

NISIN

触摸显示模组产品规格承认书

Display Module Specifications for Approval

客户： 客户型号：			NS200LQ2401AL		
批准 APPROVED	审核 CHECKED	拟制 DESIGNED	批准 APPROVED	审核 CHECKED	拟制 DESIGNED



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1.产品规格 (Product Specifications)

面板类型 (Panel Type)	TFT LCD
面板尺寸 (Panel Size)	2 inch
显示类型 (Display Type)	Normal Black
分辨率 (Resolution)	320 (RGB) x 240 (dot)
显示点间距 (Dot Pitch)	42.5Um X 127.5Um
显示色彩 (color)	16.7M
视角 (View Angle)	U/D/L/R: 80/80/80/80
显示驱动 IC (Display Driver IC)	ILI9342
接口类型 (Interface Type)	MCU
触摸类型 (TP Type)	
触摸 IC (TP IC)	
外形尺寸 (Dimensions)	43.95(H) X 38.8(V) X 2.12(T) (mm)
显示区尺寸 (Display area)	40.8x30.6 (mm)
模组亮度 (Module Brightness)	800Cd/m ² (TYP)
触摸点数 Touch points	
触摸按键 Touch Key Number	0
触摸屏固件版本	Version:

3. 接口定义 (The Interface Definition)

见 CAD

4. 电性特性 (Electrical Characteristics)



a-Si TFT LCD Single Chip Driver
320RGBx240 Resolution and 262K color

ILI9342C

18. Electrical Characteristics

18.1. Absolute Maximum Ratings

The absolute maximum rating is listed on following table. When ILI9342C is used out of the absolute maximum ratings, ILI9342C may be permanently damaged. To use ILI9342C within the following electrical characteristics limitation is strongly recommended for normal operation. If these electrical characteristic conditions are exceeded during normal operation, ILI9342C will malfunction and cause poor reliability.

Item	Symbol	Unit	Value
Supply voltage	VCI	V	-0.3 ~ +4.2
Supply voltage (Logic)	IOVCC	V	-0.3 ~ +4.2
Supply voltage (Digital)	VCORE	V	-0.3 ~ +2.4
Driver supply voltage	VGH-VGL	V	-0.3 ~ +32.0
Logic input voltage range	VIN	V	-0.3 ~ IOVCC + 0.5
Logic output voltage range	VO	V	-0.3 ~ IOVCC + 0.5
Operating temperature	Topr	°C	-30 ~ +70
Storage temperature	Tstg	°C	-55 ~ +110

Note: If the absolute maximum rating of even is one of the above parameters is exceeded even momentarily, the quality of the product may be degraded. Absolute maximum ratings, therefore, specify the values exceeding which the product may be physically damaged. Be sure to use the product within the range of the absolute maximum ratings.

18.2. DC Characteristics

18.2.1. General DC Characteristics

Item	Symbol	Unit	Condition	Min.	Typ.	Max.	Note
Power and Operation Voltage							
Analog Operating Voltage	VCI	V	Operating voltage	2.6	2.8	3.3	Note2
Logic Operating Voltage	IOVCC	V	I/O supply voltage	1.65	1.8	3.3	Note2
Digital Operating voltage	VCORE	V	Digital supply voltage	-	1.5	-	Note2
Gate Driver High Voltage	VGH	V	-	10.0	-	16.0	Note3
Gate Driver Low Voltage	VGL	V	-	-16.0	-	-9.0	Note3
Driver Supply Voltage	-	V	VGH-VGL	19	-	32	Note3
Input and Output							
Logic High Level Input Voltage	VIH	V	-	0.7*IOVCC	-	IOVCC	Note1,2,3
Logic Low Level Input Voltage	VIL	V	-	GND	-	0.3*IOVCC	Note1,2,3
Logic High Level Output Voltage	VOH	V	IOL=-1.0mA	0.8*IOVCC	-	IOVCC	Note1,2,3
Logic Low Level Output Voltage	VOL	V	IOL=1.0mA	GND	-	0.2*IOVCC	Note1,2,3
Logic Input Leakage Current	ILEA	uA	VIN=IOVCC or GND	-0.1	-	+0.1	Note1,2,3
VCOM Operation							
VCOM Amplitude	VCOMA	V		-2.0	-	-0.4	Note3
Source Driver							
Source Output Range	Vsout	V	-	DDVDH+0.1	-	DDVDH-0.1	Note4
Positive Gamma Reference Voltage	VREG1OUT	V	-	3.6	-	DDVDH-0.3	Note3
Negative Gamma Reference Voltage	VREG2OUT	V	-	DDVDL-0.3	-	-3.6	Note3

