NISIN

内嵌式触摸液晶显示模组规格承认书

(IN-CELL)LCM Specifications for Approval

客户： 客户型号：			NS570HD3032AZ01		
批准 APPROVED	审核 CHECKED	拟制 DESIGNED	批准 APPROVED	审核 CHECKED	拟制 DESIGNED

修改记录

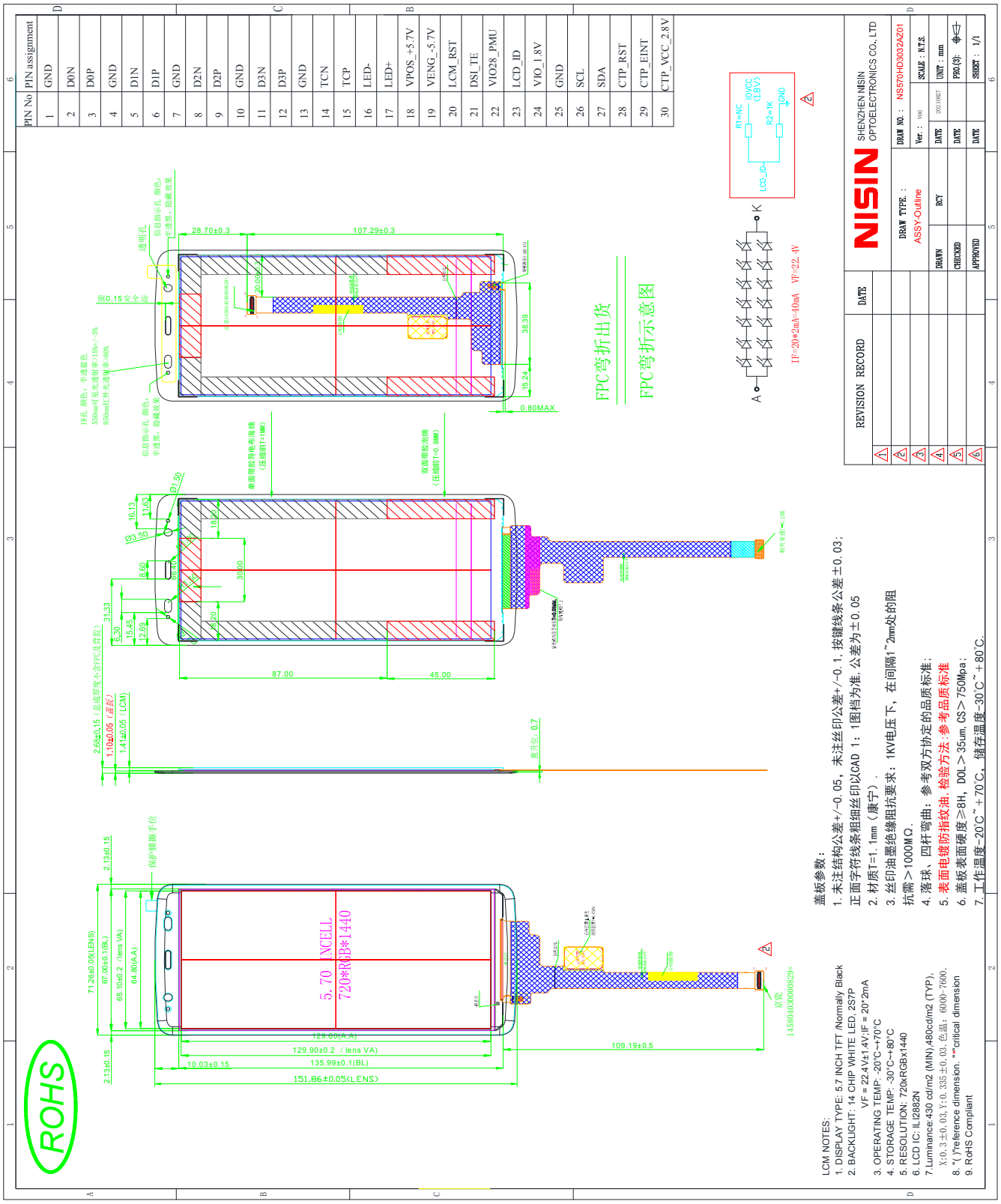
日期	版本	修改内容	页数	拟制
2021-11-15	V00	初版发行	所有	

目录

1.产品规格（Product Specifications）

面板类型（Panel Type）	a-si TFT
面板尺寸(Panel Size)	5.7 inch
显示类型（Display Type）	Normal Black
分辨率（Resolution）	720(RGB) x 1440 (dot)
显示点间距（Dot Pitch）	0.03mm X 0.09mm
显示色彩（color）	16.7M
视角（View Angle）	ALL
显示驱动 IC（Display Driver IC）	ILI2882N
接口类型（Interface Type）	MIPI 4 Lane
触摸类弄（TP Type）	INCELL
触摸 IC （TP IC）	ILI2882N
触摸接口类型（TP Interface）	I2C
外形尺寸（Dimensions）	71.26(H) X 151.86(V) X 2.68(T) (mm)
显示区尺寸（Display area）	64.8 x 129.6 (mm)
背光（Back Light）	420 Cd/m² （TYP）
触摸点数 Touch points	5
触摸按键 Touch Key Number	0

2. 产品图纸（Product Drawings）



3.接口定义（The Interface Definition）

PIN No	PIN assignment		PIN No	PIN assignment	
1	GND	D	16	LED-	B
2	D0N		17	LED+	
3	D0P		18	VPOS_+5.7V	
4	GND		19	VENG_-5.7V	
5	D1N		20	LCM_RST	
6	D1P		21	DSI_TE	
7	GND		22	VIO28_PMU	
8	D2N	C	23	LCD_ID	
9	D2P		24	VIO_1.8V	
10	GND		25	GND	
11	D3N		26	SCL	
12	D3P		27	SDA	
13	GND		28	CTP_RST	
14	TCN		29	CTP_EINT	
15	TCP		30	CTP_VCC_2.8V	

4.电性特性（Electrical Characteristics）

