Shenzhen Leadtek Electronics Co.,Ltd

PRODUCT SPECIFICATION

TFT-LCD   MODULE

Module No：LTK040BFBLM45-V0

☑ Preliminary Specification

☐ Approval Specification

Designed by	Checked by	Approved by
jona	*Jerry*	*lan*

Final Approval by Customer

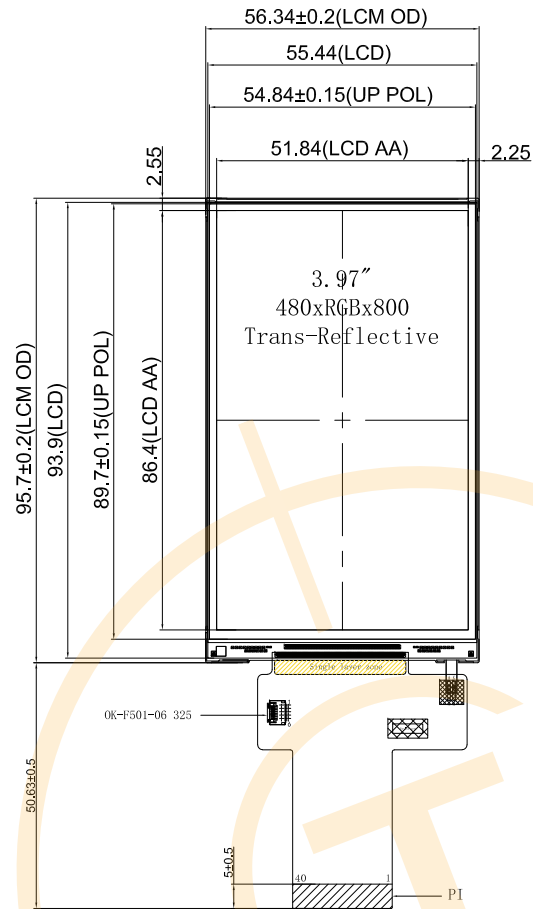| Approved by	Comment
	Distributed by: TEXIM EUROPE www.texim-europe.com

※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

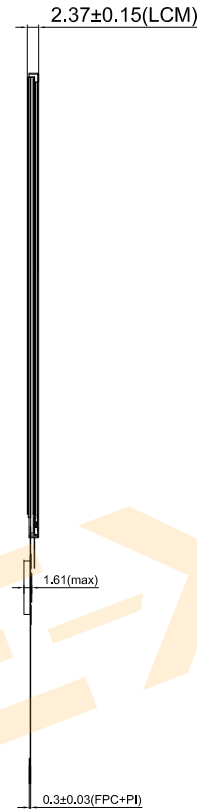| Version	Contents	Date	Note
V0	Initial version	2024.11.10	

2. General Description

N0	Item	Specification	Unit	Remark
1	LCD Size	TFT"3.97	inch	-
2	Panel Type	TN	-	-
3	Display Resolution	480 x RGB x800	pixel	-
4	Display mode	Normally White /Reflective	-	-
5	Display colors	16.7M	colors.	-
6	Viewing Direction	6, o'clock	-	-
7	LCM Module Size	56.34(H)x 95.7(V) x2.37 (T)	mm	Note
8	Active Area	54.84 (H)x 86.4 (V)	mm	Note
9	Pixel Pitch	0.108(H) x 0.108(V)	mm	-
10	Weight	TBD	g	-
11	Driver IC	ST7701S	bit	-
12	Light Source	-	-	-
13	Interface	MIPI 2 Lanes	-	-

3. Mechanical Drawing

Front View

56.34±0.2(LCM OD)
55.44(LCD)
54.84±0.15(UP POL)
51.84(LCD AA)
2.25
2.55

95.7±0.2(LCM OD)
93.9(LCD)
89.7±0.15(UP POL)
86.4(LCD AA)

3.97″
480xRGBx800
Trans-Reflective

50.63±0.5
5±0.5
40   1
PI
OK-F501-06 325

Side View

2.37±0.15(LCM)
1.61(max)
0.3±0.03(FPC+PI)

3.5±0.3
1   40
0.5±0.1
0.3±0.1
19.5±0.1
20.5±0.2

Back View

Model label

LTK040BFBLM45-V0
YYYY.MM.DD
QR code

Reinforcement of steel
sheet T=0.2mm
Cancel during proofing

Conductive double-sided tape T=0.05mm
Conductive double-sided tape T=0.00mm

PIN#	ASSIGNMENT
1	GND
2	VDD3.3V
3	SCL3.3V
4	SDA3.3V
5	INT3.3V
6	RST3.3V

LEDA ▷|◁ ▷|◁ ▷|◁ ▷|◁ ▷|◁ ▷|◁ ▷|◁ ▷|◁ LEDK

IF=20mA,VF=24±2.4V

Notes:
1. Display : 3.97″, TFT
2. Resolution: 480xRGBx800
3. LCD Viewing Direction: 6' clock
5. Display Mode: Normally white
6. LCM Brightness: 135cd/m²(TYP)
7. unmark Tolerance:±0.2
8. OPERATING TEMP: −20° C~+70° C
9. STORAGE TEMP: −30° C~+80° C
10. Requirements on Environmental Protection: ROHS
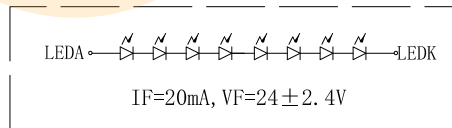
LEADTEK DISPLAY
Shenzhen Leadtek Electronics Co.,Ltd

SCALE:1/1	UNIT:mm	PAGE:1/1		Approve	Check	Drawn
Part No:	LTK040BFBLM45		VER:V0	IAN	JONA	KEVIN
Customer No:						

3				
2				
1				
0	NEW		2024.10.15	KEVIN
REV	DESCRIPTION		DATE	NAME

4.0 Interface Pin Connection

N0	Symbol	Function
1	GND	Power ground.
2	MIPI_D0+	MIPI_DP0+ are differential data signal line
3	MIPI_D0-	MIPI_DP0- are differential data signal line
4	GND	Power ground.
5	MIPI_D1+	MIPI_DP1+ are differential data signal line
6	MIPI_D1-	MIPI_DP1- are differential data signal line
7	GND	Power ground.
8	MIPI_CLK+	CLOCK Lane positive-end input pin
9	MIPI_CLK-	CLOCK Lane engative-end input pin
10	GND	Power ground.
11	MIPI_D2+	MIPI_DP2+ are differential data signal line
12	MIPI_D2-	MIPI_DP2- are differential data signal line
13	GND	Power ground.
14	MIPI_D3+	MIPI_DP3+ are differential data signal line
15	MIPI_D3-	MIPI_DP3- are differential data signal line
16	GND	Power ground.
17	GND	Power ground.
18	IOVCC(1.8V)	A supply voltage to the digital circuit. (1.8V)
19	IOVCC(1.8V)	A supply voltage to the digital circuit. (1.8V)
20	TP-VDD	Not connect
21	TP-SDA	Not connect
22	TP-SCL	Not connect
23	TP-GND	Not connect
24	RSTB	Reset signal（Low: Active).
25	NC	Not connect
26	TP-INT	Not connect
27	GND	Power ground.
28	LED-	LED cathode.