Note 1: IOVCC=1.65 to 3.3V, VCI=2.6 to 3.3V, AGND=GND=0V, Ta=-30 to 70 (to +80 no damage) °C.

Note2: Please supply digital IOVCC voltage equal or less than analog VCI voltage.

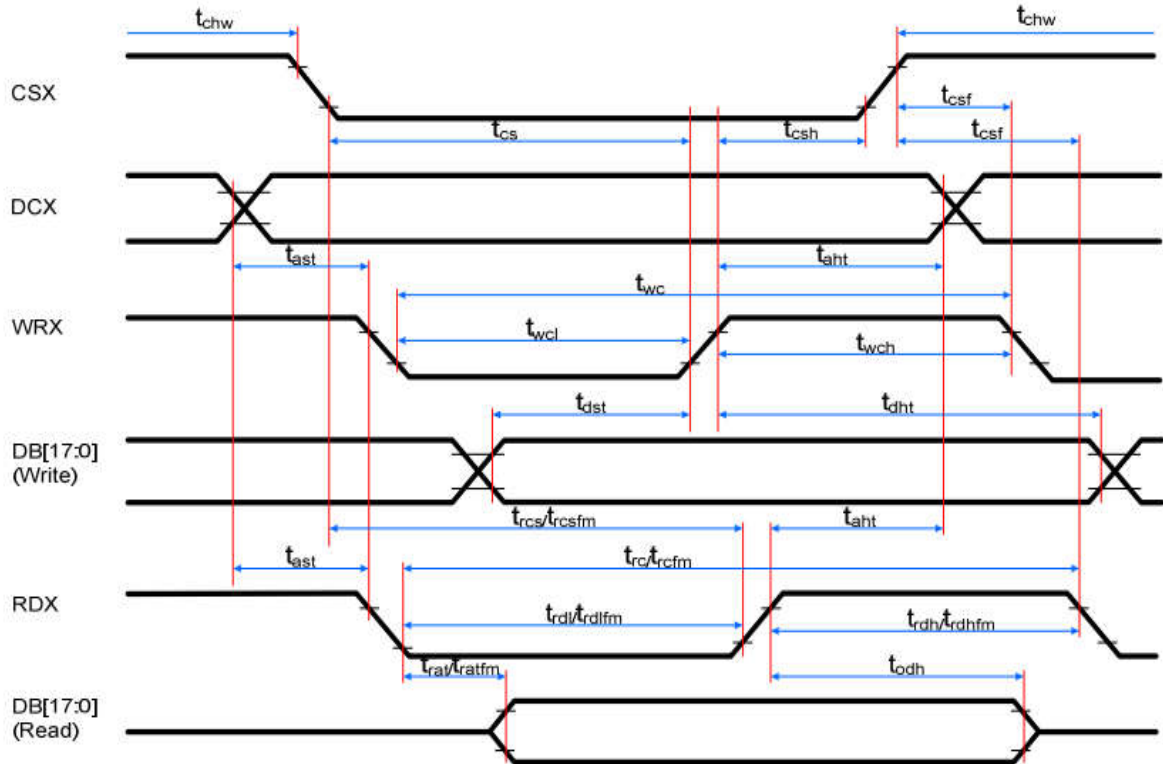
Note3: CSX, RDX, WRX, D[17:0], D/CX, RESX, TE, DOTCLK, VSYNC, HSYNC, DE, SDA, SCL, IM3, IM2, IM1, IM0, and Test pins.