14. Electrical Characteristics

14.1. Absolute Maximum Ratings

The absolute maximum rating is listed on the following table. When the ILI2882N is used out of the absolute maximum ratings, it may be permanently damaged. To use the ILI2882N within the following electrical characteristics limit is strongly recommended for normal operation. If these electrical characteristic conditions are exceeded during normal operation, the ILI2882N will malfunction and cause poor reliability.

Table 43. Absolute Maximum Ratings

Item	Symbol	Unit	Value
Supply voltage (I/O)	IOVCC ~ VSS	V	-0.3 ~ +1.95
Supply voltage (DSI I/O)	VDDAM ~ VSS	V	-0.3 ~ +1.95
Supply voltage	VSP ~ AVSS	V	-0.3 ~ +6.3
Supply voltage	VSN ~ AVSS	V	0.3 ~ -6.3
Driver Supply voltage	VGH ~ AVSS	V	-0.3 ~ +20
Driver Supply voltage	VGL ~ AVSS	V	0.3 ~ -18
Driver supply voltage	VSP – VSN	V	≦12V
Driver supply voltage	VGH – VGL	V	≦ 32V
Driver supply voltage	IOVCC – VCL	V	≦ 5.3V
Input voltage	V_{IN}	V	-0.3 ~ IOVCC + 0.3
HS Input voltage	V_{HSIN}	V	-0.3 ~ + 1.3
Operating temperature	Topr	℃	-30 ~ +70
Storage temperature	Tstg	℃	-55 ~ +110

Note:

If one of the above parameters is exceeded the absolute maximum rating 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.

