply							
LCD Drive Voltage (Logic)		V_{DD}	3.0	3.3	3.6	V	(1),(2)
VDD Current	White Pattern	I_{DD}	-	-	0.454	A	(1),(3)
VDD Power Consumption	White Pattern	P_{DD}	-	-	1.5	W	
LCD Self Test (BIST)	High level voltage	V_{BIST}	0.7*VDD	-	VDD	V	(1)
	Low level voltage		0	-	0.3*VDD	V	
Rush Current		I_{Rush}	-	-	1.5	A	(1),(4)
Allowable Logic/LCD Drive Ripple Voltage		V_{VDD-RP}	-	-	200	mV	(1),(3)
LED Power Supply							
LED Input Voltage		V_{LED}	10.8	12	13.2	V	(1),(2),(8)
LED Power Consumption		P_{LED}	-	-	26.3	W	(1),(5),(8)
LED Forward Voltage		V_F	-	-	3.2	V	(1),(2)
LED Forward Current		I_F	-	70	-	mA	
PWM Signal Voltage	High level voltage	V_{PWM}	2.5	-	5.5	V	
	Low level voltage		0	-	0.5		
LED Enable Voltage	High level voltage	V_{LED_EN}	2.5	-	5.5	V	
	Low level voltage		0	-	0.5		
Input PWM Frequency		F_{PWM}	200	-	10,000	Hz	(1),(2),(5)
Duty Ratio		PWM	10	-	100	%	(1),(6)
LED Life Time		LT	50,000	-	-	Hours	(1),(7)

Note (1) All of the specifications are guaranteed under normal conditions. Normal conditions are defined as follow: Temperature: 25℃, Humidity: 55±10%RH.

Note (2) All of the absolute maximum ratings specified in the table, if exceeded, may cause faulty operation or unrecoverable damage. It is recommended to follow the typical value.

Note (3) The specified V_{DD} current and power consumption are measured under the V_{DD} = 3.3 V, F_V = 60 Hz condition and White Pattern.

Note (4) The figures below is the measuring condition of $V_{DD.}$ Rush current can be measured when T_{RUSH} is 0.5 ms.

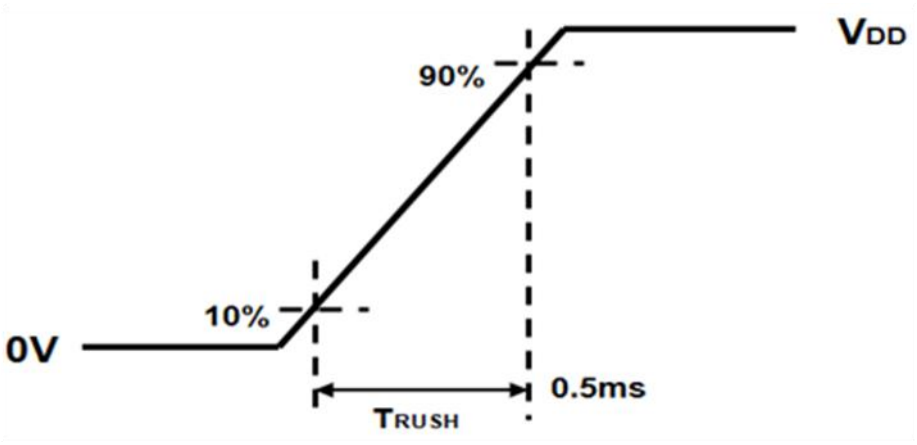


Figure 3 V_{DD} Rising Time

Note (5) The power consumption of LED Driver are under the V_{LED} = 12.0V, Dimming of Max luminance.

Note (6) Although acceptable range as defined, the dimming ratio is not effective at all conditions. The PWM frequency should be fixed and stable for more consistent luminance control at any specific level desired.

Note (7) The operation of LED Driver below minimum dimming ratio may cause flickering or reliability issue.

Note (8) The life time is determined as the sum of the lighting time till the luminance of LCD at the typical LED current reducing to 50% of the minimum value under normal operating condition.

4.5 Power ON/OFF Sequence

Interface signals are also shown in the chart. Signals from any system shall be Hi- resistance state or low level when V_{DD} voltage is off.