Note4: When the measurements are performed with LCD module. Measurement Points are like Note3.

Note5: Source channel loading = 10pF/channel, Gate channel loading = 50pF/channel

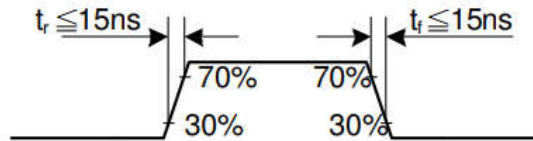
18.3. AC Characteristics

18.3.1. Display Parallel 18/16/9/8-bit Interface Timing Characteristics (8080- I system)



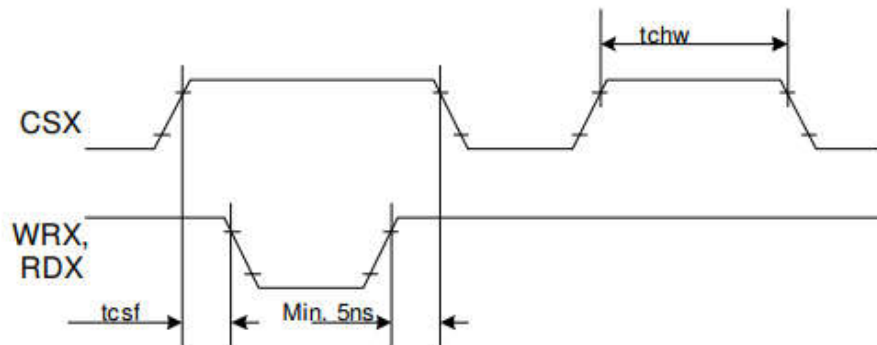
Signal	Symbol	Parameter	min	max	Unit	Description
DCX	tast	Address setup time	0	-	ns	
	taht	Address hold time (Write/Read)	10	-	ns	
CSX	tchw	CSX "H" pulse width	0	-	ns	
	tcs	Chip Select setup time (Write)	15	-	ns	
	trcs	Chip Select setup time (Read ID)	45	-	ns	
	trcsfm	Chip Select setup time (Read FM)	355	-	ns	
	tcsf	Chip Select Wait time (Write/Read)	10	-	ns	
WRX	twc	Write cycle	66	-	ns	
	twrh	Write Control pulse H duration	15	-	ns	
	twrl	Write Control pulse L duration	15	-	ns	
RDX (FM)	trcfm	Read Cycle (FM)	450	-	ns	
	trdhfm	Read Control H duration (FM)	90	-	ns	
	trdlfm	Read Control L duration (FM)	355	-	ns	
RDX (ID)	trc	Read cycle (ID)	160	-	ns	
	trdh	Read Control pulse H duration	90	-	ns	
	trdl	Read Control pulse L duration	45	-	ns	
D[17:0], D[15:0], D[8:0], D[7:0]	tdst	Write data setup time	10	-	ns	For maximum CL=30pF For minimum CL=8pF
	tdht	Write data hold time	10	-	ns	
	trat	Read access time	-	40	ns	
	tratfm	Read access time	-	340	ns	
	trod	Read output disable time	20	80	ns	

Note: $T_a = -30$ to 70 °C, $IOVCC=1.65V$ to $3.3V$, $VCI=2.6V$ to $3.3V$, $GND=0V$



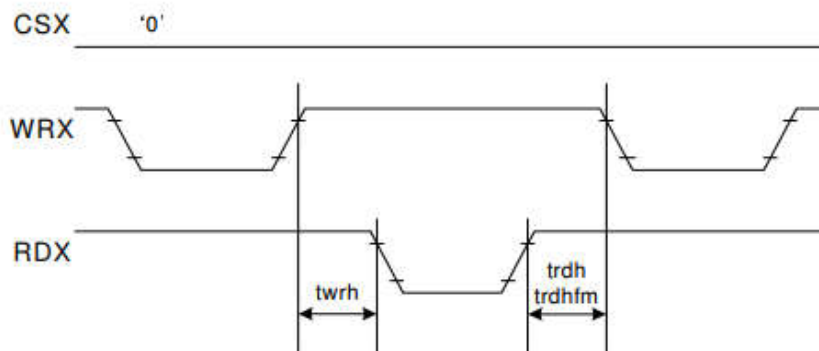
The information contained herein is the exclusive property of ILI Technology Corp. and shall not be distributed,

