NISIN

触摸显示模组产品规格承认书

Displaly Module Specifications for Approval

客户： 客户型号：			NS500HD30D4AZ01		
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
2023-6-21	V00	初版发行	所有	

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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)	5 inch
显示类型（Display Type）	Normal Black
分辨率（Resolution）	720 (RGB) x 1280 (dot)
显示点间距（Dot Pitch）	0.0286mm X 0.0858mm
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）	ILI9881P
接口类型（Interface Type）	MIPI
触摸类型（TP Type）	I2C
触摸 IC （TP IC）	GT911
外形尺寸（Dimensions）	71.4(H) X 137.43(V) X 3.2(T)(mm)
显示区尺寸（Display area）	61.78 x 109.82(mm)
模组亮度（Module Brightness）	450cd/m²
触摸点数 Touch points	5
触摸按键 Touch Key Number	0
触摸屏固件版本	Version:

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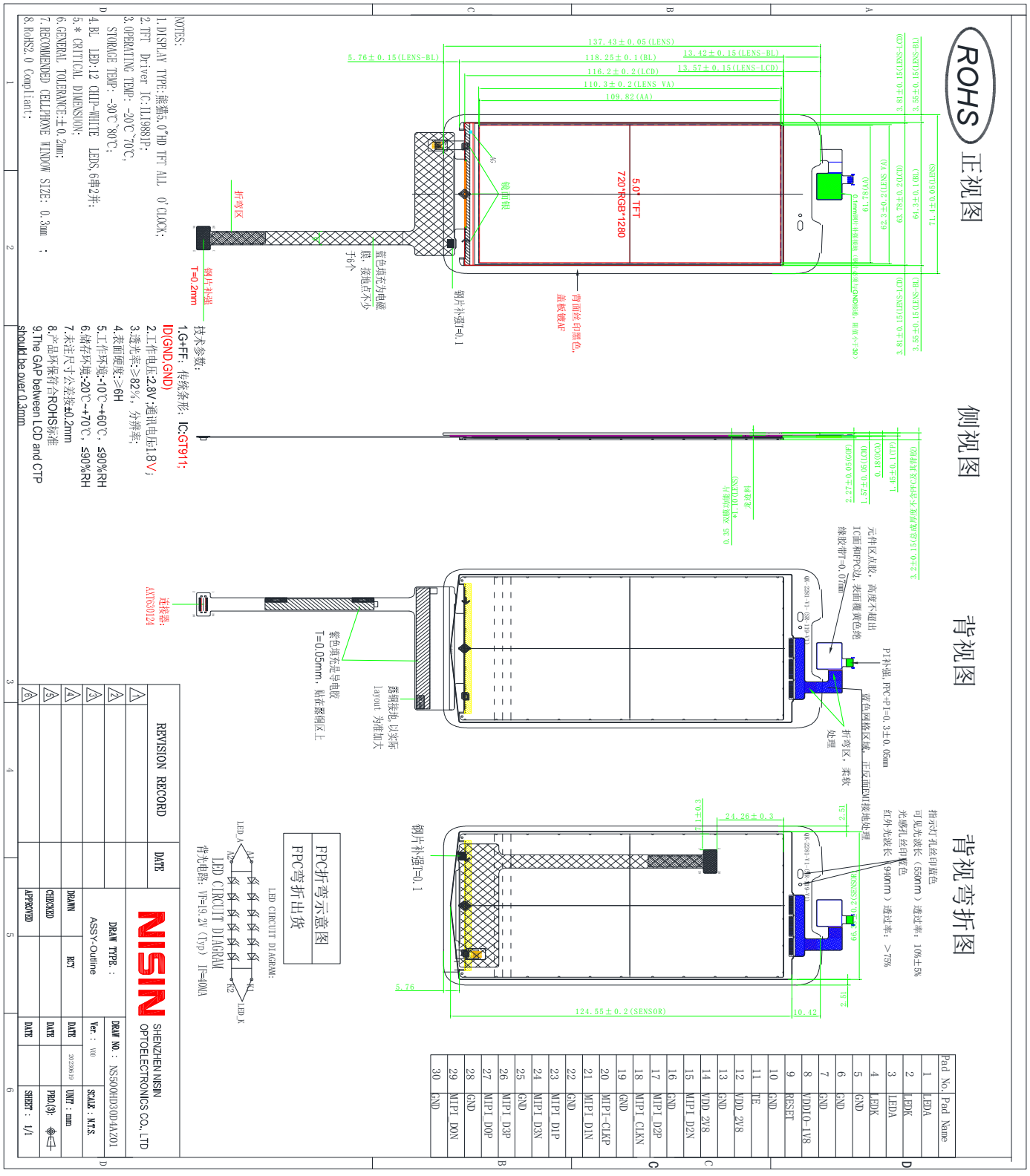
2.产品图纸（Product Drawings）