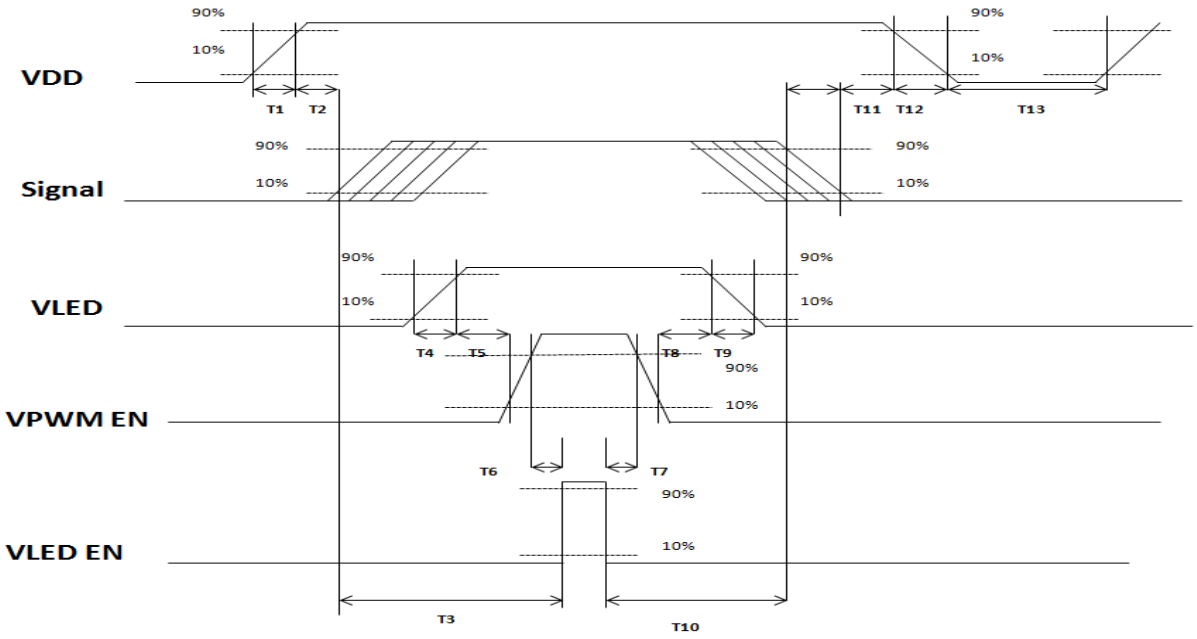


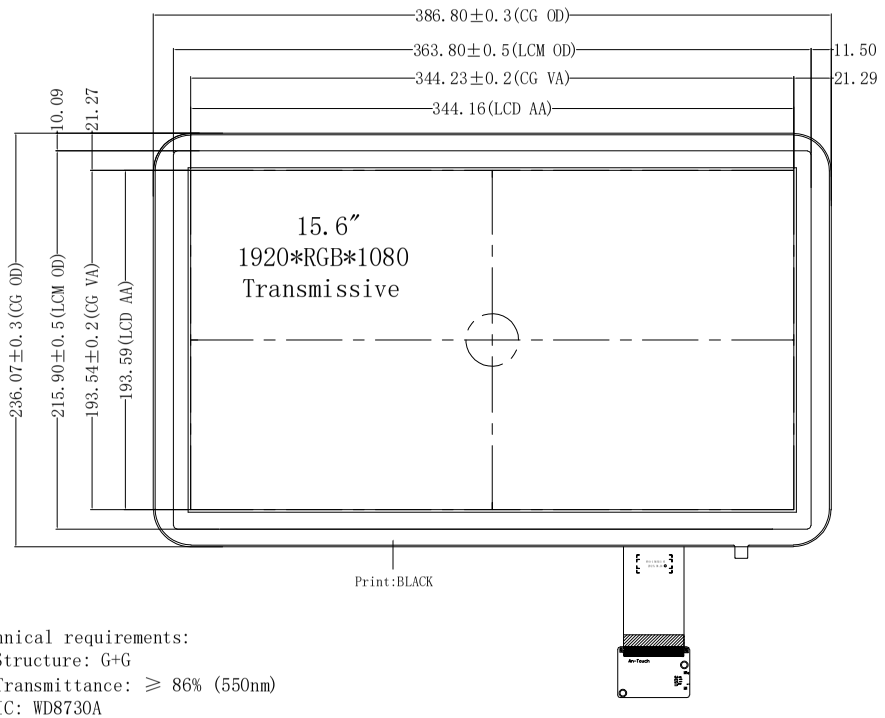
Figure 11 Power Sequence

Table 11Power Sequencing Requirements

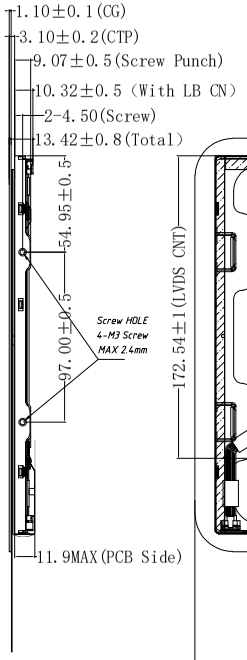
Parameter	Min.	Typ.	Max.	Unit
T1	0.5	-	10	ms
T2	30	40	50	ms
T3	200	-	-	ms
T4	0.5	-	10	ms
T5	10	-	-	ms
T6	10	-	-	ms
T7	0	-	-	ms
T8	10	-	-	ms
T9	-	-	10	ms
T10	110	-	-	ms
T11	0	16	50	ms
T12	-	-	10	ms
T13	1,000	-	-	ms