CSX timings :



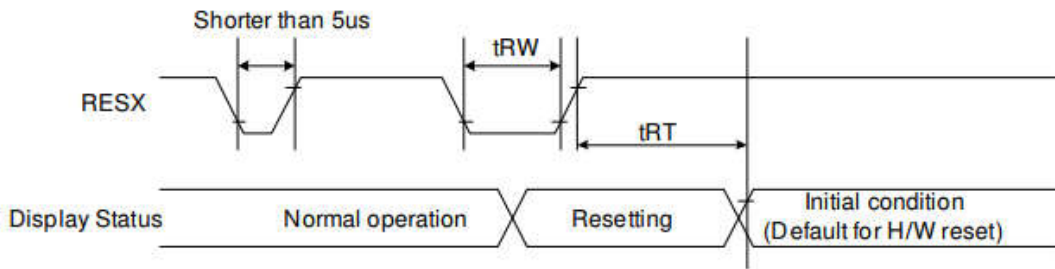
Note: Logic high and low levels are specified as 30% and 70% of IOVCC for Input signals.

Write to read or read to write timings:



Note: Logic high and low levels are specified as 30% and 70% of IOVCC for Input signals.

15.4. Reset Timing



Signal	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

Note 1: The reset cancel includes also required time for loading ID bytes, VCOM setting and other settings from NV memory 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.

Note 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 10us	Reset
Between 5us and 10us	Reset starts

Note 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.

Note 4: Spike Rejection also applies during a valid reset pulse as shown below:

5.可靠性实验测试(Reliability Test Conditions And Methods)

序号	试验项目	试验条件及方法	试验设备	检验项目	检验工具														
1	高温高湿(静、动态)试验	温度 60℃±3℃,湿度 90%±3%,要求选择时间分别为 96 小时,静、动态(产品点亮)在室温下恢复 2 小时后进行外观,显示功能检查。	恒温恒湿试验机	检验外观、功能、抗腐蚀性	目视/测试架/客户样机/显微镜														
2	高、低温冲击试验	静态-30℃(30分钟)↔80℃(30分钟)↔-30℃(30分钟),24个循环,在室温下恢复2小时后进行外观,显示功能检查。	冷热冲击试验机	检验外观、功能															
3	高温贮存试验	常温70℃+/-3℃、宽温80℃+/-3℃、96小时后在室温状态下恢复1小时在2小时内完成外观、显示功能检查。	烤箱	检验外观、功能	目视/测试架/客户样机														
4	低温贮存试验	常温-20℃+/-3℃、宽温-30℃+/-3℃、条件的试验箱内保存96小时后在室温状态下恢复1小时,在2小时完成外观、显示功能检查,特别注意检查是否有漏液、断线、腐蚀、偏光片不良现象。	低温冰箱	检验外观、功能															
5	低温贮存试验(动态)	常温-20℃+/-3℃、宽温-30℃+/-3℃条件的试验箱内点亮刷屏,过程中每1小时观察一次,检查显示功能,如:异常,卡机,花屏等。特别注意检查是否有漏液、断线、腐蚀、偏光片不良现象。	低温冰箱	检验外观、功能	目视/测试架/客户样机														
6	包装模组跌落试验	<p>1、跌落重量及自由落体高度: (图二)</p>  <p>2、自由落体角度如下:</p> <table border="1" data-bbox="284 1545 662 1904"> <thead> <tr> <th>总重量</th> <th>自由落体高度</th> </tr> </thead> <tbody> <tr> <td>0-9kg</td> <td>92cm</td> </tr> <tr> <td>9-25kg</td> <td>76cm</td> </tr> <tr> <td>25-45kg</td> <td>53cm</td> </tr> <tr> <td>45-68kg</td> <td>46cm</td> </tr> <tr> <td>大于 68kg</td> <td>41cm</td> </tr> <tr> <td></td> <td></td> </tr> </tbody> </table> <p>1) 一角: A角 2) 三菱: A-B, A-D, A-C 3) 六面: 面1, 面2, 面3, 面4, 面5, 面6;</p>	总重量	自由落体高度	0-9kg	92cm	9-25kg	76cm	25-45kg	53cm	45-68kg	46cm	大于 68kg	41cm			包装模组跌落架	测试电性能无异常、外观检验无破损,无脱离现象	目视/测试架/客户样机
总重量	自由落体高度																		
0-9kg	92cm																		
9-25kg	76cm																		
25-45kg	53cm																		
45-68kg	46cm																		
大于 68kg	41cm																		