29	LED-	LED cathode.
30	GND	Power ground.
31	NC	Not connect
32	GND	Power ground.
33	GND	Power ground.
34	NC	Not connect
35	LED+	LED anode.
36	LED+	LED anode.
37	GND	Power ground.
38	VCC(3.3V)	A supply voltage to the digital circuit. (3.3V)
39	VCC(3.3V)	A supply voltage to the digital circuit. (3.3V)
40	TP-RESET	Not connect

5.0 Absolute Maximum Ratings

5.1 Electrical Absolute Rating

5.1.1 TFT LCD Module

Item	Symbol	Min.	Max.	Unit	Note
Power supply voltage	IOVCC	1.65	3.3	V	GND=0
Power supply voltage	VCI	2.65	3.3	V	GND=0
Back-light supply voltage	VF	24	25.4	V	GND=0

Note (1) Stresses above those listed under "Absolute Maximum Rating" may cause permanent damage to the device. These are stress ratings only. Functional operation of this device at indicated in the operational sections(6.1) of this specification.

5.2 Environment Absolute Rating

Item	Symbol	Min.	Max.	Unit	Note
Operating Temperature	Topa	-20	70	℃	
Storage Temperature	Tstg	-30	80	℃	

5.3 Back-light Unit:

PARAMETER	Sym.	Min.	Typ.	Max.	Unit	Test Condition	Note
LED Current	IF	–	20	–	mA	–	–
LED Voltage	VF	–	24	–	V	–	–
LCM Brightness	Lv	–	135	–	Nits	@CA310	
Life Time		–	30000	–	Hr.	I≦20mA	–
Color	White						

Note (1) Permanent damage may occur to the LCD module if beyond this specification. Functional operation should be restricted to the conditions described under normal operating conditions.

    (2)Ta=25±2℃

    (3)Test condition: LED Current 20mA

LEDA ○—▷|—▷|—▷|—▷|—▷|—▷|—▷|—▷|—○ LEDK

$$IF=20mA, VF=24\pm2.4V$$
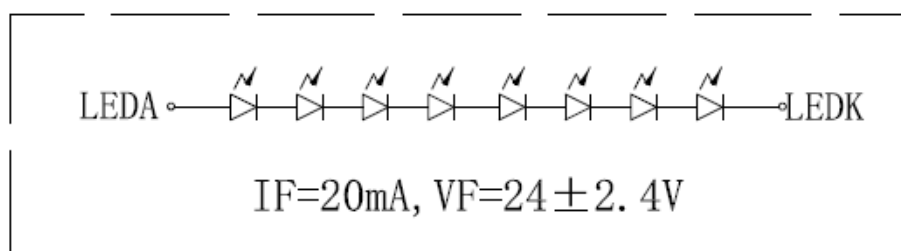
6.Timing Characteristics

**Timing POWER ON/OFF SEQUENCE**

VDDI and VDDA can be applied or powered down in any order. During the Power Off sequence, if the LCD is in the Sleep Out mode, VDDA and VDDI must be powered down with minimum 120msec. If the LCD is in the Sleep In mode, VDDA and VDDI can be powered down with minimum 0msec after the RESX is released.

CSX can be applied at any timing or can be permanently grounded. RESX has high priority over CSX.

Notes:

1. There will be no damage to the ST7701S if the power sequences are not met.

2. There will be no abnormal visible effects on the display panel during the Power On/Off Sequences.

3. There will be no abnormal visible effects on the display between the end of Power On Sequence and before receiving the Sleep Out command, and also between receiving the Sleep In command and the Power Off Sequence.

4. If the RESX line is not steadily held by the host during the Power On Sequence as defined in Sections 9.1 and 9.2, then it will be necessary to apply the Hardware Reset (RESX) after the completion of the Host Power On Sequence to ensure correct operations. Otherwise, all the functions are not guaranteed.

The power on/off sequence is illustrated below
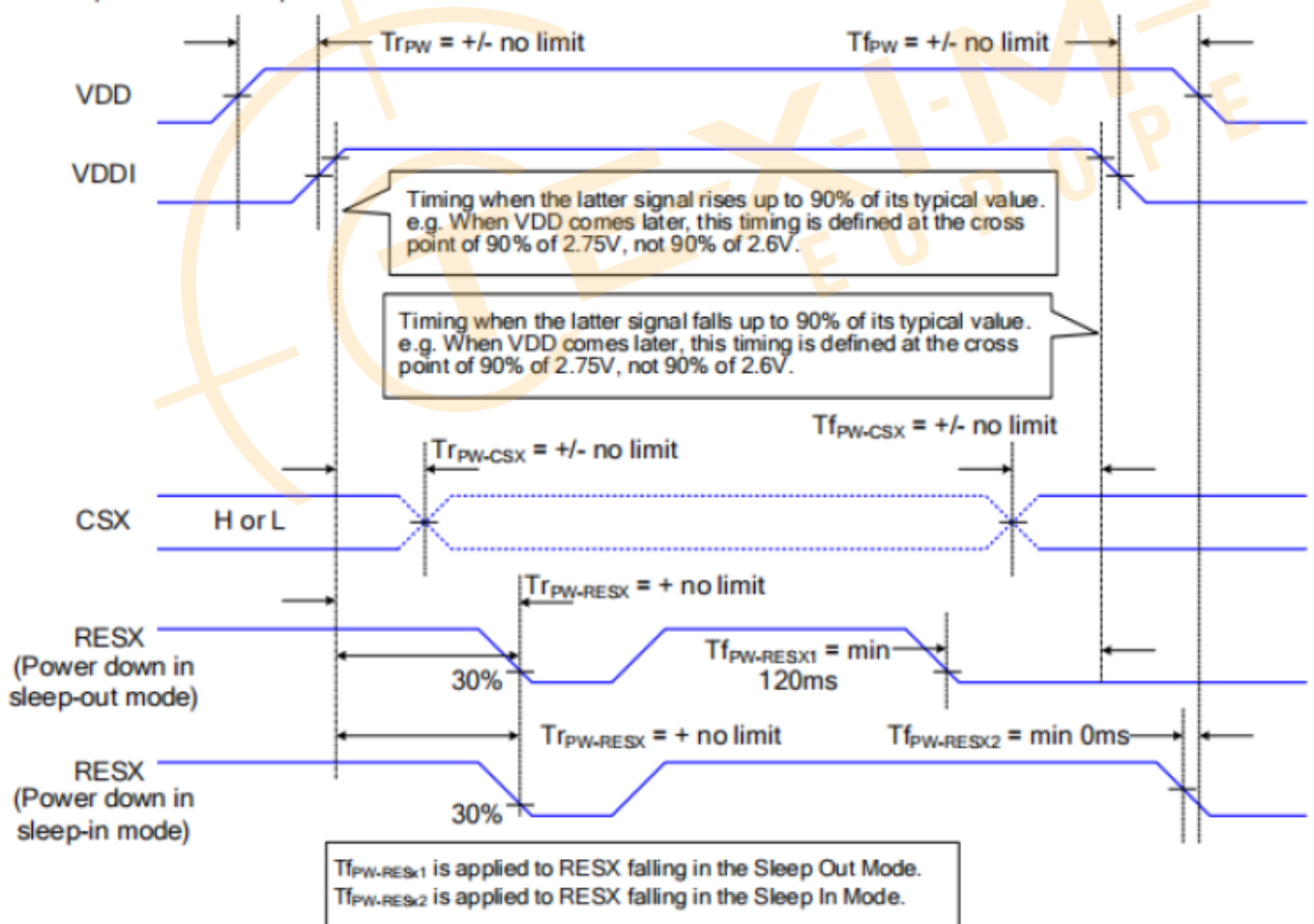
DSI-MIPI Interface Timing Characteristics of IC