5. Mechanical Drawing

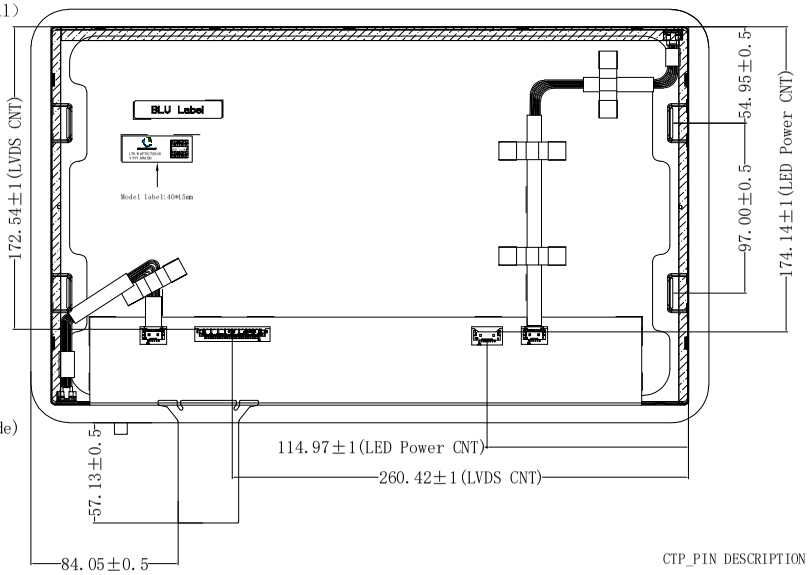
Front View



Side View



Back View



PIN DESCRIPTION

1	RXO0-
2	RXO0+
3	RXO1-
4	RXO1+
5	RXO2-
6	RXO2+
7	GND
8	RXOCLK-
9	RXOCLK+
10	RXO3-
11	RXO3+
12	RXE0-
13	RXE0+
14	GND
15	RXE1-
16	RXE1+
17	GND
18	RXE2-
19	RXE2+
20	RXECLK-
21	RXECLK+
22	RXE3-
23	RXE3+
24	GND
25	BIST
26	SDA
27	SCL
28	VDD
29	VDD
30	VDD

Technical requirements:
1. Structure: G+G
2. Transmittance: ⩾ 86% (550nm)
3. IC: WD8730A
4. Surface hardness test: ⩾ 6H (pencil hardness test)
5. OPERATING TEMP:-30℃~85℃
   STORAGE TEMP:-30℃~85℃

All materials comply with ROHS

Notes:
1. Display : 15.6″, TFT
2. Resolution: 1920xRGBx1080
3. LCD Viewing Direction: all
5. Display Mode: Normally Black
6. LCM+CTP Brightness: 800cd/㎡(TYP)
7. unmark Tolerance:±0.2
8. OPERATING TEMP: -30° C~+85° C
9. STORAGE TEMP: -30° C~+85° C
10. “*” The focus is on controlling the size
11. Requirements on Environmental Protection: ROHS
12. Critical Dimensions Under Strict Control: “*”

CTP_PIN DESCRIPTION

USB	
Pin NO.	Pin Name
1	VBUSIN
2	DN
3	DP
4	EGND

1	VLED
2	VLED
3	VLED
4	GND
5	GND
6	GND
7	VLED_EN
8	VPWM_EN

REV	DESCRIPTION	DATE	NAME
3			
2			
1			
0	NEW	2025.06.13	kevin

Shenzhen Leadtek Electronics Co.,Ltd

SCALE:1/1	UNIT:mm	PAGE:1/1		Approve	Check	Drawn
Part No:	LTK156FTICT29		VER:V0	Ian	Joan	kevin
Customer No:						

6.0 Reliability Conditions

Table 5 Reliability Condition

Item		Package	Test Conditions		Note
High Temperature Operating Test		Module	T_a=85℃(Panel surface), 120hrs		(1),(2),(3),(4)
High Temperature Storage Test		Module	T_a =85℃, 120hrs		(1),(2),(3),(4)
Low Temperature Operating Test		Module	T_a=-30℃, 120 hrs		(1),(2),(3),(4)
High Temperature/High Humidity Operating Test		Module	T_a=30℃, 90%RH, 120 hrs		(1),(2),(3),(4)
Thermal Shock Non-operation Test		Module	-20℃to 60℃,Duration at 30 min , 100cycles		(1),(3),(4)
Shock Non-operating Test		Module	100G,6ms,X Y Z×2faces×3times		(1),(3),(5)
Vibration Non-operating Test		Module	half-sine Frequency: 8Hz ~ 33Hz Stroke: 1.3mm Sweep: 2.9G 33.3Hz ~ 400Hz X, Z Cycle: 15 minutes 2 hrs for each direction of X, Z; 4 hours for Y direction		
ESD Test	Operating	Module	Contact	± 8 KV, 150pF(330Ohm)	(1),(2), (6)
			Air	± 15 KV, 150pF(330Ohm)	

Note (1) A sample can only have one test. Outward appearance, image quality and optical data can only be checked at normal conditions according to the IVO document before reliable test. Only check the function of the module after reliability test.

Note (2) The setting of electrical parameters should follow the typical value before reliability test.

Note (3) During the test, it is unaccepted to have condensate water remains. Besides, protect the module from static electricity.

Note (4) The sample must be released for 24 hours under normal conditions before judging. Furthermore, all the judgment must be made under normal conditions. Normal conditions are defined as follow: Temperature: 25℃, Humidity: 55±10%RH. T_a= Ambient Temperature

Note (5) The module should be fixed firmly in order to avoid twisting and bending.

Note (6) It could be regarded as pass, when the module recovers from function fault caused by ESD after resetting.

7.0 Package Specification TBD

9.0 Using Restriction

This product is not authorized for using in life supporting systems, aircraft navigation control systems, military systems and any other appliance where performance failure could be life-threatening or lead to be catastrophic.

