液 晶 模 组 说 明 书

LCD Module Instructions

☑初定规格 Preliminary specification

☐正式规格 Official specifications

项目编号 Project No.	TFT-H055A05 系列
产品描述 Product Description	TFT LCD Module 720(H) x 1280(V) Pixels 5.5 Inch TFT LCD

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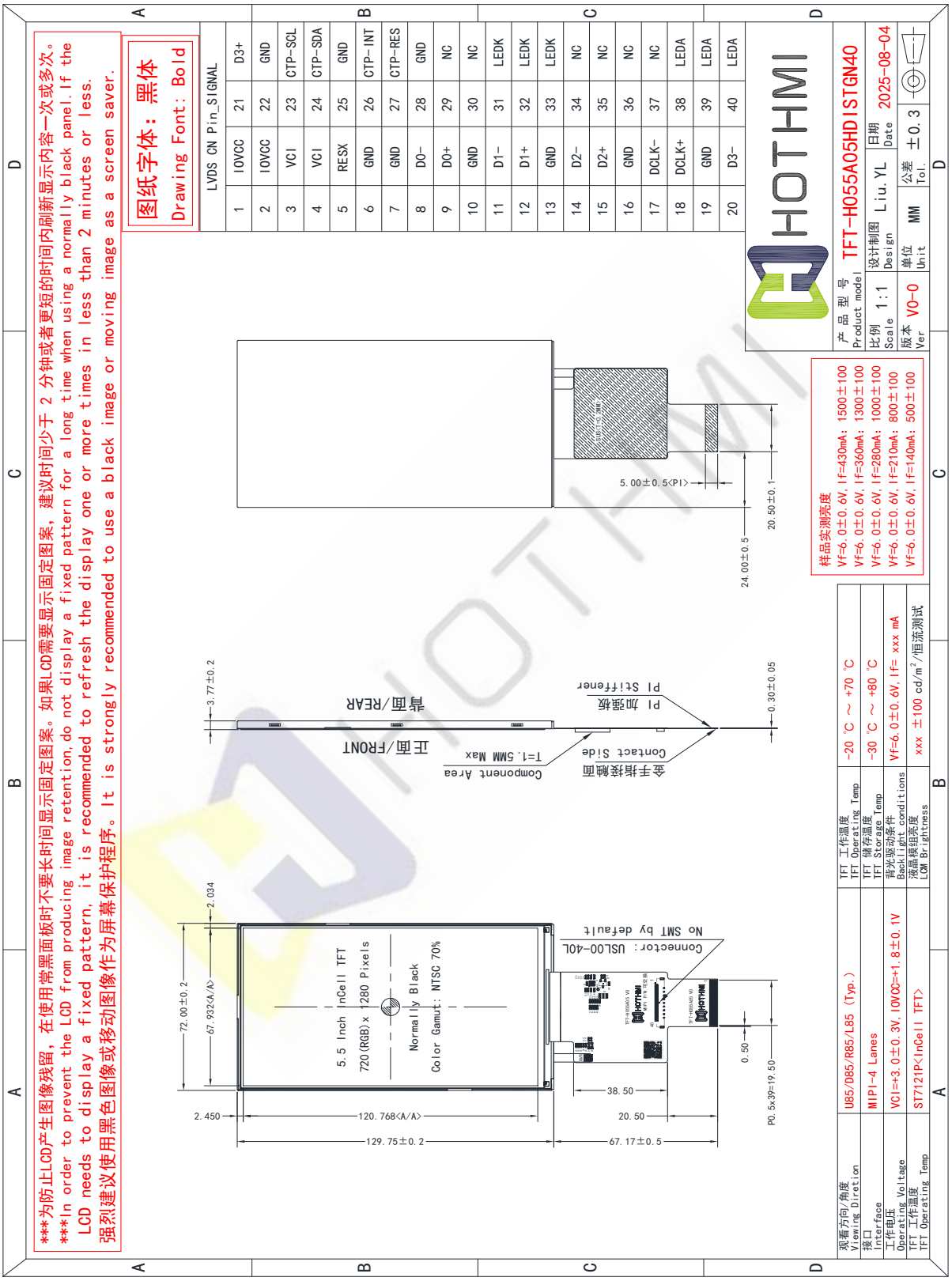
一、基本特征 General Feature:

项目 Item	标准值 Standard Value			单位 Unit
TFT 显示尺寸 TFT Display Size	5.5			英寸 Inch
TFT 分辨率 TFT Number of Pixels	720(RGB) (H) x 1280 (V)			像素 Pixel
TFT 显示有效区域 TFT Display Active Area	67.932 (H) x 120.768 (V)			毫米 mm
TFT 模组外形尺寸 TFT Module Dimensions	72.00(H) x 129.75(V) x 3.77(D) <TFT> 78.00(H) x 138.00(V) x 4.67(D) <TFT+LENS>			毫米 mm
TFT 观看方向 TFT Viewing Direction	U85/D85/R85/L85 (Typ.)			度数 Deg.
TFT 模组接口 TFT Module Interfaces	MIPI Display Serial Interface			-
TFT 驱动芯片 TFT Driver IC	ST7121P			-
电容触摸屏驱动芯片 CTP Driver IC	ST7121P			
触摸屏 Touch Panel	☑不带触摸屏 Whitout TP	☐带电阻触摸屏 With RTP	☑带玻璃盖板 With Glass cover	-
TFT 模组重量 TFT Module Weight	不带触摸屏 Without TP	T.B.D ±5%		克 g
	带电容触摸屏 With CTP	T.B.D ±5%		
	带电阻触摸屏 With RTP	T.B.D ±5%		

说明 Description:

二、外形尺寸 Outline Dimensions



TFT-H055A05HDISTGN40_V0-0<NTP_1500cd/m²>

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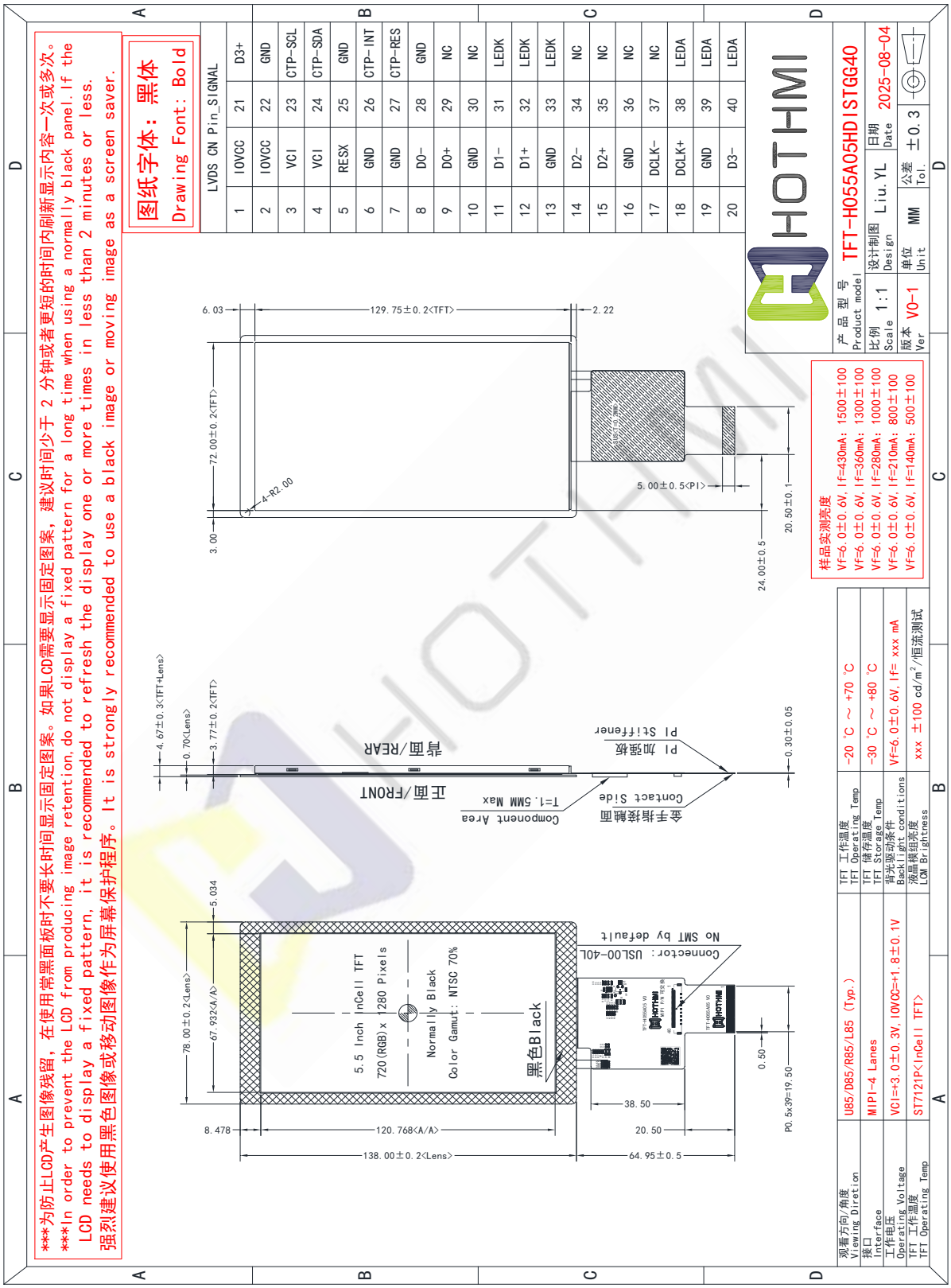