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3. 接口定义（The Interface Definition）

见 CAD 图纸

4.电性特性（Electrical Characteristics）

18.2. DC Characteristics for Panel Driving

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Power & Operation Voltage							
Analog operating voltage	VCI	-	2.6	2.8	6.6	V	
Analog operating voltage	VCIREF		2.6	2.8	6.6	V	
Digital operating voltage	VDDI	-	1.65	2.8	3.6	V	
DSI operating voltage	VDDAM	-	1.65	1.8	3.6	V	
Analog operating voltage	VSP	-	4.5		6.6	V	
Analog operating voltage	VSN	-	-6.6		-4.5	V	
Logic High level input voltage	VIH	-	0.7*VDDI		VDDI	V	Note1
Logic Low level input voltage	VIL	-	-0.3		0.3*VDDI	V	Note1
Logic High level output voltage TE , LEDPWM	VOH	IOH = -1.0mA	0.8*VDDI		VDDI	V	Note1
Logic Low level output voltage TE , LEDPWM	VOL	IOL = +1.0mA	0		0.2*VDDI	V	Note1
Gate Driver High Voltage	VGH	-	8.0	-	19	V	
Gate Driver Low Voltage	VGL	-	-16.0	-	-7.0	V	
Driver Supply Voltage	-	[VGH-VGL]	15	-	32	V	
VCOM Operation							
DC VCOM Amplitude Voltage	VCOM	-	-4.0	-	0	V	Note3
Source Driver							
Source Output Range	VSOUT(+)	-	0.3	-	VREG1OUT-0.1	V	Note4
	VSOUT(-)	-	VREG2OUT +0.1	-	-0.3	V	Note4
Positive Gamma Reference Voltage	VREG1OUT	-	3.5	-	VSP-0.5	V	
Negative Gamma Reference Voltage	VREG2OUT	-	VSN+0.5	-	-3.5	V	
Source Output Setting Time	Tr	Below with 99% precision	5.1	5.6	7.3	uS	Note3.4
Output Deviation Voltage (Source Output channel)	Vdev	Sout>=4.2V Sout<=0.8V	-20	0	20	mV	Note3
		4.2V>Sout>0.8V	-15	0	15	mV	
Output Offset Voltage	VOFFSET	-	-35	0	35	mV	Note3
Standby mode current consumption							
Sleep In mode	I(VDDI SLP IN)	Ta = 25 °C VDDI=1.8V VSP=5.5V VSN=-5.5V	-	130	-	uA	
	I(VSP SLP IN)		-	45	-	uA	
	I(VSN SLP IN)		-	5	-	uA	

Notes:

1. Ta = -30 to 70 °C (to 85 °C no damage) , VDDI = 1.65V to 3.6V, VSP = 4.5V to 6.6V, VSN = -6.6V to -4.5V,

2. Supply digital VDDI voltage equal or less than analog VCI voltage.

3. Source channel loading = 9KΩ,70pF/channel

4. The maximum value is between with Note 3 and Gamma setting value

For Panel Reference Only

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7.5.4 MIPI Interface Characteristics:

7.5.4.1 High Speed Mode

Figure 4 DSI clock channel timing

Figure 5 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	

Table 7 Mipi Interface- High Speed Mode Timing Characteristics

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7.5.4.2 Lowe Power Mode

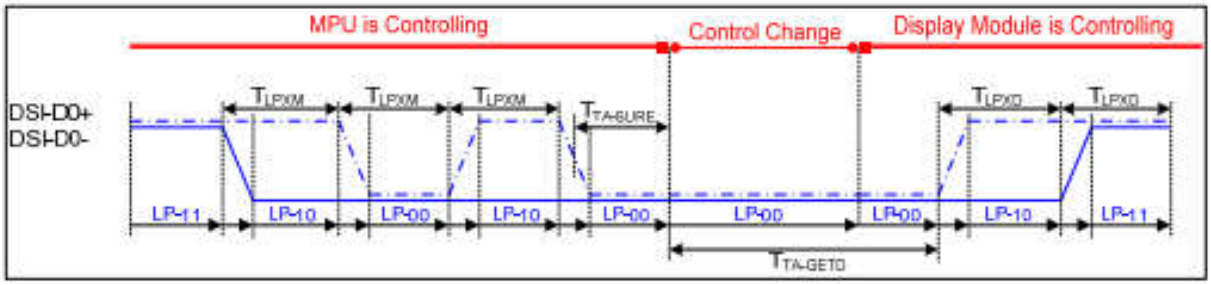

Figure 6 Bus Turnaround (BTA) from display module to MPU Timing

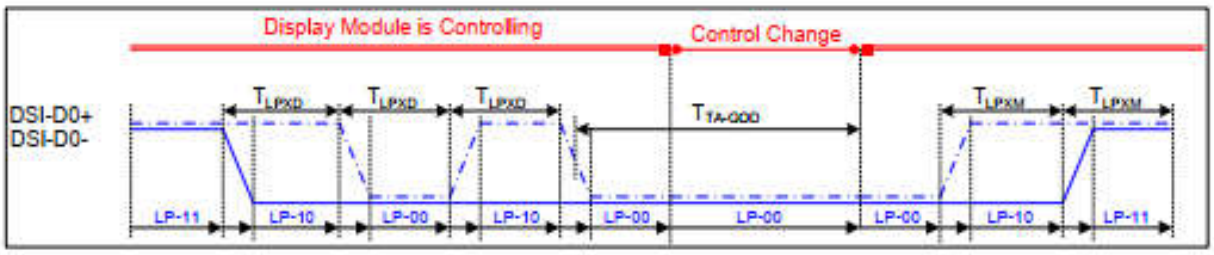

Figure 7 Bus Turnaround (BTA) from MPU to display module Timing

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}	$2xT_{LPXD}$	ns	Output
DSI-D0+/-	TTA-GETD	Time to drive LP-00 by display module	$5xT_{LPXD}$		ns	Input
DSI-D0+/-	TTA-GOD	Time to drive LP-00 after turnaround request-MPU	$4xT_{LPXD}$		ns	Output