**High Speed Mode**

DSI clock channel timing

Rising and falling time on clock and data channel
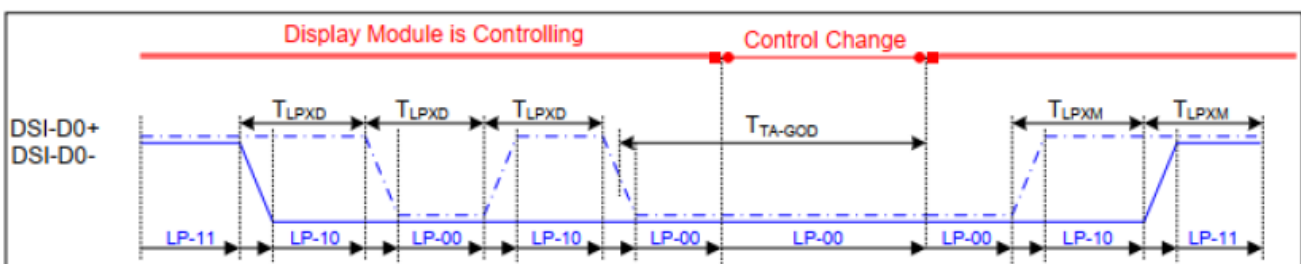
VDDI=1.8,VDD=2.8, AGND=DGND=0V, Ta=25 ℃

Signal	Symbol	Parameter	MIN	MAX	Unit	Description
DSI-CLK+/-	$2xUI_{INSTA}$	Double UI instantaneous	4	25	ns	
DSI-CLK+/-	UI_{INSTA} UI_{INSTB}	UI instantaneous halfs	2	12.5	ns	$UI = UI_{INSTA} = UI_{INSTB}$
DSI-Dn+/-	tDS	Data to clock setup time	0.15	-	UI	
DSI-Dn+/-	tDH	Data to clock hold time	0.15	-	UI	

Mipi Interface- High Speed Mode Timing Characteristics

Lowe Power Mode
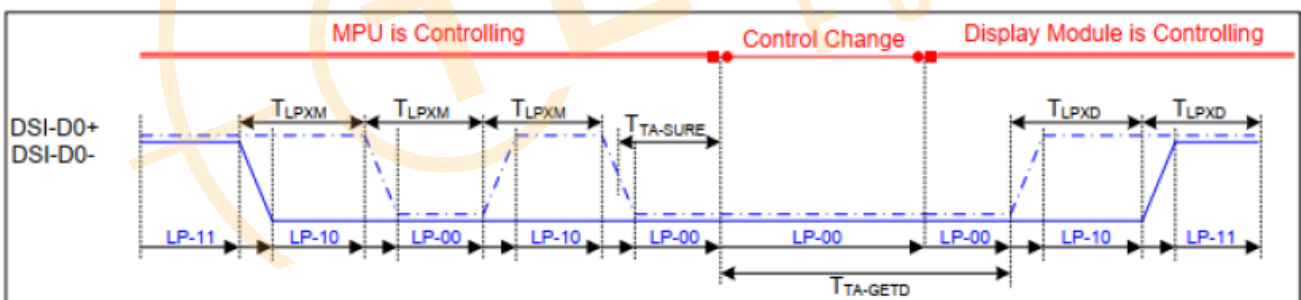
Bus Turnaround (BTA) from display module to MPU Timing

Bus Turnaround (BTA) from MPU to display module Timing

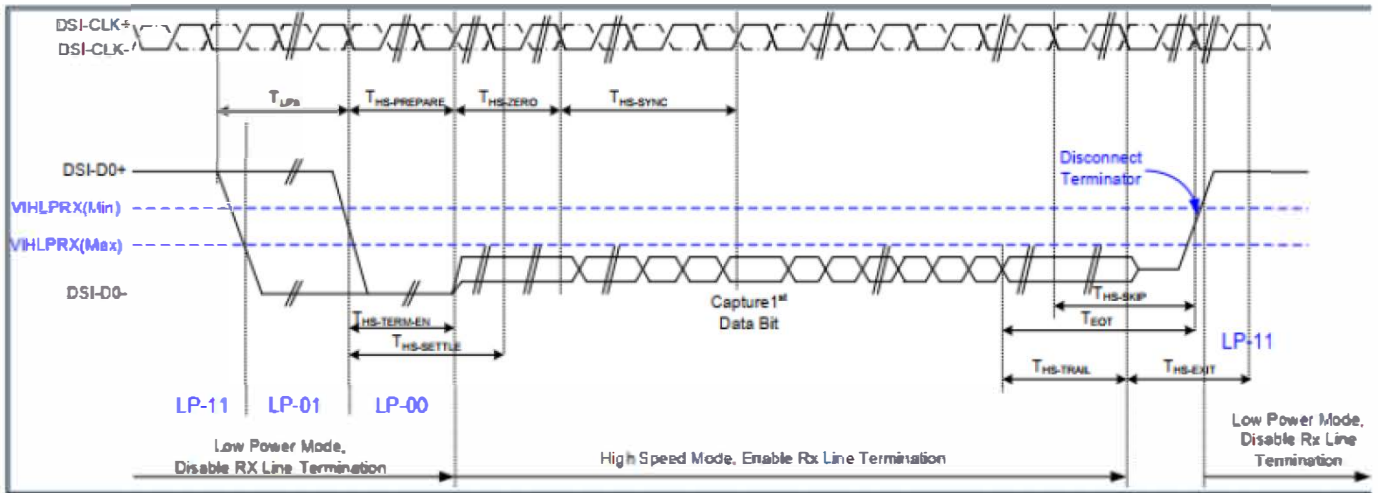*VDDI=1.8,VDD=2.8, AGND=DGND=0V, Ta=25 ℃*

Signal	Symbol	Parameter	MIN	MAX	Unit	Description
DSI-D0+/-	TLPXM	Length of LP-00,LP-01, LP-10 or LP-11 periods MPU→Display Module	50	75	ns	Input
DSI-D0+/-	TLPXD	Length of LP-00,LP-01, LP-10 or LP-11 periods MPU→Display Module	50	75	ns	Output
DSI-D0+/-	TTA-SURED	Time-out before the MPU start driving	T_{LPXD}	$2 \times T_{LPXD}$	ns	Output
DSI-D0+/-	TTA-GETD	Time to drive LP-00 by display module	$5 \times T_{LPXD}$		ns	Input
DSI-D0+/-	TTA-GOD	Time to drive LP-00 after turnaround request-MPU	$4 \times T_{LPXD}$		ns	Output