9.1 Operation Precaution

(1)The LCD product should be operated under normal conditions.
Normal conditions are defined as below:

Temperature: 25℃
Humidity: 55±10%
Display pattern: continually changing pattern (Not stationary)

(2) Brightness and response time depend on the temperature. (It needs more time to reach normal brightness in low temperature.)

(3) It is necessary for you to pay attention to condensation when the ambient temperature drops suddenly. Condensate water would damage the polarizer and electrical contacted parts of the module. Besides, smear or spot will remain after condensate water evaporating.

(4) If the absolute maximum rating value was exceeded, it may damage the module.

(5) Do not adjust the variable resistor located on the module.

(6) Sufficient suppression to the electromagnetic interference shall be done by system manufacturers. Grounding and shielding may be important to minimize the interference.

(7) Image sticking may occur when the module displayed the same pattern for long time.

(8) Do not connect or disconnect the module in the “power on” condition. Power supply should always be turned on/off by the “power on/off sequence”

(9) Ultra-violet ray filter is necessary for outdoor operation.

9.2 Mounting Precaution

(1) All the operators should be electrically grounded and with Ion-blown equipment turning on when mounting or handling. Dressing finger-stalls out of the gloves is important for keeping the panel clean during the incoming inspection and the process of assembly.

(2) It is unacceptable that the material of cover case contains acetic or chloric. Besides, any other material that could generate corrosive gas or cause circuit break by electro-chemical reaction is not desirable.

(3) The case on which a module is mounted should have sufficient strength so that external force is not transmitted to the module directly.

(4) It is obvious that you should adopt radiation structure to satisfy the temperature specification.

(5) It should be attached to the system tightly by using all holes for mounting, when the module is assembled. Be careful not to apply uneven force to the module， especially to the PCB on the back.

(6) A transparent protective film needs to be attached to the surface of the module.

(7) Do not press or scratch the polarizer exposed with anything harder than HB pencil lead. In addition, don’t touch the pin exposed with bare hands directly.

(8) Clean the polarizer gently with absorbent cotton or soft cloth when it is dirty.
(9) Wipe off saliva or water droplet as soon as possible. Otherwise, it may cause deformation and fading of color.
(10) Clean the panel gently with absorbent cotton or soft cloth when it is dirty. Ethanol(C2H5OH) is allowed to be used. Ketone (ex. Acetone), Toluene, Ethyl acid, Methyl chloride, etc are not allowed to be used for cleaning the panel, which might react with the polarizer to cause permanent damage.
(11) Do not disassemble or modify the module. It may damage sensitive parts in the LCD module, and cause scratches or dust remains. IVO does not warrant the module, if you disassemble or modify the module.

9.3 Handling Precaution

(1) Static electricity will generate between the film and polarizer, when the protection film is peeled off. It should be peeled off slowly and carefully by operators who are electrically grounded and with Ion-blown equipment turning on. Besides, it is recommended to peel off the film from the bonding area.
(2) The protection film is attached to the polarizer with a small amount of glue. When the module with protection film attached is stored for a long time, a little glue may remain after peeling.
(3) If the liquid crystal material leaks from the panel, keep it away from the eyes and mouth. In case of contact with hands, legs or clothes, it must be clean with soap thoroughly.

9.4 Storage Precaution

When storing modules as spares for long time, the following precautions must be executed.
(1) Store them in a dark place. Do not expose to sunlight or fluorescent light. Keep the temperature between 5℃ and 35℃ at normal humidity.
(2) The polarizer surface should not come in contact with any other object. It is recommended that they be stored in the container in which they were shipped.
(3) It is recommended to use it in a short-time period, after it's unpacked. Otherwise, we would not guarantee the quality.

9.5 Others

When disposing LCD module, obey the local environmental regulations.

LEADTEK DISPLAY

深圳市丽台电子有限公司

Shenzhen Leadtek Electronics Co.,Ltd

Incoming Inspection Standard

品质允收标准

Model N0. /产品型号: Applicable to Leadtek Touch Display Screen

Updated Date /生效日期: 2025.04.01

Version / 版 本 号: V0

Record of Revision /修订履历.

Version /版本号	Revision Record /修订内容	Reviser /修订人	Revision Date /修订日期
V0	首发 / Initial release	Green	2025.04.01

1、Scope of application /适用范围.

适用于丽台电子触摸显示屏/ Applicable to Leadtek Touch Display Screen.

2、Inspection conditions and environment / 检验条件与环境.

2.1、Inspection Conditions / 检验条件:

2.1.1、Inspection Distance / 检测距离: 35cm ±5cm.

2.1.2、Inspection time /检验时间：Displays performance test /功能测试：2~3S /Image，

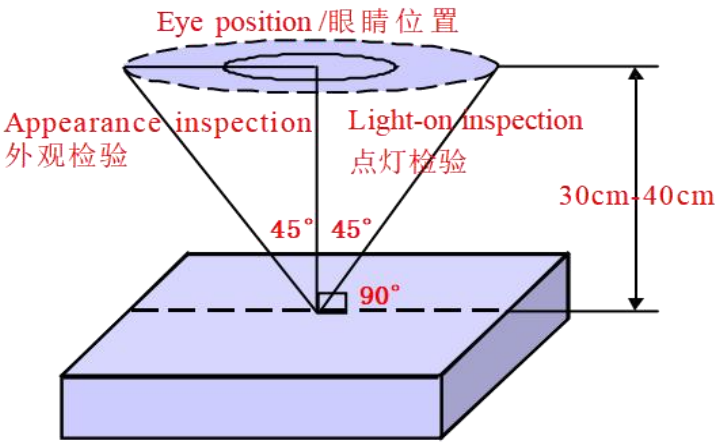
Appearance Inspection / 外观检验：8~10S.