TFT-H055A05HDISTGG40_V0-1<With Glass cover_1500cd/m²>

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三、引脚说明 Pin Description

3.1 模组引脚说明 TFT Pin Description

引脚编号 Pin NO.	标号 Symbol	详细描述 Description
1～2	IOVCC	I/O 电源电压 I/O supply voltage
3～4	VCI	数字电源电压 Digital supply voltage
5	RESX	全局复位引脚。低电平进入复位状态。电平电压：IOVCC Global reset pin. Active Low to enter Reset State. Voltage Level: IOVCC
6～7	GND	电源地 Power supply ground
8	DON	MIPI 数据通道 0 负端输入引脚 MIPI data Lane 0 negative-end input pin
9	DOP	MIPI 数据通道 0 正端输入引脚 MIPI data Lane 0 positive-end input pin
10	GND	电源地 Power supply ground
11	D1N	MIPI 数据通道 1 负端输入引脚 MIPI data Lane 1 negative-end input pin
12	D1P	MIPI 数据通道 1 正端输入引脚 MIPI data Lane 1 positive-end input pin
13	GND	电源地 Power supply ground
14	D2N	MIPI 数据通道 2 负端输入引脚 MIPI data Lane 2 negative-end input pin
15	D2P	MIPI 数据通道 2 正端输入引脚 MIPI data Lane 2 positive-end input pin
16	GND	电源地 Power supply ground
17	DCKN	MIPI 时钟线负端输入引脚 MIPI clock Lane negative-end input pin
18	DCKP	MIPI 时钟线正端输入引脚 MIPI clock Lane positive-end input pin