14.2. DC Characteristics for Panel Driving

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Power & Operation Voltage							
Logic operating voltage	IOVCC	-	1.65	1.8	1.95	V	
Operating Voltage	VSP	-	4.5	5.5	6.3	V	
Operating Voltage	VCI		2.5	2.8	3.3		
Operating Voltage	VSN	-	-6.3	-5.5	-4.5	V	
Logic operating voltage	VDDAM	-	1.65	1.8	1.95	V	
Logic High level input voltage	V_{IH}	-	0.7*IOVCC	-	IOVCC	V	Note1
Logic Low level input voltage	V_{IL}	-	0	-	0.3*IOVCC	V	Note1
Logic High level output voltage TE, LEDPWM	V_{OH}	I_{OH} = -1.0mA	0.8*IOVCC	-	IOVCC	V	Note1
Logic Low level output voltage TE, LEDPWM	V_{OL}	I_{OL} = +1.0mA	0	-	0.2*IOVCC	V	Note1
Driver Supply Voltage	-	|VGHO+TVCH-VGL|	-	-	34	V	
VCOM Operation							
DC VCOM Amplitude Voltage	VCOM	-	-3.0	-	0	V	Note2
Source Driver							
Positive Source Output Range	V_{SOUT}	-	0.2	-	GVDDP	V	Note3
Negative Source Output Range	V_{SOUT}	-	GVDDN	-	-0.2	V	Note3
Positive Gamma Reference Voltage	GVDDP	-	3	-	6	V	Note4
Negative Gamma Reference Voltage	GVDDN	-	-6	-	-3	V	Note4
Source Output Setting Time	Tr	Below with 99% precision	-	3.5		us	Note2,3
Source Output Deviation Voltage	V_{DEV}	Sout>=4.2V Sout<=0.8V	-	40		mV	Note2
		4.2V>Sout>0.8V	-	30		mV	-
Source Output Offset Voltage	V_{OFFSET}	-	-	50		mV	Note2
Booster Operation							
Gate Driver High Voltage	VGH	-	8	-	20	V	
Gate Driver Low Voltage	VGL	-	-6	-	-18	V	

Note:

1. Ta = -30 to 70 °C (to 85 °C no damage), IOVCC=1.65V ~ 1.95V.
2. Source Channel Loading = 6.5Kohm, 50pF/Channel
3. The Max. Value is between with Note-2 measure point and Gamma setting value
4. GVDDP≦VSP-0.3V and GVDDN≧VSN+0.3V.

14.3.1. DSI Timing Characteristics

14.3.1.1. High Speed Mode – Clock Channel Timing

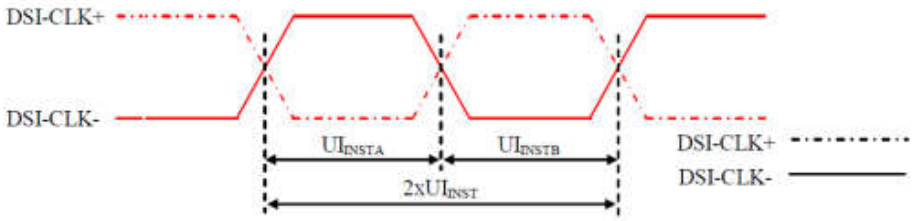


Figure 102. DSI Clock Channel Timing

Table 45. DSI Clock Channel Timing

Signal	Symbol	Parameter	Min.	Max.	Unit
DSI-CLK+/-	$2xUI_{INST}$	Double UI instantaneous	2	25	ns
DSI-CLK+/-	UI_{INSTA}, UI_{INSTB}	UI instantaneous Half	1	12.5	ns