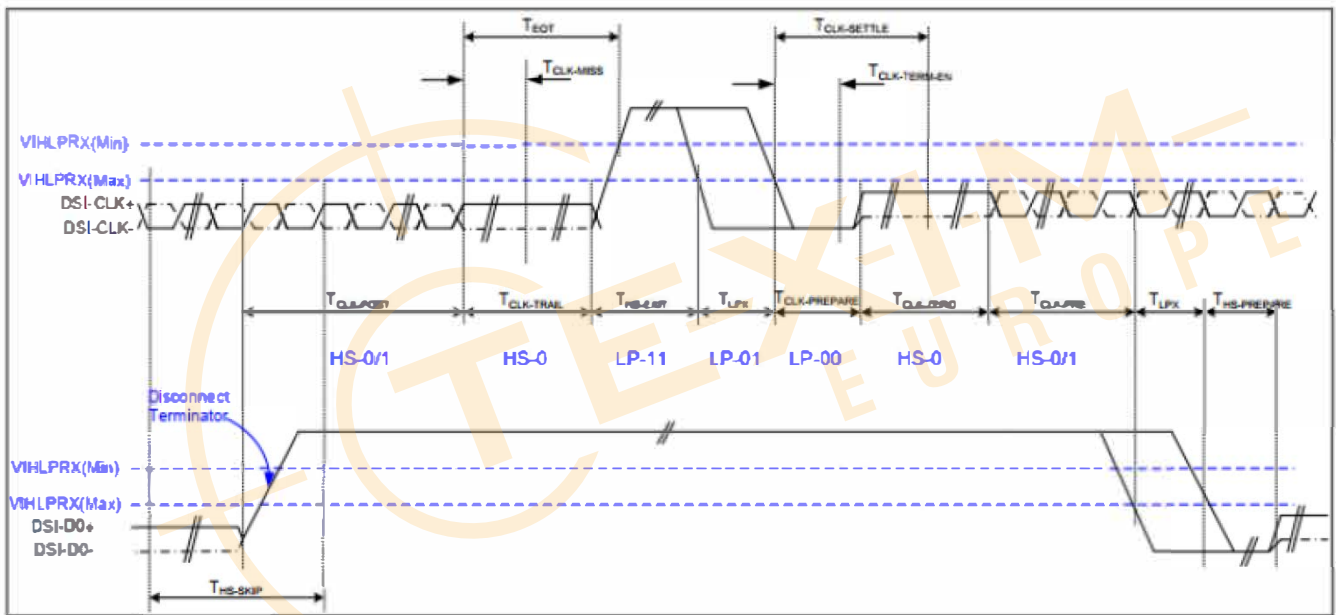**Mipi Interface Low Power Mode Timing Characteristics**

DSI Bursts Mode

DSI Bursts Mode

Data lanes-Low Power Mode to/from High Speed Mode Timing

Clock lanes- High Speed Mode to/from Low Power Mode Timing

VDDI=1.8,VDD=2.8, AGND=DGND=0V, Ta=25 ℃

Signal	Symbol	Parameter	MIN	MAX	Unit	Description
		Low Power Mode to High Speed Mode Timing				
DSI-Dn+/-	TLPX	Length of any low power state period	50	-	ns	Input
DSI-Dn+/-	THS-PREPARE	Time to drive LP-00 to prepare for HS transmission	40+4 UI	85+6 UI	ns	Input
DSI-Dn+/-	THS-TERM-EN	Time to enable data receiver line termination measured from when Dn crosses VILMAX	-	35+4 UI	ns	Input
DSI-Dn+/-	THS-PREPARE + THS-ZERO	THS-PREPARE + time to drive HS-0 before the sync sequence	140+ 10UI	-	ns	Input
		High Speed Mode to Low Power Mode Timing				
DSI-Dn+/-	THS-SKIP	Time-out at display module to ignore transition period of EoT	40	55+4 UI	ns	Input
DSI-Dn+/-	THS-EXIT	Time to drive LP-11 after HS burst	100	-	ns	Input
DSI-Dn+/-	THS-TRAIL	Time to drive flipped differential state after last payload data bit of a HS transmission burst	60+4 UI	-	ns	Input
		High Speed Mode to/from Low Power Mode Timing				
DSI-CLK+/-	TCLK-POS	Time that the MPU shall continue sending HS clock after the last associated data lane has transition to LP mode	60+5 2UI	-	ns	Input
DSI-CLK+/-	TCLK-TRAIL	Time to drive HS differential state after last payload clock bit of a HS transmission burst	60	-	ns	Input
DSI-CLK+/-	THS-EXIT	Time to drive LP-11 after HS burst	100	-	ns	Input
DSI-CLK+/-	TCLK-PREPARE	Time to drive LP-00 to prepare for HS transmission	38	95	ns	Input
DSI-CLK+/-	TCLK-TERM-EN	Time-out at clock lan display module to enable HS transmission	--	38	ns	Input
DSI-CLK+/-	TCLK-PREPARE + TCLK-ZERO	Minimum lead HS-0 drive period before starting clock	300	-	ns	Input
DSI-CLK+/-	TCLK-PRE	Time that the HS clock shall be driven prior to any associated data lane beginning the transition from LP to HS mode	8UI	-	ns	Input
DSI-CLK+/-	TEOT	Time form start of TCLK-TRAIL period to start of LP-11 state	-	105ns +12 UI	ns	Input

Reset Description：
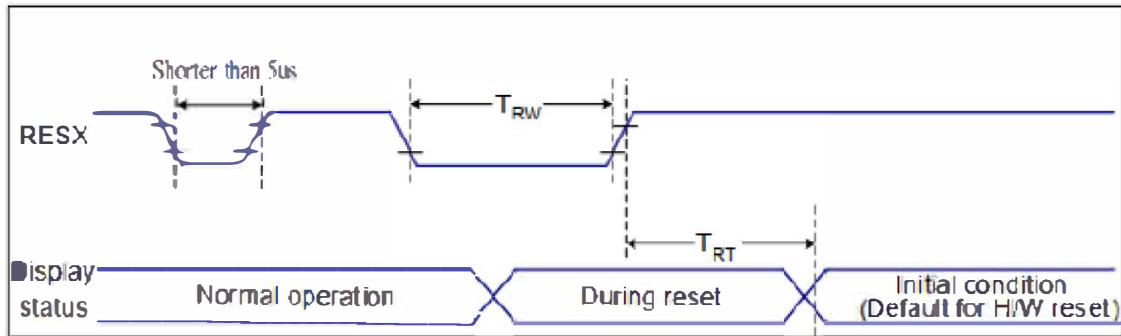
Figure 9 Reset Timing

VDD1=1.8, VDD=2.8, AGND=0GND=0V, Ta=25 ℃

| Related Pins	Symbol	Parameter	MIN	MAX	Unit
RESX	TRW	Reset pulse duration	10	-	us
	TRT	Reset cancel	-	5 (Note 1, 5)	ms
				120(Note 1, 6, 7)	ms

Table 9 Reset Timing

Notes:

1. The reset cancel includes also required time for loading ID bytes, VCOM setting and other settings from NVM (or similar device) to registers. This loading is done every time when there is HW reset cancel time (tRT) within 5 ms after a rising edge of RESX.

2. Spike due to an electrostatic discharge on RESX line does not cause irregular system reset according to the table below:

RESX Pulse	Action
Shorter than 5us	Reset Rejected
Longer than 9us	Reset
Between 5us and 9us	Reset starts

3. During the Resetting period, the display will be blanked (The display is entering blanking sequence, which maximum time is 120 ms, when Reset Starts in Sleep Out –mode. The display remains the blank state in Sleep In –mode.) and then return to Default condition for Hardware Reset.

4. Spike Rejection also applies during a valid reset pulse as shown below:
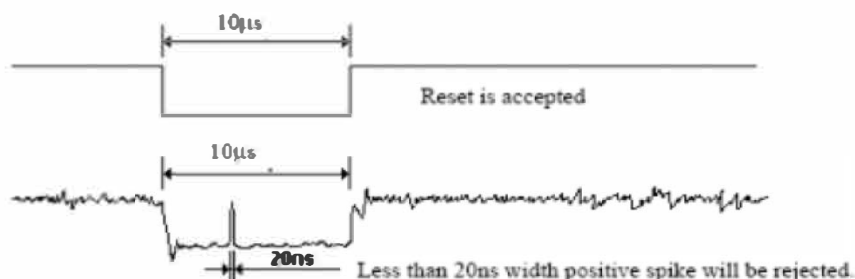
5. When Reset applied during Sleep In Mode.

6. When Reset applied during Sleep Out Mode.

7. It is necessary to wait 5msec after releasing RESX before sending commands. Also Sleep Out command cannot be sent for 120msec.