Table 8 Mipi Interface Low Power Mode Timing Characteristics

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7.5.4.3 DSI Bursts Mode

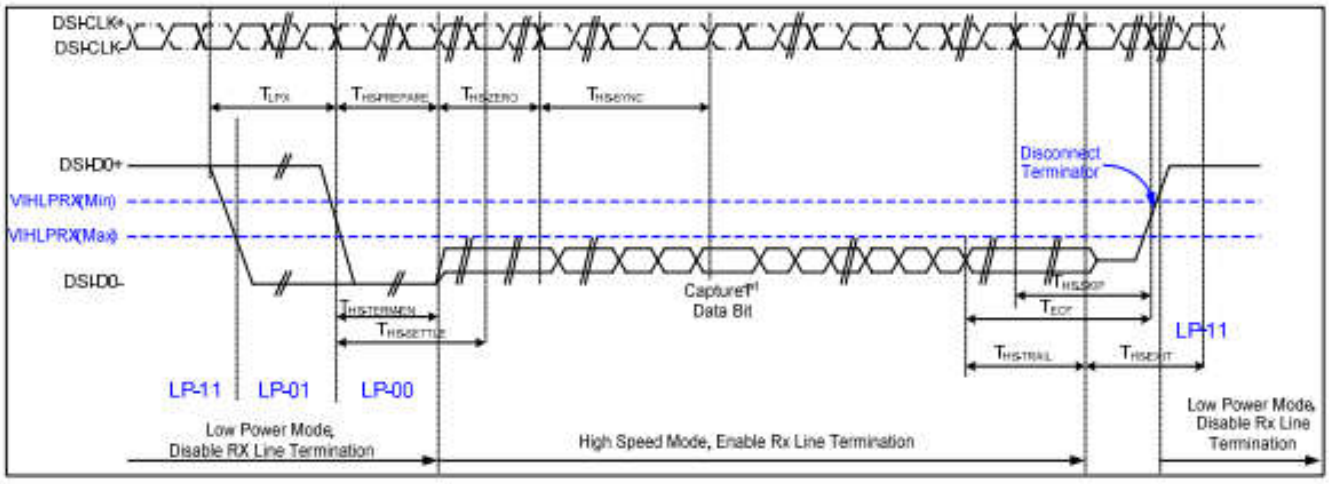

Figure 7 Data lanes-Low Power Mode to/from High Speed Mode Timing

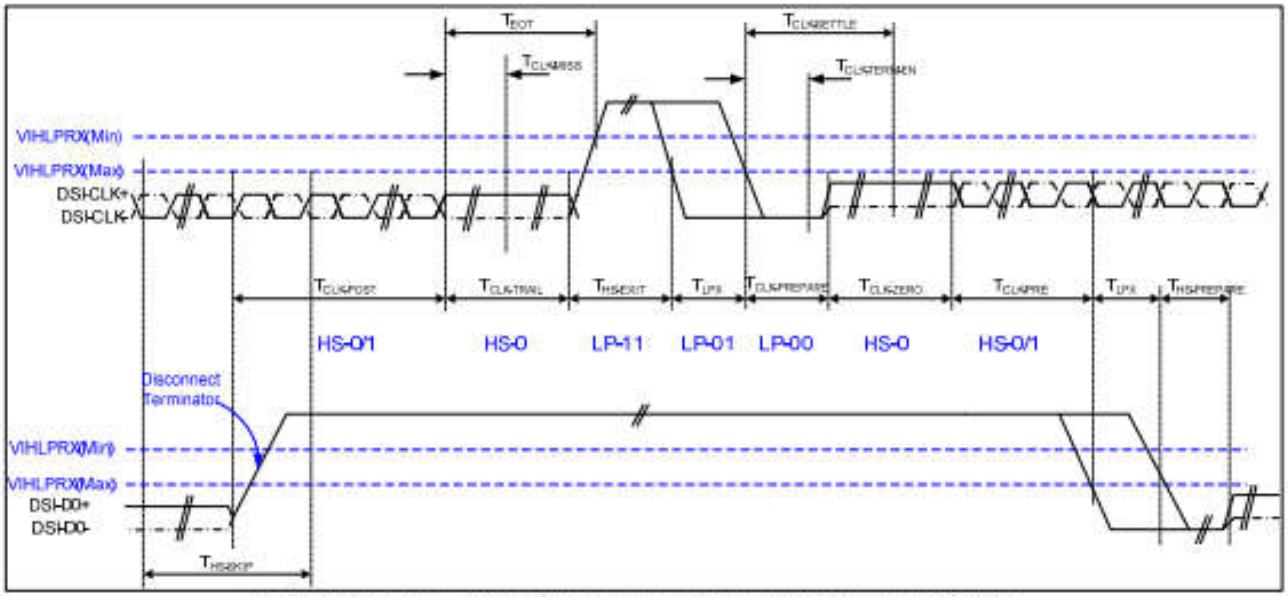

Figure 8 Clock lanes- High Speed Mode to/from Low Power Mode Timing

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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	-	105n s+12 UI	ns	Input

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7.5.5 Reset Timing:

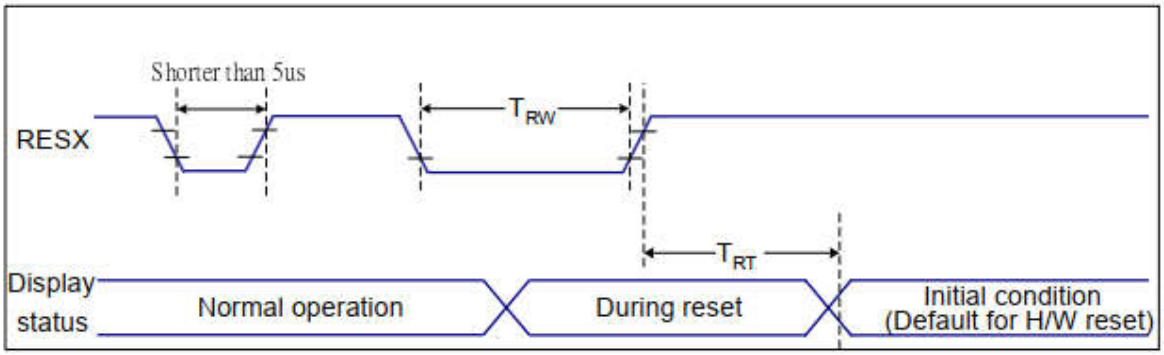

Figure 9 Reset Timing

VDDI=1.8,VDD=2.8, AGND=DGND=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