2.1.3、Inspection the viewing angle /检验视角:

Display Inspection Angle /显示检验角度： ±45°.

Appearance Inspection Angle /外观检验角度：±45°.

Eye position /眼睛位置：



(Perpendicular to LCD panel surface /垂直于LCD表面)

2.2、 Inspection environment /检验环境：

Temperature / 温度		25±5℃
Humidity / 湿度		55±5%RH
Brightness 亮度	Appearance Inspection / 外观检验	800~1000 Lux
	Display Inspection / 功能检验	200~300 Lux

2.3、Sampling conditions / 抽样方式.

Sampling Plan /抽样计划		GB/T 2828.1- 2003
		Batch single sampling/批量单次抽样
		General inspection level：Ⅱ/一般检验水平：二级
AQL	Major Defect /主要缺陷	0.25
	Minor Defect /次要缺陷	0.65

3、Terms and definitions /术语和定义.

3.1、Defect classification / 缺陷分类:

3.1.1、Major defects /主要缺陷: Defects that cause the product to fail or reduce the usability of the product / 引起产品功能失效和减少产品的有效使用与操作的缺陷.

3.1.2、Minor defects / 次要缺陷: Defects that do not affect the functionality and effective use and operation of the product / 不影响产品功能和有效使用与操作的缺陷.

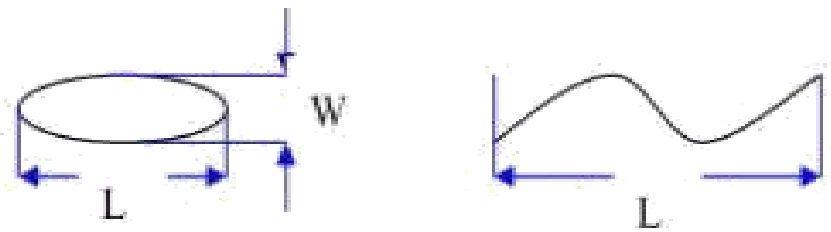
3.2、Point defects / 点状缺陷:

The size of a punctate defect is defined by the diameter D, and the average diameter of the defect is D=1/2(W+L) / 点状缺陷由直径 D 定义大小，缺陷的平均直径 D=1/2(W+L).

3.3、line defects / 线状缺陷:

When defect size L ≥ 2W,the defect count as liner type defect.Size of linear defect is defined by length (L) and the maximum width (W)

当缺陷尺寸 L≥2W 时，被视为线状缺陷，线状缺陷是由长度（L）和最大宽度（W）定义的.



3.4、LCD sub-pixels / LCD 子像素点:

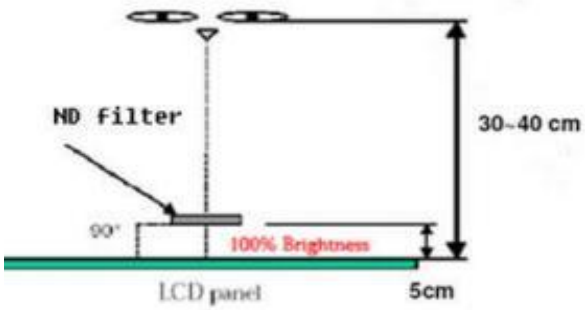
The sub-pixel defect area is greater than 50% of the LCD sub-pixel area, and is visible through ND5% masking

子像素点缺陷面积大于 50% LCD 子像素面积，且透过 ND5%遮盖是可见的.

3.5、ND card test method / ND 卡检验方法:

Hold the ND card about 5cm above the display area, with your eyes 30-40cm away from the panel, and observe for 2~3 seconds

在显示区域上方大约 5cm 处握住 ND 卡，眼睛距离面板 30-40cm，观察 2~3 秒.



3.6、Surface substances that can be cleaned are not considered defects (e.g. finger prints on the protective film, dust particles)

可以被清洁干净的表面物质不视为缺陷 (如保护膜上的手指印，尘粒) .

3.7、Defects that can be covered by the material and are not visible to the eye, and do not affect the function and use are not considered defects

能被物料覆盖目视不可见，且不影响功能与使用的缺陷不视为缺陷.

3.8、AA shows that damage to the glass outside the area does not affect the effective line and does not expand the loss is acceptable

AA 显示区域以外的玻璃损伤，不影响有效线路和不会在扩大损失的是可以接受的.

3.9、Issues not specified or defined in this document shall be dealt with through friendly negotiation between the parties / 本文件中未规定或定义的问题，双方友好协商处理.