7	盐雾试验	标准条件:中性盐雾试验(NSS试验):5%的氯化钠盐水溶液,溶液PH值中性(6.5~7.2),试验温度 $35\pm 2^{\circ}\text{C}$,盐雾的沉降率在 $1\sim 2\text{ml}/80\text{cm}^2\cdot\text{h}$ 之间,时间24h。2.其它特殊要求条件:醋酸盐雾试验(ASS试验):5%氯化钠溶液中配入冰醋酸,溶液PH值为3左右,试验温度 $35\pm 2^{\circ}\text{C}$,盐雾的沉降率在 $1\sim 2\text{ml}/80\text{cm}^2\cdot\text{h}$ 之间,时间24h。	盐雾试验设备	检验外观、功能,盐雾试验结果的判定方法,腐蚀物出现判定法:定性判定,试验后功能测试应OK,外观观察产品无腐蚀现象产生。	目视/测试架/客户样机/显微镜
8	ESD 抗静电试验	测试架测试状态下试验:接触4KV,非接触(空气)8KV放电测试	抗静电枪 (尖头接触放电,圆头空气放电)	检验外观、功能	目视/测试架

6. 光电参数 (Optical Characteristics)

6.1 光学规格 (Optical Specifications)

4.0 OPTICAL SPECIFICATION

4.1 Overview

The test of Optical specifications shall be measured in a dark room (ambient luminance ≤ 1 lux and temperature = $25 \pm 2^\circ\text{C}$) with the equipment of Luminance meter system (Goniometer system and TOPCON BM-5) and test unit shall be located at an approximate distance 50cm from the LCD surface at a viewing angle of θ and ϕ equal

to 0° . The center of the measuring spot on the Display surface shall stay fixed.

The backlight should be operating for 30 minutes prior to measurement.