Note: $UI_{INST} = UI_{INSTA} = UI_{INSTB}$

14.3.1.2. High Speed Mode – Data Clock Channel Timing

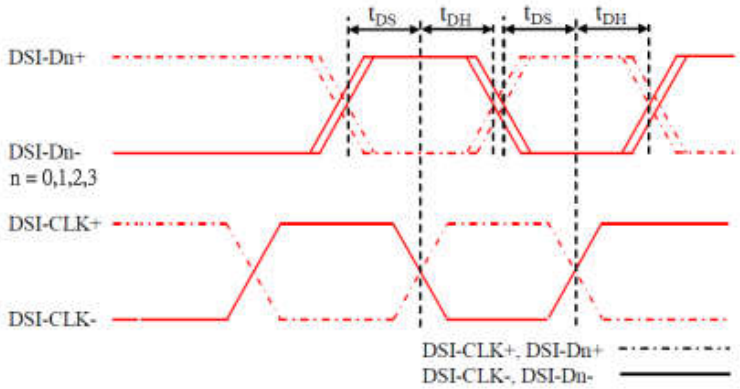


Figure 103. DSI Data to Clock Channel Timings

14.3.1.3. High Speed Mode – Rise and Fall Timings

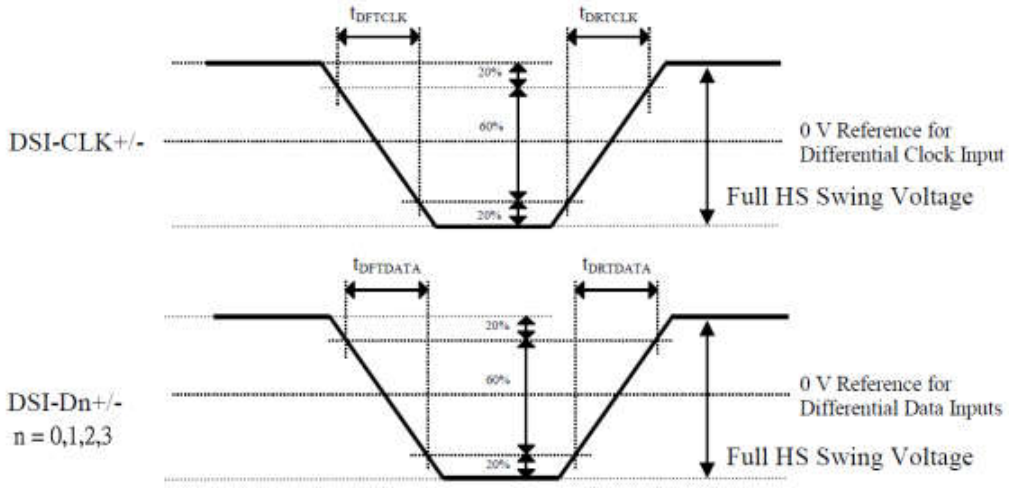


Figure 104. Rise and Fall Timings on Clock and Data Channels

Table 47. Rise and Fall Timings on Clock and Data Channels

Parameter	Symbol	Condition	Specification		
			Min.	Typ.	Max.
Differential Rise Time for Clock	t_{DRTCLK}	DSI-CLK+/-	150 ps	-	0.3UI
Differential Rise Time for Data	$t_{DRTDATA}$	DSI-Dn+/- (n=0,1,2,3)	150 ps	-	0.3UI
Differential Fall Time for Clock	t_{DFTCLK}	DSI-CLK+/-	150 ps	-	0.3UI
Differential Fall Time for Data	$t_{DFTDATA}$	DSI-Dn+/- (n=0,1,2,3)	150 ps	-	0.3UI

Note:

The display module has to meet timing requirements, what are defined for the transmitter (MCU) on MIPI D-Phy standard.

14.3.1.4. Low Speed Mode – Bus Turn Around

Lower Power Mode and its State Periods are illustrated for reference purposes on the Bus Turnaround (BTA) from the MCU to the Display Module (ILI2882N) sequence below.

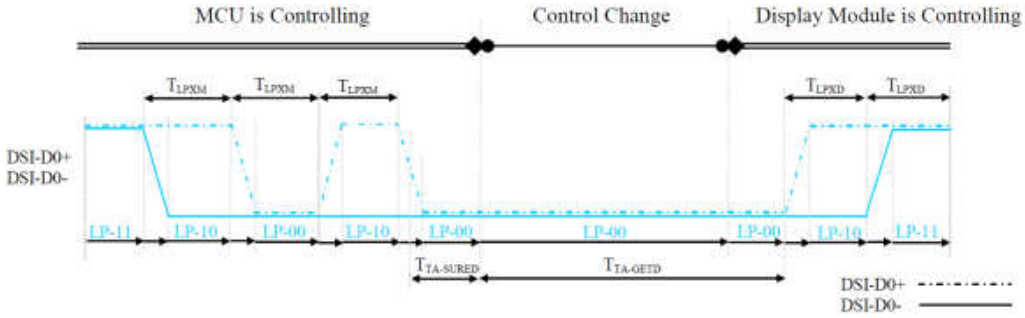


Figure 105. BTA from the MCU to the Display Module

Lower Power Mode and its State Periods are illustrated for reference purposes on the Bus Turnaround (BTA) from the Display Module (ILI2882N) to the MCU sequence below.