4.0、Inspection standards /检验标准:

4.1、Structural size standards / 结构尺寸标准:

Measurement items /测量项目		Specification /规格	Remark /备注
Name/名称	Unit /单位	Tolerance /公差	
Outside dimension：Length 尺寸：长	mm /毫米	0.10mm~0.3mm	Please refer to the product specification for detailed dimensions and tolerances 详细的尺寸规格和公差请参考产品规格书
Outside dimension：Width 尺寸：宽	mm /毫米	0.10mm~0.3mm	
Outside dimension：Thickness 尺寸：厚	mm /毫米	0.20mm~0.50mm	

4.2、Appearance Inspection standards:

(D ： diameter, W ： width, L ： length, N ： quantity, DS ： spacing)

Material 检验区域	Inspection items 检验项目	Product size 适用尺寸	Inspection standards 检验规格	Category 缺陷类别	
LCD	ITO	Full size 全尺寸	ITO can't open circuit, short circuit, ITO notch cannot exceed 70% of width. ITO 不能有开路和短路，ITO 缺口不能超过宽度的 70%.	MA	
	Corners broken 崩边/崩角	Full size 全尺寸	1、It cannot affect the appearance of valid routes and functions; 不能影响有效线路和功能外观.	MA	
			2、There must be no extensible rips 不能有可延伸性裂纹.	MA	
Silicone 硅胶	Silicone coating 硅胶涂布	Full size 全尺寸	1、The height cannot exceed the LCD CF surface / 高度不能超过 LCD CF 面.		MI
			2、No overflow and lack of glue / 不能溢胶和缺胶.		MI
			3、Silicone cannot cover POL and FPC/ 硅胶不能覆盖到 POL 和 FPC.		MI

Material 检验区域	Inspection items 检验项目	Product size 适用尺寸	Inspection standards 检验规格	Category 缺陷类别	
PCBA FPC Connector 连接器	Appearance 表面外观	Full size 全尺寸	1.FPC is not allowed to have drape/bubble/fold / 不允许有披锋/气泡/褶皱.		MI
			2.Surface scratches do not allow copper leakage / 表面划伤不允许出现漏铜.	MA	
			3.Cracking is not allowed / 不允许破裂.	MA	
			4.Gold finger oxidation is not allowed 不允许金手指氧化.	MA	
			5.Chromatic aberration is not allowed 不允许出现色差.	MA	
	Components 元器件	Full size 全尺寸	1. Damage, missing parts, and incorrect models are not allowed 不允许损伤、缺件、型号错误.	MA	
			2.Components need to be insulated with high temperature adhesive (unless not required by the drawings) / 元器件需要有高温胶绝缘保护（除非图纸无要求）.		MI
	Weld 焊接	Full size 全尺寸	1. False soldering, virtual soldering, and tinning are not allowed 不允许假焊、虚焊、连锡.	MA	
			2. No solder bead residue is allowed 不允许有锡珠残留.		MI
			3.The pads need to be glued with high temperature (unless not required by the drawings) / 焊盘需贴高温胶（除非图纸无要求）.		MI
POL 偏光片	Scratches 划伤	Under 6 inches 6 寸以下	1.W≤0.05mm；L≤5mm，Ignore（忽略）. 2.0.05mm＜W≤0.10mm；L≤5mm；N≤2; DS≥10mm. 3.0.10mm＜W；5mm＜L，Not allowable（不允许）.		MI
		6~10.0 inches 6 寸~10.0 寸	1.W≤0.07mm；L≤5mm，Ignore（忽略）. 2.0.07mm＜W≤0.12mm；L≤10mm；N≤3；DS≥10mm. 3.0.12mm＜W；10mm＜L，Not allowable（不允许）.		MI
		More than 10 inches 10 寸以上	1.W≤0.10mm；L≤5mm，Ignore（忽略）. 2.0.10mm＜W≤0.15mm；L≤10mm；N≤4；DS≥10mm. 3.0.15mm＜W；10mm＜L，Not allowable（不允许）.		MI

Material 检验区域	Inspection items 检验项目	Product size 适用尺寸	Inspection standards 检验规格	Category 缺陷类别	
POL 偏光片	Bubbles	Under 6 inches 6 寸以下	1.D≤0.15mm，Ignore（忽略）. 2.0.15mm＜D≤0.30mm；N≤2；DS≥10mm. 3.D＞0.30mm，Not allowable（不允许）.		MI
		More than 6 inches 6 寸以上	1.D≤0.20mm，Ignore（忽略）. 2.0.20mm＜D≤0.40mm；N≤3；DS≥10mm. 3.D＞0.40mm，Not allowable（不允许）.		MI
	Bubbles around the edges 边缘气泡	Full size 全尺寸	1.Within 1/2BM of the display area, it is not allowed 显示区往外 1/2BM 区域内，不允许. 2.The display area is 1/2 outside the BM area, and it is not controlled 显示区往外 1/2BM 区域以外，不管控.		MI
	Point defects Embossing	Under 6 inches 6 寸以下	1.D≤0.15mm，Ignore（忽略）. 2.0.15mm＜D≤0.30mm；N≤2；DS≥10mm. 3.D＞0.30mm，Not allowable（不允许）.		MI
		6~10.0 inches 6 寸~10.0 寸	1.D≤0.20mm，Ignore（忽略）. 2.0.20mm＜D≤0.40mm；N≤3；DS≥10mm. 3.D＞0.40mm，Not allowable（不允许）.		MI
		More than 10 inches 10 寸以上	1.D≤0.25mm，Ignore（忽略）. 2.0.25mm＜D≤0.50mm；N≤4；DS≥10mm. 3.D＞0.50mm，Not allowable（不允许）.		MI
	Dirty 脏污	Full size 全尺寸	Dirt, finger prints, etc. are not allowed 不允许有脏污、手指印等.		MI
	Warping 起翘	Full size 全尺寸	Not allowed 不允许.		MI
	Paste offset 贴附偏位	Full size 全尺寸	It is not allowed to exceed the patch tolerance required by the drawing; After TP lamination, it is not allowed to leak the edges of the polarizer 不允许超出图纸要求的贴片公差；在 TP 贴合后不允许漏偏光片边缘.		MI
	Angle mistake 角度错误	Full size 全尺寸	Not allowed 不允许.	MA	
	Mixture 混料	Full size 全尺寸	Not allowed 不允许.	MA	