- 下一页 -
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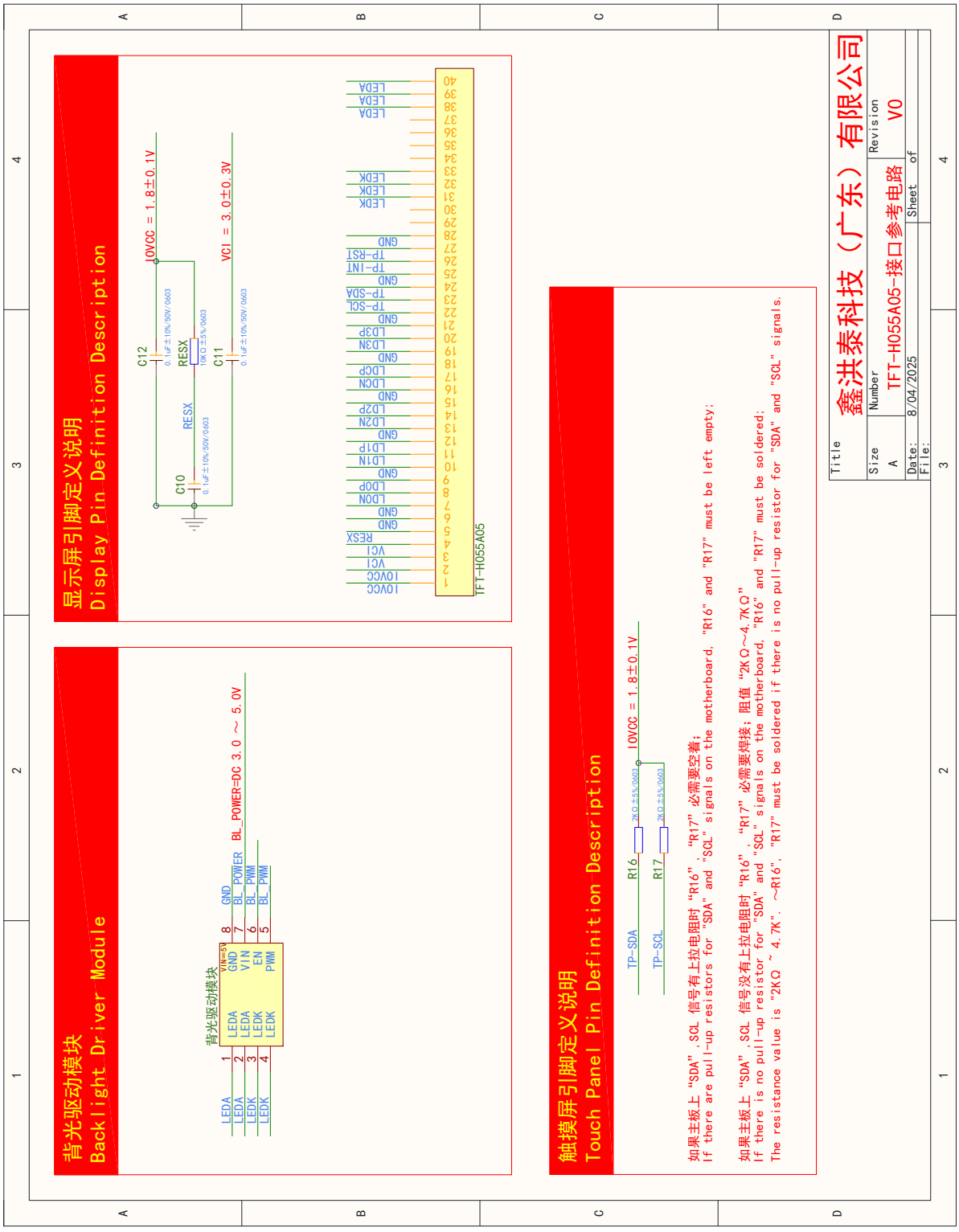
引脚编号 Pin NO.	标号 Symbol	详细描述 Description
19	GND	电源地 Power supply ground
20	D3N	MIPI 数据通道 3 负端输入引脚 MIPI data Lane 3 negative-end input pin
21	D3P	MIPI 数据通道 3 正端输入引脚 MIPI data Lane 3 positive-end input pin
22	GND	电源地 Power supply ground
23	CTP_SCL	电容触摸I2C 时钟信号.电平电压：IOVCC CTP I2C clock signal.Voltage Level: IOVCC
24	CTP_SDA	电容触摸I2C 数据信号.电平电压：IOVCC CTP I2C data signals.Voltage Level: IOVCC
25	GND	电源地 Power supply ground
26	CTP_INT	电容触摸中断信号.电平电压：IOVCC CTP interrupt signal.Voltage Level: IOVCC
27	CTP_RTN	电容触摸重置复位引脚.电平电压：IOVCC CTP Reset pin.Voltage Level: IOVCC
28	GND	电源地 Power supply ground
29～30	NC	不连接 Not connected
31～33	LEDK	LED阴极 LED cathode
34～37	NC	不连接 Not connected
38～40	LEDA	LED阳极 LED anode
- 结束 - - END -		