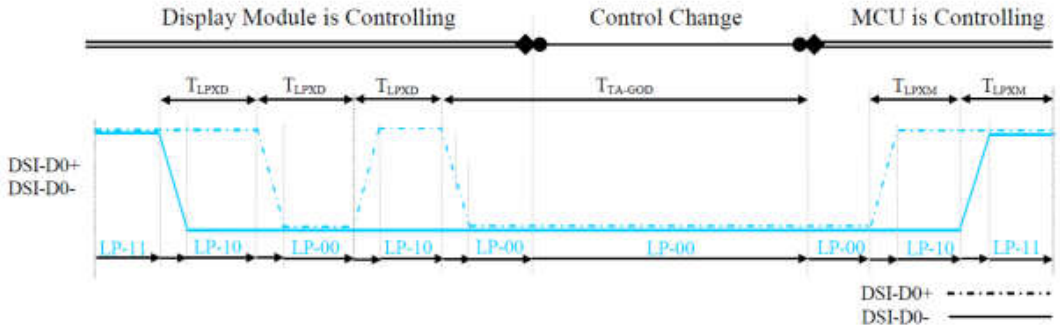


Figure 106. BTA from the Display Module to the MCU

Table 48. Low Power State Period Timings – A

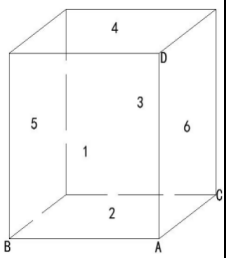
Table 48. Low Power State Period Timings – A

Signal	Symbol	Description	Min	Max	Unit
DSI-D0+/-	T_{LPXM}	Length of LP-00, LP-01, LP-10 or LP-11 periods MCU ➔ Display Module (ILI2882N)	50	75	ns
DSI-D0+/-	T_{LPXD}	Length of LP-00, LP-01, LP-10 or LP-11 periods Display Module (ILI2882N) ➔ MCU	50	75	ns
DSI-D0+/-	$T_{TA-SURED}$	Time-out before the Display Module (ILI2882N) starts driving	T_{LPXD}	$2*T_{LPXD}$	ns

Table 49. Low Power State Period Timings – B

Signal	Symbol	Description	Time	Unit
DSI-D0+/-	$T_{TA-GETD}$	Time to drive LP-00 by Display Module (ILI2882N)	$5*T_{LPXD}$	ns
DSI-D0+/-	T_{TA-GOD}	Time to drive LP-00 after turnaround request – MCU	$4*T_{LPXD}$	ns

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

<table>
<tr><th>序号</th><th>试 验项目</th><th>试验条件及方法</th><th>试验设备</th><th>检验项目</th><th>检验工具</th></tr>
<tr><td>1</td><td>高 温高 湿(静、动 态) 试验</td><td>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。</td><td>恒温恒湿试验机</td><td>检验外观、功能、抗腐蚀性</td><td rowspan="2">目视/测试架/客户样机/显微镜</td></tr>
<tr><td>2</td><td>高 、低 温冲 击试验</td><td>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。</td><td>冷热冲击试验机</td><td>检验外观、功能</td></tr>
<tr><td>3</td><td>高 温存 贮试验</td><td>常温60℃+-3℃、宽温70℃+/-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。</td><td>烤箱</td><td>检验外观、功能</td><td rowspan="2">目视/测试架/客户样机</td></tr>
<tr><td>4</td><td>低 温存 贮试验</td><td>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。</td><td>低温冰箱</td><td>检验外观、功能</td></tr>
<tr><td>5</td><td>低温存贮试验（动态）</td><td>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。</td><td>低温冰箱</td><td>检验外观、功能</td><td>目视/测试架/客户样机</td></tr>
<tr><td>6</td><td>包 装模 组跌 落试验</td><td>1、跌落重量及自由落体高度:（图二）
 