Material 检验区域	Inspection items 检验项目	Product size 适用尺寸	Inspection standards 检验规格	Category 缺陷类别	
TP	Scratches 划伤	Under 6 inches 6 寸以下	1.W≤0.05mm；L≤5mm，Ignore（忽略）. 2.0.05mm＜W≤0.10mm；L≤5mm；N≤2；DS≥10mm. 3.0.10mm＜W；5mm＜L，Not allowable（不允许）. 4.There is a feeling scratch，Not allowable 有感划伤，不允许.		MI
		6~10.0 inches 6 寸~10.0 寸	1.W≤0.07mm；L≤5mm，Ignore（忽略）. 2.0.07mm＜W≤0.12mm；L≤10mm；N≤3；DS≥10mm. 3.0.12mm＜W；10mm＜L，Not allowable（不允许）. 4.There is a feeling scratch，Not allowable 有感划伤，不允许.		MI
		More than 10 inches 10 寸以上	1.W≤0.10mm；L≤5mm，Ignore（忽略）. 2.0.10mm＜W≤0.15mm；L≤10mm；N≤4；DS≥10mm. 3.0.15mm＜W；10mm＜L，Not allowable（不允许）. 4.There is a feeling scratch，Not allowable 有感划伤，不允许.		MI
	Black dots white dots 黑点/白点	Under 6 inches 6 寸以下	1.D≤0.15mm，Ignore（忽略）. 2.0.15mm＜D≤0.30mm；N≤2；DS≥10mm. 3.D＞0.30mm，Not allowable（不允许）.		MI
		6~10.0 inches 6 寸~10.0 寸	1.D≤0.20mm，Ignore（忽略）. 2.0.20mm＜D≤0.40mm；N≤3；DS≥10mm. 3.D＞0.40mm，Not allowable（不允许）.		MI
		More than 10 inches 10 寸以上	1.D≤0.25mm，Ignore（忽略）. 2.0.25mm＜D≤0.50mm；N≤4；DS≥10mm. 3.D＞0.50mm，Not allowable（不允许）.		MI
	OCA Bubbles 气泡	Full size 全尺寸	Not allowed 不允许.		MI
	Corners broken 崩边/崩角	Full size 全尺寸	1.Product front /产品正面：Edge and corner chipping is not allowed / 崩角、崩边不允许 2.Product back /产品背面: X≤ 0.5 , Y≤0.5，Z≤1/2T；N≤4；DS≥10mm.	MA	
	Silk screen 丝印	Full size 全尺寸	The silk screen is clear, complete and correct 丝印清晰、完整、内容正确.		MI

Material 检验区域	Inspection items 检验项目	Product size 适用尺寸	Inspection standards 检验规格	Category 缺陷类别	
TP	Dirty 脏污	Full size 全尺寸	Uncleanable dirt，Not allowable. 不可擦拭的脏污，不允许.		MI
	Broken 破损	Full size 全尺寸	Not allowable. 不允许.		MI
	Ink color aberration 油墨色差	Full size 全尺寸	ΔE>1，Not allowable（不允许）.		MI
	Cover pinholes 针孔	Full size 全尺寸	1.D≤0.20mm , N≤2 , DS≥10mm，allowable 2.D > 0.20mm，intensive pinholes（密集型针孔），Not allowable（不允许）.		MI
	Paint off 掉漆	Full size 全尺寸	Touch-up on the back of the cover is allowed, and the touch-up area cannot exceed 2.0mm in diameter / 允许在盖板背面补漆，补漆面积不能超过直径 2.0mm.		MI
BL 背光	Backlight separation 背光分离	Full size 全尺寸	Not allowable 不允许.		MI
	Deformed 变形	Full size 全尺寸	Measured using a plug gauge，If the deformation exceeds 0.3mm, NG is judged 使用塞规测量，形变超过 0.3mm，判定 NG.		MI
	Iron frame Oxidation /abscission 铁框氧化/脱落	Full size 全尺寸	Not allowable 不允许.		MI
	Dirt/adhesive residue/solder beads 脏污/残胶/锡珠	Full size 全尺寸	Not allowable 不允许.		MI
	Inkjet/barcode/ QR code 喷码/条码/二维码	Full size 全尺寸	The inkjet code is clear and complete, the barcode and QR code can be scanned normally, and the content and format meet the requirement / 喷码清晰完整、条码和二维码可正常扫描，内容和格式与要求相符.		MI
	Auxiliary materials 辅料	Full size 全尺寸	Accessories (vinyl, double-sided tape, insulating glue, etc.) are not allowed to be missed, misguided, defective, etc 辅料（黑胶、双面胶、绝缘胶等）不允许有漏贴、贴偏、残缺等.		MI