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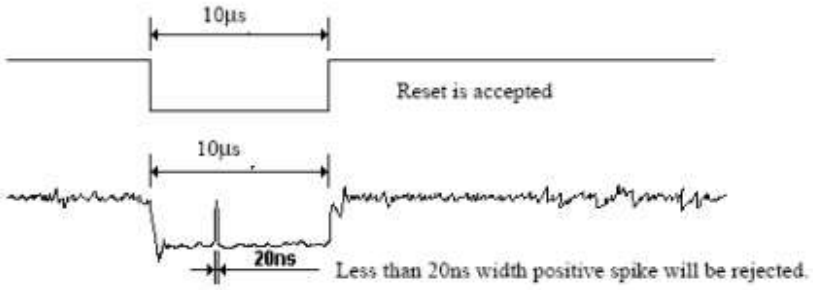

5. When Reset applied during Sleep In Mode.

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.

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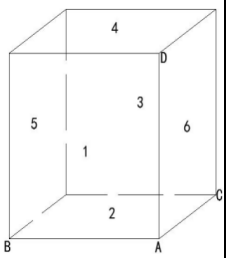
5.可靠性实验测试(Reliability Test Conditions And Methods)

<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。</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>

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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

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6. 光电参数（Optical Characteristics）

7. OPTICAL SPECIFICATION

Item		Symbol	Conditions	Specifications			Unit	Note
				Min.	Typ.	Max.		
Transmittance (Under Clight)		T%	Viewing normal angle $\theta_X = \theta_Y = 0°$	3.08	3.64	--	%	T% definition : (w/o DBEF) & (w/o APCF) (w/o Haze) & (w/o WPA)
Contrast Ratio		CR		800	1000	--	--	
Response Time		$T_{on}+T_{off}$		--	25	35	ms	All left side data are based on INX's following condition – 1. LC : AAS 2. BLU : under C_light 3. Machine : DMS-900 4. V_{LC} : Vbright ≧ 4.7V Vdark ≦ 0.3V
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 (CIE1931)	Red	X_R	Viewing normal angle $\theta_X = \theta_Y = 0$	0.643	0.663	0.683	--	Under C light simulation
		Y_R		0.306	0.326	0.346		
	Green	X_G		0.257	0.277	0.297		
		Y_G		0.552	0.572	0.592		
	Blue	X_B		0.119	0.139	0.159		
		Y_B		0.066	0.086	0.106		
	White	X_W		0.278	0.298	0.318		
		Y_W		0.308	0.328	0.348		
Color Gamut	CG				70		%	

*Note (1)Definition of Contrast Ratio (CR):

The contrast ratio can be calculated by the following expression.

Contrast Ratio (CR) = L255 / L0

L255: Luminance of gray level 255

L 0: Luminance of gray level 0

CR = CR (5)

CR (X) is corresponding to the Contrast Ratio of the point X at Figure in Note (5)

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4. The color chromaticity coordinates specified in Table1 shall be calculated from
The spectral data measured with all pixels first in red, green, blue and white.
Measurements shall be made at the center of the C/F.
Measurement condition is C - light source & Halogen Lamp
5. The electro-optical response time measurements shall be made as FIG.2 by switching the "data" input signal ON and OFF.
The times needed for the luminance to change from 10% to 90% is Tr, and 90% to 10% is Tf.