4.2 Optical Specifications

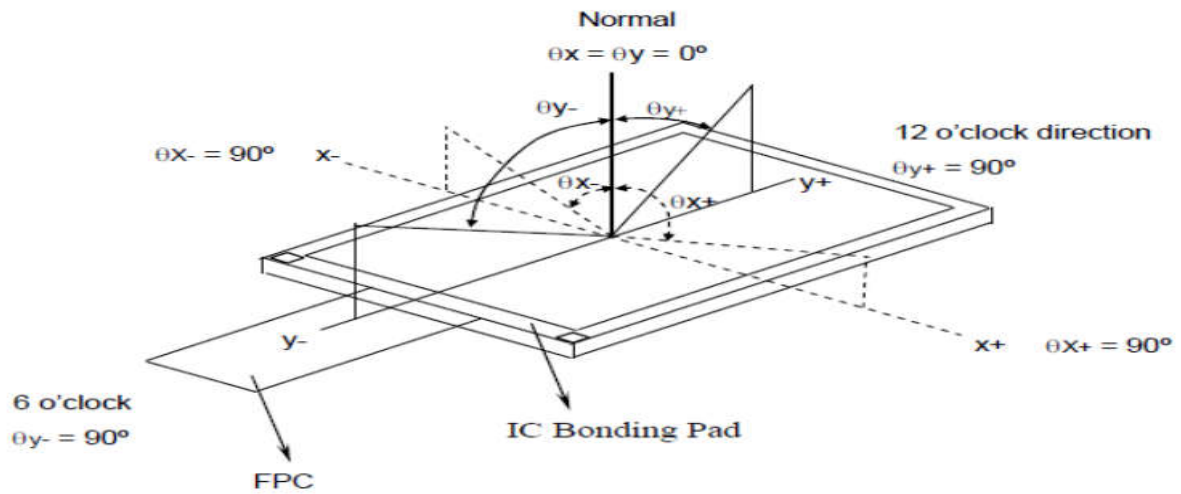
<Table 4. Optical Specifications >

Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing Angle Range	Horizontal	$\Theta 3$	CR > 10	70	80	-	Deg.	Note1
		$\Theta 9$		70	80	-	Deg.	
	Vertical	$\Theta 12$		70	80	-	Deg.	
		$\Theta 6$		70	80	-	Deg.	
Contrast ratio		CR	$\Theta = 0^\circ$	1000	1500	-		Note2
Transmittance		Tr		4.34	5.1		%	Note3
Color Gamut		CG		55	60		%	
Reproduction of color	Red	Rx	$\Theta = 0^\circ$	0.618	0.638	0.658		Note4 (Based on C Light)
		Ry		0.318	0.338	0.358		
	Green	Gx		0.276	0.296	0.326		
		Gy		0.555	0.575	0.595		
	Blue	Bx		0.117	0.137	0.157		
		By		0.104	0.124	0.144		

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6.2 视角定义 (Description of View Angle)

Measurement Set Up



7. 检验标准 (Inspection standard)

9.1 Inspection conditions is as follows

- 1) Viewing angle is within $\pm 30^\circ$ from vertical direction, as fig 1
- 2) Viewing angle is the angle defined in the drawing
- 3) Ambient temperature is approximately $25 \pm 5^\circ \text{C}$
- 4) Ambient luminance is about 300~500 Lux.

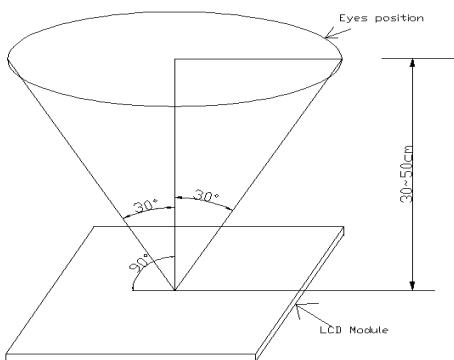
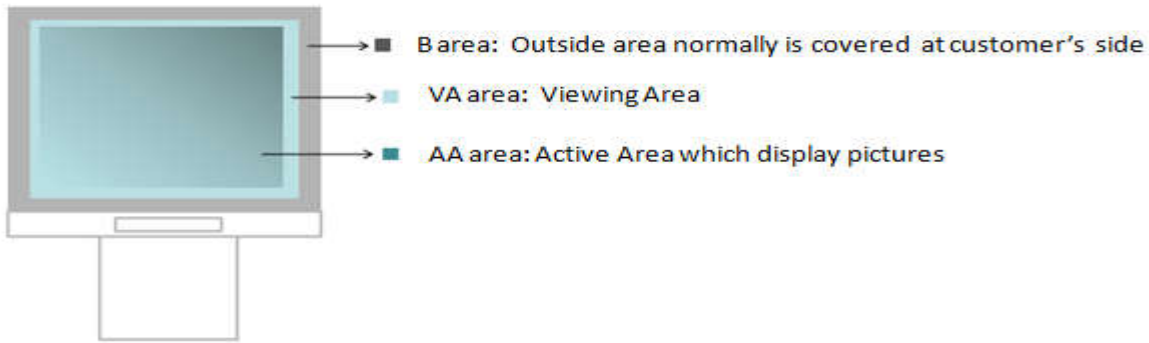
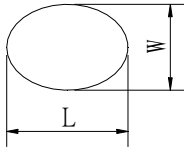


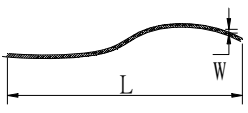
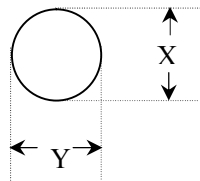
fig1