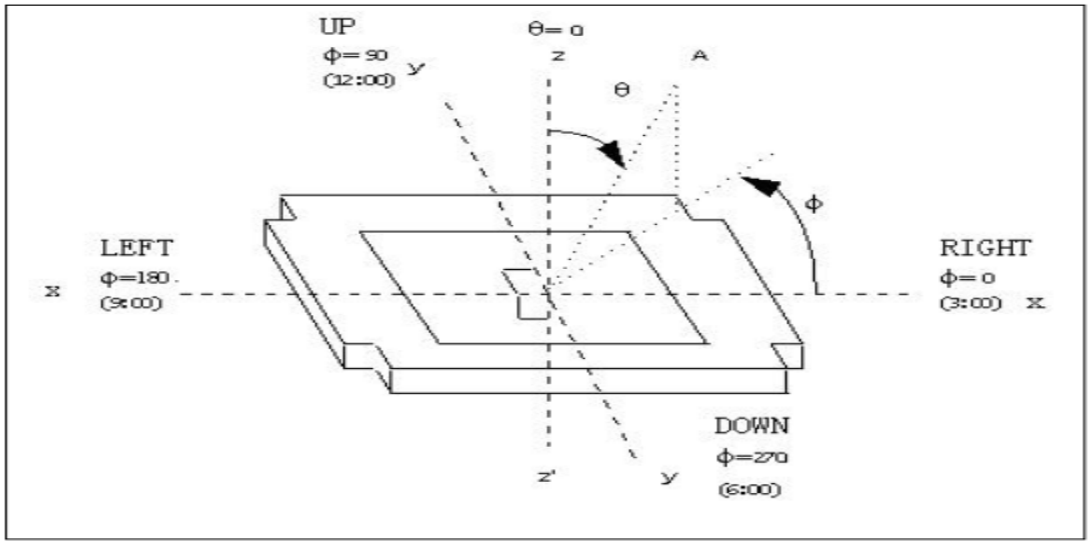
2、自由落体角度如下：
<table><tr><th>总重量</th><th>自由落体高度</th></tr><tr><td>0-9kg</td><td>92cm</td></tr><tr><td>9-25kg</td><td>76cm</td></tr><tr><td>25-45kg</td><td>53cm</td></tr><tr><td>45-68kg</td><td>46cm</td></tr><tr><td>大于 68kg</td><td>41cm</td></tr><tr><td></td><td></td></tr></table>1） 一角：A角
2） 三菱：A-B, A-D, A-C
3） 六面：面 1，面 2，面 3，面 4，面 5，面 6;</td><td>包装模组跌落架</td><td>测试电性能无异常、外观检验无破损，无脱离现象</td><td>目视/测试架/客户样机</td></tr>
</table>

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±2℃,盐雾的沉降率在 1～2ml/80cm².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±2℃,盐雾的沉降率在 1～2ml/80cm².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. OPTICAL SPECIFICATION

Item		Symbol	Conditions	Specifications			Unit	Note
				Min.	Typ.	Max.		
Transmittance (w/o APCF)		T%	Viewing normal angle $\theta_X = \theta_Y = 0°$	2.92	3.44		%	All left side data are based on Innolux's following condition – 1.LC: AAS 2.Light Source: INX's BLU 3. Polarizer : Front: GRT1794XHUHC3 Rear: APCF04SD5MSCA124E 4.Measurement machine : DMS-900 5. Transmittance w/o APCF 6. VLC dark < 0.4V, VLC white > 5.4V
Contrast Ratio		CR		1200	1500		--	
Response Time		$T_{on}+T_{off}$			30	35	ms	
Viewing Angle	Hor.	θ_{X+}	Center CR>10	75	80		deg.	
		θ_{X-}		75	80			
	Ver.	θ_{Y+}		75	80			
		θ_{Y-}		75	80			
CF only Color Chromaticity (CIE 1931)	Red	Rx	Viewing normal angle $\theta_X = \theta_Y = 0°$	0.641	0.661	0.681	-	Under C light Simulation
		Ry		0.305	0.325	0.345	-	
	Green	Gx		0.257	0.277	0.297	-	
		Gy		0.550	0.570	0.590	-	
	Blue	Bx		0.119	0.139	0.159	-	
		By		0.068	0.088	0.108	-	
	White	Wx		0.282	0.302	0.322	-	
		Wy		0.309	0.329	0.349	-	
	Color Gamut			65	69.2		%	



7.检验标准（Inspection standard）

8.1 Inspection conditions is as follows

1) Viewing angle is within +-30° from vertical direction, as fig 1

2) Viewing angle is the angle defined in the drawing

3) Ambient temperature is approximately 25+-5° C

4) Ambient luminance is about 300~500 Lux.