7.0 OPTICAL SPECIFICATIONS

7.1 Overview

The test of optical specifications shall be measured at 25±2℃ and at the center of the measuring spot on the Display surface shall stay fixed. The backlight should be operating for 30 minutes prior to measurement (Transmittance mode).

Transmittance Mode (BLU ON), Reflection Mode(BLU OFF)

Optical should be tested base on BOE's POL and Backlight (Color Rank：B03，SuiJing；Bef*2)

Optics should be tested without fingerprint and smudge on panel after peeling off the protective film of polarizer.

Item		B2 SPEC	Remark
Transmittance	**Transmittance**	Min 1.1%；Typ 1.5%	Test equipment：M1，Note 4.3
	CR	Min 30:1；Typ 45:1	Test equipment：M3，Note 4.2
	Color Gamut（NTSC）	Min 15%；Typ 20%	Only CF，C Light，without OC，Note 4.5
	R (x，y)	(0.478，0.301) ±0.03	
	G (x，y)	(0.315，0.454) ±0.03	
	B (x，y)	(0.180，0.190) ±0.03	
	View Angle (12/6/9/3点)	TBD	Test equipment：M1 source pad down，CR>10 Note 4.1
	人眼观看角度	6点	Source Pad Down
	Response Time（25℃）	Max 30ms	Test equipment：M1 Tr+Tf，W90%/B10%. Note 4.4
Reflection	**Reflection（SCI）**	Min 8%；Typ 9.5%	Test equipment：M2 Note 4.3
	CR	Min 6；Typ 8	Test equipment：M2 Note 4.2
	Color Gamut（NTSC）	Min 13%；Typ 17%	NTSC Test equipment：M2 Note 4.5
	W (x，y)	(0.316，0.370) ±0.03	
	View Angle (12/6/9/3点)	TBD	Test equipment：M1 source pad down，CR>2 Note 4.1

Measuring Condition:

Transmittance Mode (Blu on), Reflection Mode(Blu off);
Dark room (ambient luminance ≤1lux); Ambient temperature： 25±2℃

Measuring Point: Center of the Active area (one point) unless otherwise specified
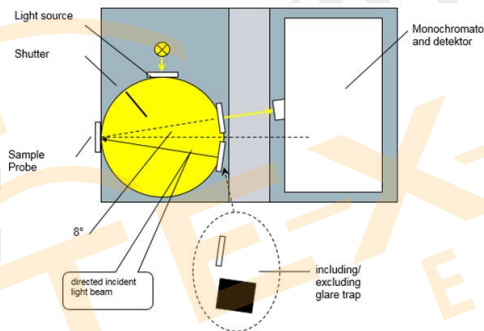
Measuring Equipment:

<1> **Reflective Mode measurement system**

Backlight is off, test point AA center
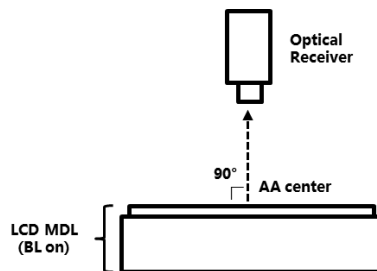M1: Measure equipment: DMS903
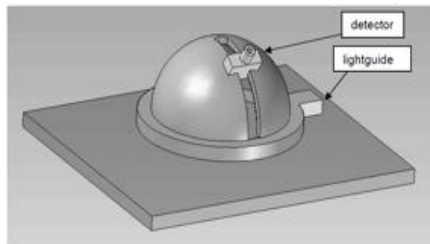

M2: Measure equipment: CM700D (8°, D65)

<2> **Transmissive mode measurement system**

Backlight is on , test point AA center
M3: Measure equipment: EYE2-400

4.1. Specifications are based on module testing.Transmittance/Reflection viewing angle is the angle at which the contrast ratio is greater than 10 / 2. The viewing are determined for the horizontal or 3, 9 o'clock direction and the vertical or 6, 12 o'clock direction with respect to the optical axis which is normal to the LCD surface. Spec. will be updated according to measured values.Human viewing angle is 8'clock in trans mode (source pad 6'clock).

<Figure 4.1. Viewing Angle Range Is Defined As Follows>
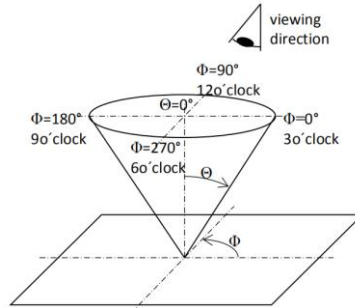
4.2. Specifications are based on module testing.Contrast measurements shall be made at viewing angle of $\theta= 0°$ and at the center of the LCD surface. Luminance shall be measured with all pixels in the view field set first to white, then to the dark (black) state. Contrast Ratio (CR) is defined mathematically.

$$CR = \frac{\text{Luminance when displaying a white raster}}{\text{Luminance when displaying a black raster}}$$

4.3. Specifications are based on module testing.Center transmittance and reflection of white is defined as the LCD surface. Luminance shall be measured with all pixels in the view field set first to white. Trans based on BOE背光（Color Rank：B03，穗晶；Bef*2）.

4.4. Specifications are based on module testing.Response time (black to white): Tr+Tf Black(10%) to White(90%). As shown in figure below, the time needed for the transmittance to change from 10% to 90% is Tr, and 90% to 10% is Tf.
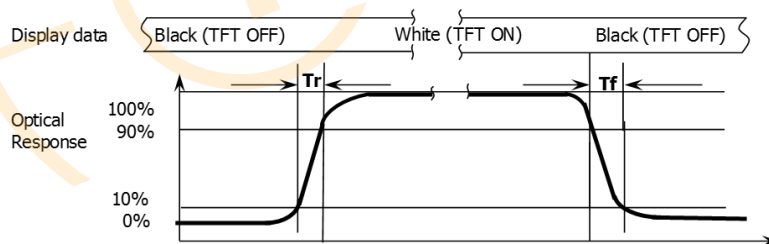
4.5. The color coordinates and Color Gamut of Transmittance mode specified in Table 4. shall be measured at the center of the color filter glass with C - light source.The color coordinates of Reflection mode specified in Table 4. shall be measured at the center of the panel with D65 light.Color Gamut of Reflection Mode should be tested with LCM and calculated by RGB's x and y as below:

8. Reliability test items

No.	Test Item	Test Condition	Notes
1	High Temp. Storage	+80°C / 48H	1. Functional test isOK. Missing Segment,short, unclear segment non-display,display abnormally and liquid crystal leakare un-allowed.
2	Low Temp. Storage	-30°C / 48H	
3	High Tempe. Operating	+70°C / 48H	
4	Low Tempe. Operating	-20°C / 48H	
5	High Temperature /Humidity storage	50°C x 90%RH /48H	
6	Thermal and cold shock	Static state，-20℃（30min）~60℃（30min），50 cycles	2. No low temperature bubbles,end seal loose andfall, frame rainbow.
7	ESD test	±2KV,Human Body Mode, 150pF/330Ω；±4KV, Air Mode, 150pF/330Ω；	

Note: All tests above are practiced at module type.

There is no display function NG issue occurred, All the cosmetic specification is judged before the reliability stress.

9.0 General Precaution

9.1 Use Restriction

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

9.2 Asembly Precaytton

1、 Please use the mounting hole on the module side in installing and do not bending or wrenching LCD in assembling. And please do not drop, bend or twist LCD module in handling.

2、 Please design display housing in accordance with the following guide lines.

3、 Housing case must be destined carefully so as not to put stresses on LCD all sides and not to wrench module. The stresses may cause non-uniformity even if there is no non-uniformity statically.