9.2 Panel area definition



9.3 Routine inspection standards

项目	不良定义	不良现象	判定标准		检验方法				
9.3.1	外观尺寸	与图纸尺寸不相符	NG		卡尺				
9.3.2	功能	显示少线	NG		目视				
		无显示	NG		目视				
		显示异常	NG		目视	主			
		TP 功能不良, 无触摸	NG		目视/用手触摸	主			
9.3.3	点亮产品可见及在 LCD 或 T/P 上有擦拭不掉的点状物	偏光片刺伤、脏点、 圆形物、黑点  $\Phi = (L+W)/2$	LCM/总成 0.95 寸—2.4 寸		目视 (用菲淋卡比对)	次			
			$\Phi \leq 0.10mm$	1、距产品 30mm 目视不见忽略。 2、5mm 间距内只允许 3 个点。 3、显示区只允许 10 个点, 超过以上第 2 第 3 项则 NG。					
				$0.10mm < \Phi \leq 0.15mm$			1		
				$\Phi > 0.15mm$			NG		
			0.15mm < Φ ≤ 0.2mm 按照 A-品入库				LCM/总成 > 2.4 寸——6.0 寸		目视 (用菲淋卡比对)
			$\Phi \leq 0.10mm$	1、10mm 间距内只允许 3					

				个		
				2、显示区只允许 10 个点，超过以上任意一项则 NG		
			$0.1\text{mm} < \Phi \leq 0.15\text{mm}$	4 (TP、屏各允许 2 个)		
			$0.15\text{mm} < \Phi \leq 0.2\text{mm}$	2 (TP、屏各允许 1 个)		
			$\Phi > 0.2\text{mm}$	NG		
9.3.4	点亮产品可见及在 LCD 或 T/P 上有擦拭不掉的线状物/刮伤		LCM/总成 0.95 寸——6.0 寸	允许个数	目视(用菲琳卡比对)	次
			长(L)	宽(W)		
			$\leq 1\text{mm}$	$\leq 0.03\text{mm}$	2	
			$\leq 2\text{mm}$	$0.03 < W \leq 0.05\text{mm}$	1	
			$> 2\text{mm}$	$> 0.05\text{mm}$	NG	
			两条线毛之间必须距离 5mm 以上 (0.95 寸—3.0 寸). 两条线毛之间必须距离 10mm 以上 (3.1 寸—6.0 寸).			
9.3.5	偏光片气泡	$\Phi = (X+Y) / 2$ 	尺寸	允许个数	在日光台灯下撕起保护膜, 距待测物 30cm 目视	次
			1、 $\Phi \leq 0.1\text{mm}$ 2、不超过边框 1/3	不计 (密集不可)		
			$0.10 < \Phi \leq 0.2\text{mm}$	1		
			$\Phi > 0.2\text{mm}$	NG		
			$0.2 < \Phi \leq 1.5\text{mm}$, (边框以外)	3		
			0.95 寸-2.4 寸气泡间距大于 5mm 以上 > 2.4 寸-6.0 寸气泡间距大于 10mm 以上			
9.3.6	T/P 及偏光片凹凸点	T/P: LCD 偏光片上有凹凸点	可视区有水纹 (擦拭不掉) 拒收 未进入可视区允收, 客户装机后不见允收		在同一视角下用样品比对	次
9.3.7	Mura	边框四周或任一侧的色差、较画面深、区域云状	1. 判定画面为 128 灰阶画面, 用 ND filter 盖住 mura 位置进行		ND filter, 128 灰阶	次

		<p>不均、固定位置之图形凹陷状、封口部分较画面深的半圆形、一圈圈均匀的色差、线状 mura、黑画面可见因 spacer 聚集产生的 mura、均匀的实斜线、区域性斜线、Driver IC 与 TFT 匹配问题等原因的 mura</p>	<p>判定。 2、ND1.3 (ND5%可遮盖不见) 3、双方若有签 限度样品, 优先限度样品。</p>	画面	
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