Figure 1. Measurement Set Up

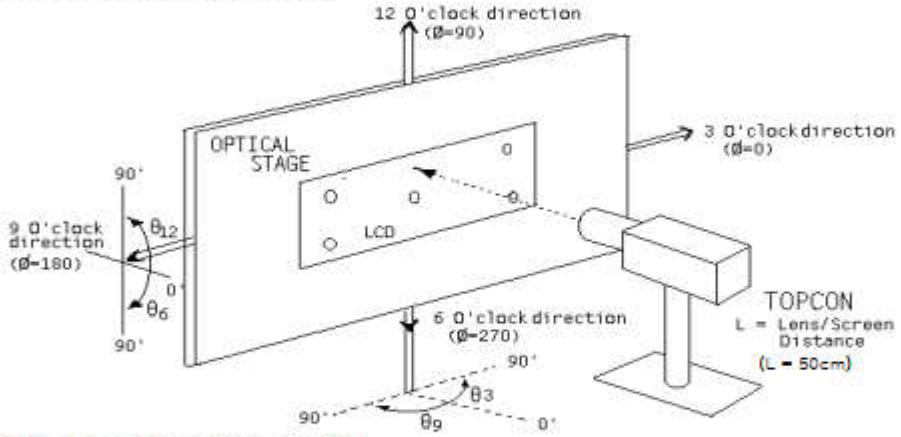
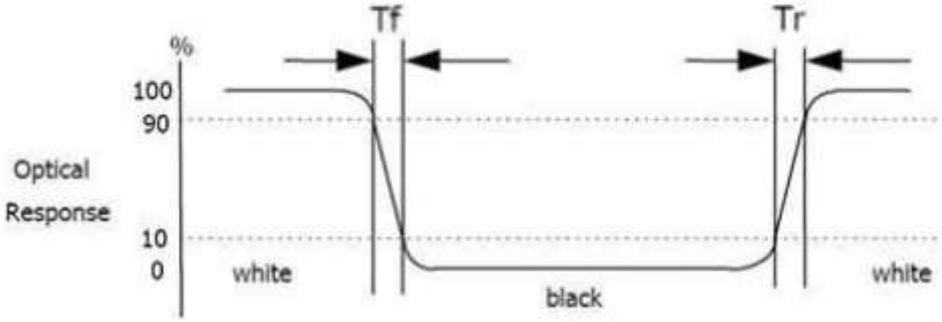


Figure 2. Response Time Testing



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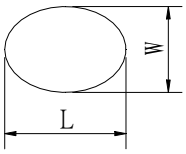
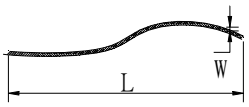
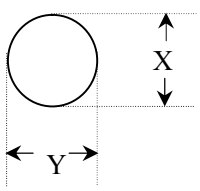
7.检验标准（Inspection standard）

<table>
<tr><td>项目</td><td>不良定义</td><td>不良现象</td><td colspan="3">判定标准</td><td>检验方法</td><td></td></tr>
<tr><td>9.3.1</td><td>外观尺寸</td><td>与图纸尺寸不相符</td><td colspan="3">NG</td><td>卡尺</td><td></td></tr>
<tr><td rowspan="4">9.3.2</td><td rowspan="4">功能</td><td>显示少线</td><td colspan="3">NG</td><td>目视</td><td></td></tr>
<tr><td>无显示</td><td colspan="3">NG</td><td>目视</td><td></td></tr>
<tr><td>显示异常</td><td colspan="3">NG</td><td>目视</td><td>主</td></tr>
<tr><td>TP 功能不良，无触摸</td><td colspan="3">NG</td><td>目视/用手触摸</td><td>主</td></tr>
<tr><td>9.3.3</td><td>点亮产品可见及在 LCD 或 T/P 上有擦拭不掉的点状物</td><td>偏光片刺伤、脏点、圆形物、黑点
 

Φ=(L+W)/2</td><td colspan="3">LCM/总成＞2.4 寸——6.0 寸
Φ≦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
0.1mm＜Φ≦0.15mm：4（TP、屏各允许 2 个）
0.15mm＜Φ≦0.2mm：2（TP、屏各允许 1 个）
Φ＞0.2mm：NG</td><td>目 视(用菲淋卡比对)</td><td>次</td></tr>
<tr><td>9.3.4</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)≦1mm，宽(W)≦0.03mm：允许个数 2
长(L)≦2mm，0.03＜W≦0.05mm：允许个数 1
长(L)＞2mm，宽(W)＞0.05mm：NG
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>9.3.5</td><td>偏光片气泡</td><td>Φ=（X+Y）/2
 
</td><td>尺寸</td><td>允许个数</td><td>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</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>

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			＞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

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