4、 Keep sufficient clearance between LCD module back surface and housing when the LCD module is mounted. The clearance in the design is recommended taking into account the tolerance of LCD module thickness and mounting structure height on the housing.

5、 Please do not push or scratch LCD panel surface with any-thing hard. And do not soil LCD panel surface by touching with bare hands. (Polarizer film, surface of LCD panel is easy to be flawed.)

6、 Please do not press any parts on the rear side such as source IC, gate IC, and FPC during handling LCD module. If pressing rear part is unavoidable, handle the LCD module with care not to damage them.

7、 Please wipe out LCD panel surface with absorbent cotton or soft cloth in case of it being soiled.

8、 Please wipe out drops of adhesives like saliva and water on LCD panel surface immediately. They might damage to cause panel surface variation and color change. 11.2.7 Please do not take a LCD module to pieces and reconstruct it. Resolving and reconstructing modules may cause them not to work well.

9.3 Disassembling or Modification

Do not disassemble or modify the module. It may damage sensitive parts inside LCD module, and may cause scratches or dust on the display. Leadtek does not warrant the module, if customers disassemble or modify the module.

9.4 Breakage of LCD Panel

1、 If LCD panel is broken and liquid crystal spills out, do not ingest or inhale liquid crystal, and do not contact liquid crystal with skin.

2、 If liquid crystal contacts mouth or eyes, rinse out with water immediately.

3、 If liquid crystal contacts skin or cloths, wash it off immediately with alcohol and rinse thoroughly with water.

4、 Handle carefully with chips of glass that may cause injury, when the glass is broken.

9.5 Absolute Maximum Ratings and Power Protection Circuit

1、Do not exceed the absolute maximum rating values, such as the supply voltage variation, input voltage variation, variation in parts' parameters, environmental temperature, etc., otherwise LCD module may be damaged.

2、 Please do not leave LCD module in the environment of high humidity and high temperature for a long time.

3、 It's recommended employing protection circuit for power supply.

11.6 Operation

1、Do not touch, push or rub the polarizer with anything harder than HB pencil lead.Use fingerstalls of soft gloves in order to keep clean display quality, when persons handle the LCD module for incoming inspection or assembly.

2、 When the surface is dusty, please wipe gently with absorbent cotton or other soft material.

3、Wipe off saliva or water drops as soon as possible. If saliva or water drops contact with polarizer for a long time, they may causes deformation or color fading.

4、When cleaning the adhesives, please use absorbent cotton wetted with a little petroleum benzine or other adequate solvent.

9.6 Static Electricity

1、Protection film must remove very slowly from the surface of LCD module to prevent from electrostatic occurrence.

2、 Because LCD module uses CMOS-IC on TFT-LCD panel, it is very weak to electrostatic discharge. Please be careful with electrostatic discharge.

3、Persons who handle the module should be grounded through adequate methods.

9.7 Disposal

When disposing LCD module, obey the local environmental regulations.

9.8 OTHERS

1、A strong incident light into LCD panel might cause display characteristics' changing inferior because of polarizer film, color filter, and other materials becoming inferior. Please do not expose LCD module direct sunlight land strong UV rays.

2、 Please pay attention to a panel side of LCD module not to contact with other materials in preserving it alone.

3、 For the packaging box, please pay attention to the followings:

4、Packaging box and inner case for LCD are designed to protect the LCDs from the damage or scratching during transportation. Please do not open except picking LCDs up from the box.

5、 Please do not pile them up more than 6 boxes. (They are not designed so.) And please do not turn over.

6、 Please handle packaging box with care not to give them sudden shock and vibrations. And also please do not throw them up.

7、Packing box and inner case for LCDs are made of cardboard. So please pay attention not to get them wet. (Such like keeping them in high humidity or wet place can occur getting them wet.)

10.0 Packing form-TBD

深圳市丽台电子有限公司

Shenzhen Leadtek Electronics Co.,Ltd

Incoming Inspection Standards

来料检验标准

Model No. / 产品型号： <u>Applies 0.95~5.0 Inch Touch Display Screen</u>

Updated Date /生效日期： <u>2022-05-20</u>

Version / 版 本： <u>A0</u>

Customer confirmation ： <u>_____</u>

Record of Revision /修订履历

Version /版本	Revision Record /修订内容	Reviser /修订人	Revision Date /修订日期
V0	首发 / Starting	Green	2022.05.20

1

1.Scope of application /适用范围.

This document shall be applied to 0.95~5.0 inch touch display screen.

本文件适用于0.95~5.0 寸触摸显示屏.

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

2. 1 Inspection Conditions /检验条件:
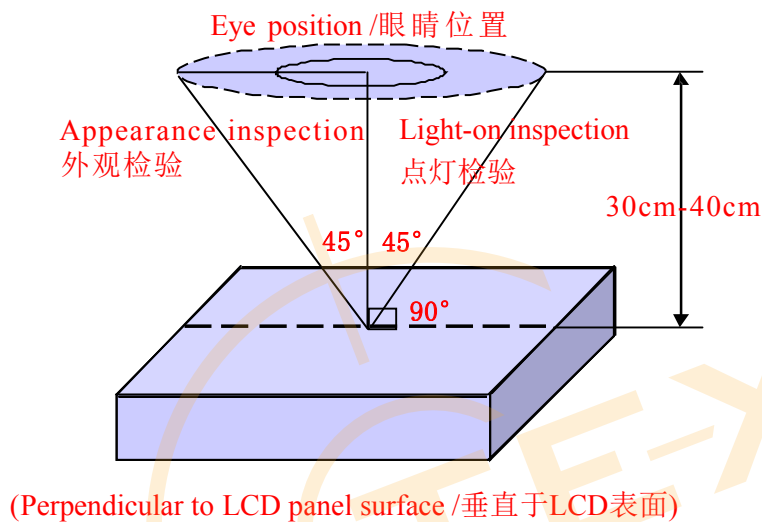
(1) Inspection Distance /检测距离: 35cm ±5cm.

（2）Check time /检验时间：

Displays performance test /功能测试：2~3S /Image，Cosmetic Inspection /外观检验:10~12S.

(3) Check the viewing angle /检验视角:

   Light-on Inspection Angle /点灯检验角度：±45°.

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

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

2.2 Inspection environment /检验环境:

Ambient Temperature 温度		25℃±5℃
Ambient Humidity 湿度		55±5%RH
Ambient Illumination 亮度	Cosmetic Inspection 外观检验	800-1000 Lux
	Functional Inspection 点灯检验	200~300Lux

2.3 Sampling Conditions /抽样条件:

（1）Quantity to be inspected /批量：Quantity of shipment lot per model /单次运送单一型号数量.

（2）Sampling method /抽样方法：

Sampling Plan /抽样计划		GB/T 2828.1- 2003
		Normal Inspection ， Single Sampling 正常检验、单次抽样
		General inspection level： Ⅱ 一般检验水平：二级
AQL	Major Defect /主要缺陷	0.65
	Minor Defect /次要缺陷	1.0

（3）The classification of Major(MA) and Minor(MI) defects is shown as "3.1 Classification of defects".

主缺（MA）及次缺（MI）定义于"3.1缺陷分类".

3.Terms And Definitions /术语和定义

3.1 Classification of defects / 缺陷分类 :

（1）Major defects /主要缺陷:

A major defect is a defect that is likely to result in failure, or to reduce materially the usability of the product for its intended purpose .

可导致产品功能失效或减少产品可用性的缺陷.

（2）Minor defects /次要缺陷:

It will not cause the product to fail and reduce the defects in the effective use and operation of the product.

不会导致产品功能失效和减少产品的有效使用与操作的缺陷.