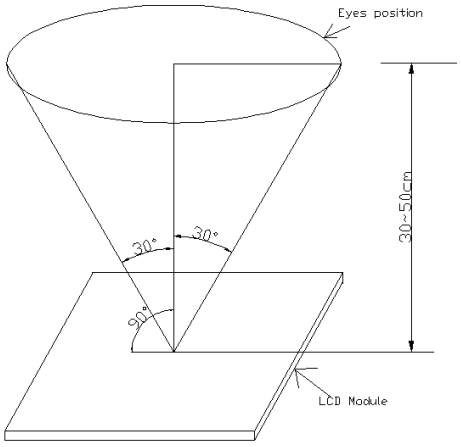
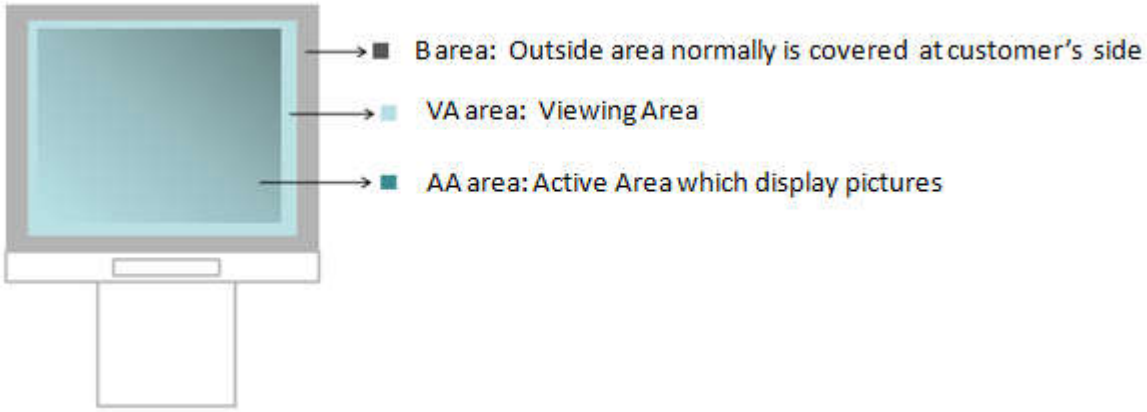
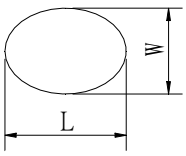


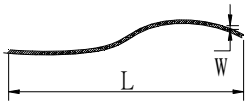
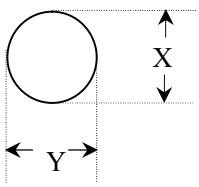
fig1

8.2 Panel area definition



8.3 Routine inspection standards

项目	不良定义	不良现象	判定标准			检验方法	
11.3.1	外观尺寸	与图纸尺寸不相符	NG			卡尺	
11.3.2	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
11.3.3	*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*  *Φ=(L+W)/2*	LCM/总成 0.95 寸—2.4 寸			目视(用菲淋卡比对)	次
			Φ≦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 。		

<table>
<tr><td></td><td></td><td></td><td>0.10mm<Φ≦0.15mm</td><td></td><td>1</td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td>Φ>0.15mm</td><td></td><td>NG</td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td colspan="4">0.15mm<Φ≦0.2mm 按照 A-品入库</td></tr>
<tr><td></td><td></td><td></td><td colspan="3">LCM/总成>2.4 寸——6.0 寸</td><td rowspan="5">目 视
(用菲淋卡比对)</td><td rowspan="5"></td></tr>
<tr><td></td><td></td><td></td><td>Φ≦0.10mm</td><td></td><td>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</td></tr>
<tr><td></td><td></td><td></td><td>0.1mm<Φ≦0.15mm</td><td></td><td>4（TP、屏各允许 2 个）</td></tr>
<tr><td></td><td></td><td></td><td>0.15mm<Φ≦0.2mm</td><td></td><td>2（TP、屏各允许 1 个）</td></tr>
<tr><td></td><td></td><td></td><td>Φ>0.2mm</td><td></td><td>NG</td></tr>
<tr><td>11.3.4</td><td>点亮产品可见及在LCD或T/P上有擦拭不掉的线状物/刮伤</td><td> 
</td><td colspan="3">LCM/总成 0.95 寸——6.0 寸
长(L) | 宽(W) | 允许个数
≦1mm | ≦0.03mm | 2
≦2mm | 0.03<W≦0.05mm | 1
>2mm | >0.05mm | 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）.</td><td>目视(用菲淋卡比对)</td><td>次</td></tr>
<tr><td>11.3.5</td><td>偏光片气泡</td><td>Φ=（X+Y）/2
 
</td><td colspan="3">尺寸 | 允许个数
1、Φ≦0.1mm
2、不超过边框 1/3 | 不计(密集不可)
0.10<Φ≦0.2mm | 1
Φ>0.2mm | NG
0.2<Φ≦1.5mm,（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</td><td>在日光台灯下撕起保护膜,距待测物 30cm 目视</td><td>次</td></tr>
</table>

			上		
11.3.6	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
11.3.7	Mura	边框四周或任一侧的色差、较画面深、区域云状不均、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	1.判定示画面为 128 灰阶画面，用 ND filter 盖住 mura 位置进行判定。 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。	ND filter, 128 灰阶画面	次