4.3、Functional inspection standards:

(D ： diameter,　W ： width,　L ： length,　N ： quantity,　DS ： spacing)

Material 检验区域	Inspection items 检验项目	Product size 适用尺寸	Inspection standards 检验规格	Category 缺陷类别	
Display Screen 模组	Light leakage / Mura 漏光/ Mura	Full size 全尺寸	1.Use ND5% filter masking, visual invisibility is OK 使用 ND5%遮盖，目视不可见即为 OK. 2.If necessary, sign off on the sample 必要时，签限定样.		MI
	Brightness uniformity 亮度均匀性	Full size 全尺寸	Brightness uniformity < 85.0%，Not allowable 亮度均匀性 < 85.0%，不允许.	MA	
	LCD bright spots/dark spots 玻璃亮点/暗点	Under 6 inches 6 寸以下	1.D≤0.10mm，Ignore（忽略）. 2.0.10mm < D≤0.20mm；N≤2；DS≥10mm. 3.D > 0.20mm，Not allowable（不允许）.		MI
		6~10.0 inches 6 寸~10.0 寸	1.D≤0.15mm，Ignore（忽略）. 2.0.15mm < D≤0.30mm；N≤3；DS≥10mm. 3.D > 0.30mm，Not allowable（不允许）.		MI
		More than 10 inches 10 寸以上	1.D≤0.20mm，Ignore（忽略）. 2.0.20mm < D≤0.40mm；N≤4；DS≥10mm. 3.D > 0.40mm，Not allowable（不允许）.		MI
	Backlight black dots/white dots 背光黑点/白点	Under 6 inches 6 寸以下	1.D≤0.15mm，Ignore（忽略）. 2.0.15mm < D≤0.30mm；N≤2；DS≥10mm. 3.D > 0.30mm，Not allowable（不允许）.		MI
		6~10.0 inches 6 寸~10.0 寸	1.D≤0.20mm，Ignore（忽略）. 2.0.20mm < D≤0.40mm；N≤3；DS≥10mm. 3.D > 0.40mm，Not allowable（不允许）.		MI
		More than 10 inches 10 寸以上	1.D≤0.25mm，Ignore（忽略）. 2.0.25mm < D≤0.50mm；N≤4；DS≥10mm. 3.D > 0.50mm，Not allowable（不允许）.		MI
	Linear foreign bodies 线状异物	Under 6 inches 6 寸以下	1.W≤0.05mm；L≤5mm，Ignore（忽略）. 2.0.05mm < W≤0.10mm ; L≤5mm ; N≤2; DS≥10mm. 3.0.10mm < W；5mm < L，Not allowable（不允许）.		MI
		6~10.0 inches 6 寸~10.0 寸	1.W≤0.07mm；L≤5mm，Ignore（忽略）. 2.0.07mm < W≤0.12mm ; L≤10mm ; N≤3 ; DS≥10mm. 3.0.12mm < W；10mm < L，Not allowable（不允许）.		MI
		More than 10 inches 10 寸以上	1.W≤0.10mm；L≤5mm，Ignore（忽略）. 2.0.10mm<W≤0.15mm ; L≤10mm ; N≤4 ; DS≥10mm. 3.0.15mm < W；10mm < L, Not allowable（不允许）.		MI

Material 检验区域	Inspection items 检验项目	Product size 适用尺寸	Inspection standards 检验规格	Category 缺陷类别	
Display Screen 模组	White/Black print 白印/黑印	Full size 全尺寸	Use ND5% filter masking, visual invisibility is OK 使用 ND5%遮盖，目视不可见即为 OK.		MI
	Interference pattern/Newtonian pattern 干涉纹/牛顿纹	Full size 全尺寸	Not allowable 不允许.		MI
	Membranes displacement 膜材移位	Full size 全尺寸	Not allowable 不允许.		MI
	Color blocks 色斑	Full size 全尺寸	Use ND5% filter masking, visual invisibility is OK /使用 ND5%遮盖，目视不可见即为 OK.		MI
	Display abnormal 画异	Full size 全尺寸	Not allowable 不允许.	MA	
	No display 无显示	Full size 全尺寸	Not allowable 不允许.	MA	
	Line/Missing Drawing 线条/缺画	Full size 全尺寸	Not allowable 不允许.	MA	
	Splash screen 闪屏	Full size 全尺寸	Not allowable 不允许.	MA	
	LCD grid LCD 网格	Full size 全尺寸	Not allowable 不允许.	MA	
	Afterimage 残影	Full size 全尺寸	Not allowable 不允许.	MA	
	Wrong viewing angle 可视角错误	Full size 全尺寸	Not allowable 不允许.	MA	
TP	No touch 无触摸	Full size 全尺寸	Not allowable 不允许.	MA	
	Touch the jump point 触摸跳点	Full size 全尺寸	Not allowable 不允许.	MA	
	Touch not sensitive 触摸不灵敏	Full size 全尺寸	Not allowable 不允许.	MA	