3.2 Point defects /点状缺陷：

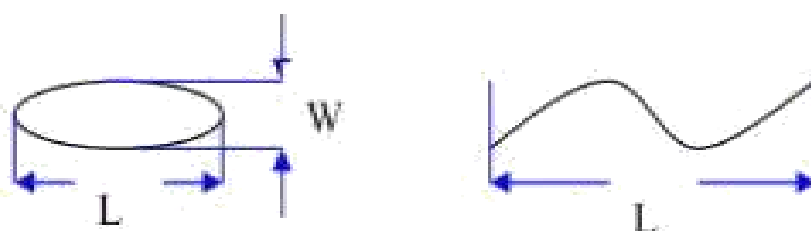The size of the point defect is defined by the diameter D, and the average diameter of the defect is D=1/2（W+L）.

点状缺陷的大小是由直径 D 定义的，缺陷的平均直径 D=1/2(W+L).

3.3 Linear 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

3.4 LCD sub-pixel dot /LCD子像素点

（1）Definition /定义 ：The point defect area is greater than 50% of the LCD sub-pixel area, and is visible through ND5% filter 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.

（2）The drawing of 1/2 area sub-pixel definition / 1/2 面积的子像素定义绘图:

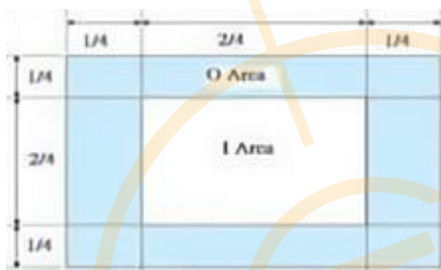The 1/2 area sub-pixel can be defined as below one or more of specific shapes

1/2 面积的子像素可以定义为如下一个或多个特定形状图：

3.5 Small bright dot /细碎亮点 ：

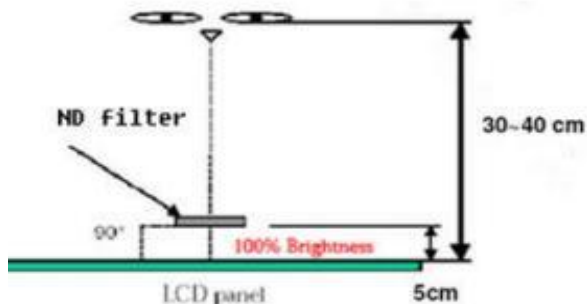Point defects smaller than "LCD sub-pixels" /小于"LCD子像素点"的点缺陷.

（Ratio of Zone I to Zone O /I 区与 O 区比例：1：2：1）

3.6 ND filter inspection method /ND卡的检验方法：

Hold the ND filter 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.

3.7 Any FPC surface problems that do not leak copper on the surface and do not cause functional failure are acceptable.
任何 FPC 表面问题，表面未露铜和不造成功能失效是可以接受的.

3.8 Extraneous substances that can be wiped out ，like Finger point,Particles are not considered as a defect .
可以被擦拭干净的表面物质不视为缺陷 (如手指印，尘粒) .

3.9 Defects that are covered by the material and are not visible to the eye and do not affect the function and use are not considered defects.

会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.

3.10 Panel damage /面板损伤：

Glass damage outside the AA display area that does not affect the effective wiring is acceptable.

AA 显示区域以外的玻璃损伤，不影响有效线路是可以接受的.

3.11 Issues not specified or defined in this acceptance standard shall be handled through friendly negotiation between the two parties.

本允收标准中未规定或定义的问题，双方友好协商处理.

4. Inspection standards /检验标准

4.1 Structural Dimensions /结构尺寸规格

Serial Number 序号	Measurement items /测量项目		Specification /规格		Remark /备注
	名称 /Name	Unit /单位	Tolerance /公差		
1	Outside dimension：Length 尺寸：长	mm /毫米	0.10mm~0.20mm		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
2	Outside dimension：Width 尺寸：宽	mm /毫米	0.10mm~0.2mm		
3	Outside dimension：Thickness 尺寸：厚	mm /毫米	0.20mm~0.30mm		

4.2 Appearance Inspection Specification /外观检验规格
（D：diameter， W：width， L：length， N：quantity， DS：spacing）

Inspection area 检验区域	Inspection items 检验项目	Inspection specifications 检验规格	Defect category 缺陷类别	
Glass 玻璃	Wire(on Array) 线路	Can't be damaged 不能损伤	MA	
	Chipping/corner breaking 崩边/破角	Can't affect the effective lines and functions 不能影响有效线路和功能	MA	
	Edge 边缘	There must be no extensional cracks 不可有延伸性裂纹	MA	
Silicone 硅胶	Silicone coating 硅胶涂布	The height must not exceed the LCD CF surface 高度不能超过LCD CF面		MI
	Glue overflow 溢胶	Can't cover FPC, POL, etc 不能覆盖到FPC、POL等		MI

Inspection area 检验区域	Inspection items 检验项目	Inspection specifications 检验规格	Defect category 缺陷类别	
PCBA FPC Connector 连接器	Appearance 外观	Scratches or injuries are not allowed to cause copper exposure 划伤或损伤不允许表面出现露铜		MI
	Component 元器件	Can't be damaged and lack 不能损伤和缺少	MA	
	Gold finger oxidation 金手指氧化	Not allowed 不允许		MI
	Connection status 连接状况	The connection must be accurate and stable 必须准确稳定连接	MA	
	Break 破裂	Not allowed 不允许	MA	
	Soldering,：false soldering/tinning/tin beads 假焊/连锡/锡珠	Not allowed 不允许	MA	
POL 偏光片	Scratches 划伤	1. W≤0.05mm；L≤5mm，Ignore（忽略） 2. 0.05mm＜W≤0.10mm；L≤5mm；N≤3；DS≥10mm 3. 0.10mm＜W；5mm＜L，Not allowable（不允许）		MI
	Dent 凹凸印	1. D≤0.15mm，Ignore（忽略） 2. 0.15mm＜D≤0.30mm；N≤3；DS≥10mm 3. 0.30mm＜D，Not allowable（不允许）		MI
	Bubbles 气泡	1. D≤0.15mm，Ignore（忽略） 2. 0.15mm＜D≤0.30mm；N≤3；DS≥10mm 3. 0.30mm＜D，Not allowable（不允许）		MI
	Point defects 点状不良	1. D≤0.15mm，Ignore（忽略） 2. 0.15mm＜D≤0.30mm；N≤3；DS≥10mm 3. 0.30mm＜D，Not allowable（不允许）		MI
	Edge bubbles 边缘气泡	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
	Dirty/watermarked 脏污/水印	No dirt/water lines/finger marks are allowed, and must be wiped clean 不允许有脏污/水印/手指印，须擦拭干净方可		MI
	Warping 起翘	Not allowed 不允许		MI
	Attaching offset 贴偏	It is necessary to completely cover the display area outward, within the 1/2BM area, or without leaking POL edges after TP is attached 需完整覆盖显示区往外、1/2BM区以内或贴合TP后不会出现漏偏光片边缘		MI
	Mixture 混料	Mixing different types of POL or not using POL as required by the BOM，not allowed 不允许混贴不同型号的POL或未按BOM要求使用POL	MA	

Inspection area 检验区域	Inspection items 检验项目	Inspection specifications 检验规格		Defect category 缺陷类别
TP&CG	Point defects 点状不良	1. D≤0.15mm，Ignore（忽略） 2. 0.15mm＜D≤0.30mm；N≤3；DS≥10mm 3. 0.30mm＜D，Not allowable（不允许）		MI
	Scratches 划伤	1. W≤0.05mm；L≤5mm，Ignore（忽略） 2. 0.05mm＜W≤0.10mm；L≤5mm；N≤3；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
	Edges and corners cracked 崩角/崩边	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≤3；DS≥10mm		MI
	Silk screen 丝印	The silk screen is clear, complete and correct 丝印清晰、完整、内容正确		MI
	Dirty 脏污	Non-wipeable dirt, not allowed 不可擦拭的脏污，不允许		MI
	Broken 破损	Not allowable 不允许	MA	
	Ink color aberration 油墨色差	ΔE>1，Not allowable（不允许）		MI
	Cover pinholes 针孔	1. D≤0.10mm，N≤3，DS≥10mm，allowable 2. D＞0.10mm，intensive pinholes（密集型针孔），Not allowable（不允许）		MI
	IR holes IR孔	Dirt, deviation, color difference, etc. are not allowed 不允许脏污、偏位、色差等		MI
BL 背光	Backlight separation 背光分离	Not allowable 不允许		MI
	Deformation of rubber iron and rubber frame 胶铁、胶框变形	Use the plug gauge 0.3mm on the flat surface and can snap in and judge NG 在平面上使用塞规0.3mm卡翘曲位置，能卡进判定NG		MI
	The iron frame is oxidized and not tightened 铁框氧化、卡不紧	Not allowable 不允许		MI
	Backlight sticky solder beads, glue, etc 背面粘锡珠、残胶等	Not allowable 不允许		MI
	Lnkjet coding，Barcode，QR code 喷码/条码/二维码	The lnkjet coding is clear and complete, the barcode and QR code can be scanned normally, and the content and format match 喷码清晰完整、条码和二维码可正常扫描，内容和格式相符		MI
	Accessories (protective film, double-sided tape, insulating adhesive, etc.) 辅料（保护膜、双面胶、绝缘胶等）	Defects such as missing pastes, sticking deviations, defects, and fractures are not allowed 不允许有漏贴、贴偏、残缺、断裂等缺陷		MI

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4.3 Electrical test specifications /电性检查规格

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

Inspection items 检验项目	Inspection specifications 检验规格	Defect category 缺陷类别	
Glass bright spots/dark spots 玻璃亮点/暗点	1. D≤0.15mm，Ignore（忽略） 2. 0.15mm＜D≤0.30mm；N≤3；DS≥10mm 3. 0.30mm＜D，Not allowable（不允许）		MI
Mura	Use ND5% filter masking, visual invisibility is OK, 200~300Lux 使用ND5%遮盖，目视不可见即为OK，200~300Lux		MI
Small bright dot 细碎亮点	Use ND5% filter masking, visual invisibility is OK 使用ND5%遮盖，目视不可见即为OK		MI
Light leakage 漏光	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
Backlight black/white dots 背光黑点/白点	1. D≤0.15mm，Ignore（忽略） 2. 0.15mm＜D≤0.30mm；N≤3；DS≥10mm 3. 0.30mm＜D，Not allowable（不允许）		MI
Linear foreign bodies 线状异物（异物毛丝等）	1. W≤0.05mm；L≤5mm，Ignore（忽略） 2. 0.05mm＜W≤0.10mm；L≤5mm；N≤3；DS≥10mm 3. 0.10mm＜W；5mm＜L，Not allowable（不允许）		MI
Black/White Print 黑印/白印	Use ND5% filter masking, visual invisibility is OK 使用ND5%遮盖，目视不可见即为OK		MI
The display is uneven 显示不均匀	Use ND5% filter masking, visual invisibility is OK 使用ND5%遮盖，目视不可见即为OK		MI
The brightness is uneven 亮度不均匀	Brightness uniformity＜85.0%，Not allowable 亮度均匀性＜85.0%，不允许		MI
Displacement of the membrane 膜材移位	Not allowable 不允许		MI
Interference pattern/Newtonian pattern 干涉纹/牛顿纹	Not allowable 不允许		MI
Display abnormal 显示异常	Not allowable 不允许	MA	
No display 无显示	Not allowable 不允许	MA	
Line/Missing Drawing 线条/缺画	Not allowable 不允许	MA	
Splash screen 闪屏	Not allowable 不允许	MA	
LCD grid LCD网格	Not allowable 不允许	MA	
Afterimage 残影	Not allowable 不允许	MA	
Wrong viewing angle 视角错误	Not allowable 不允许	MA	
No touch 无触摸	Not allowable 不允许	MA	
Touch the jump point 触摸跳点	Not allowable 不允许	MA	
Not sensitive 触摸不灵敏	Not allowable 不允许	MA	

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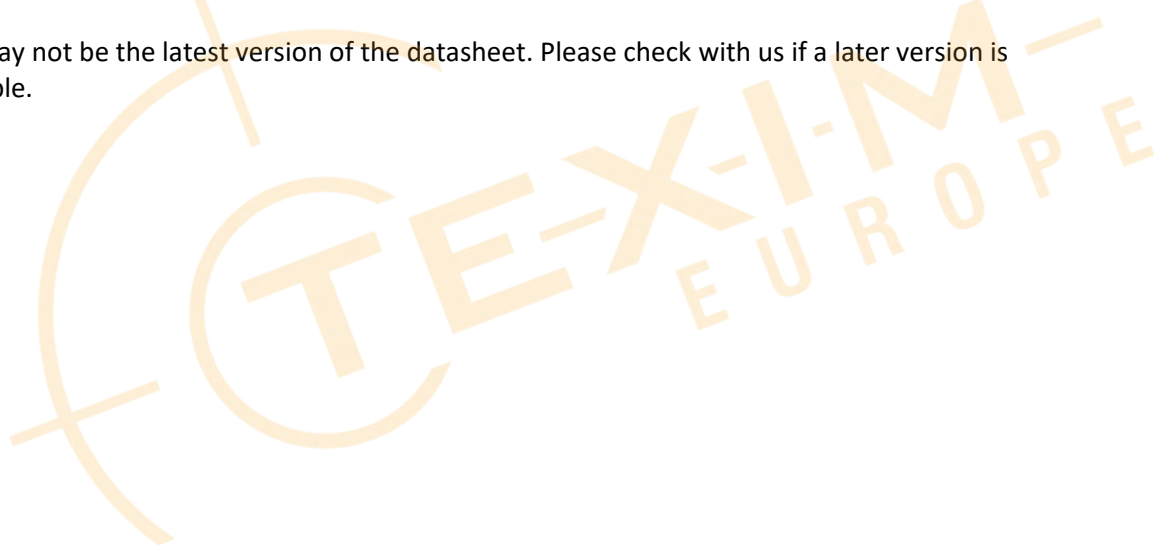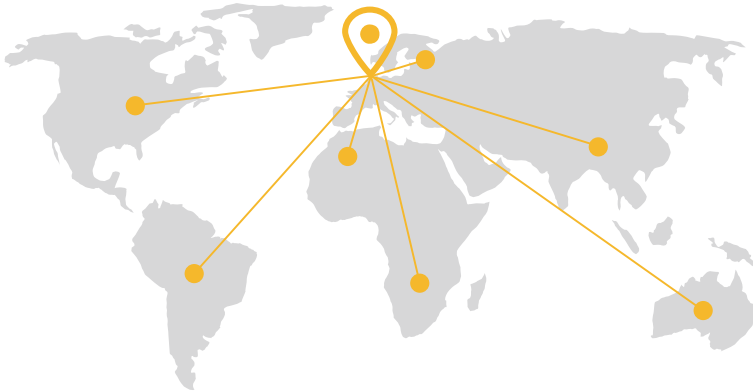
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