3.2 电容触摸引脚说明 CTP Pin Description

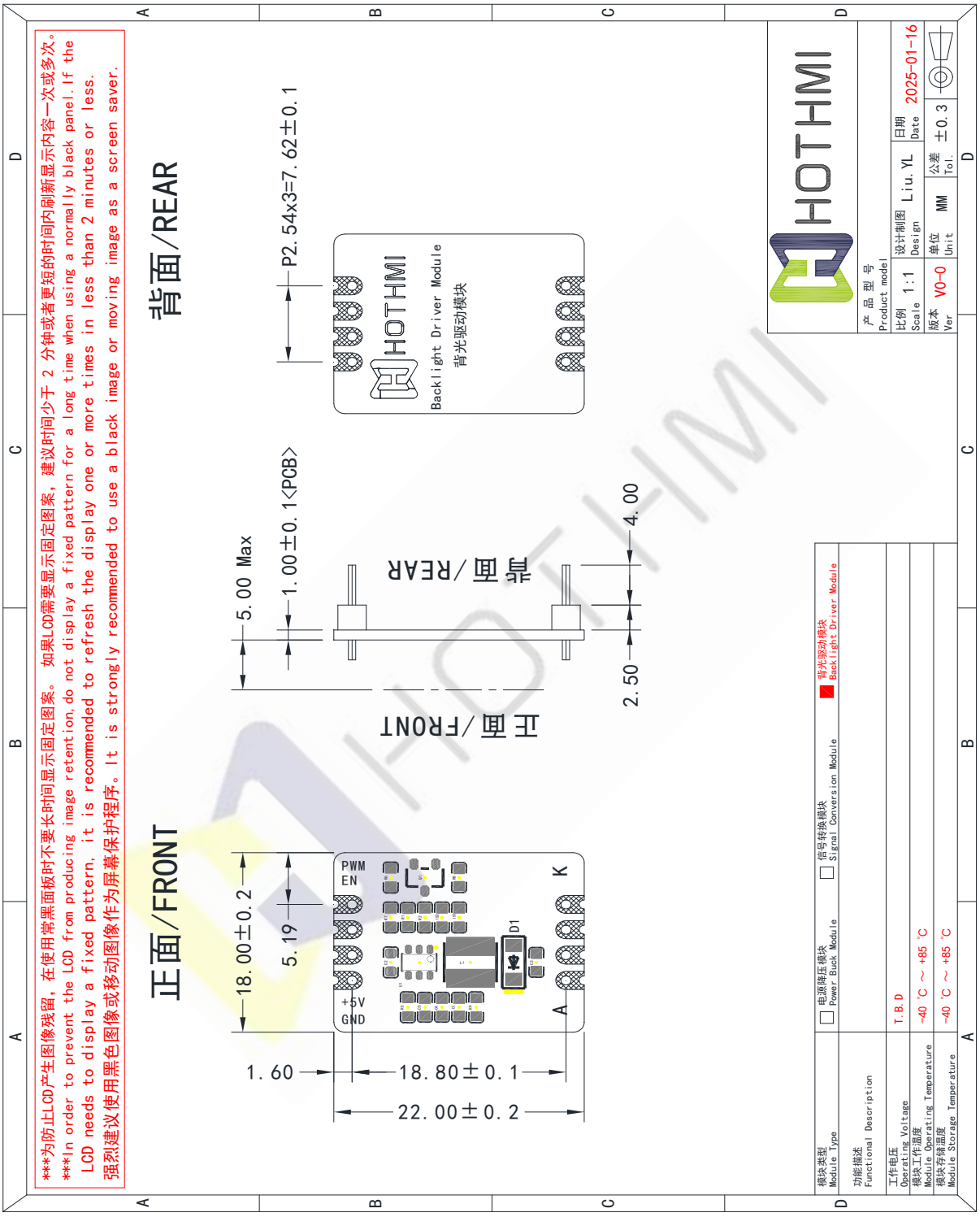
引脚编号 Pin NO.	标号 Symbol	详细描述 Description
1	-	-
2	-	-
3	-	-
4	-	-
5	-	-
6	-	-
- 结束 - - END -		

3.3 接线说明 Wiring instructions



说明 1：为了方便调试，我司可以提供配套的驱动模块

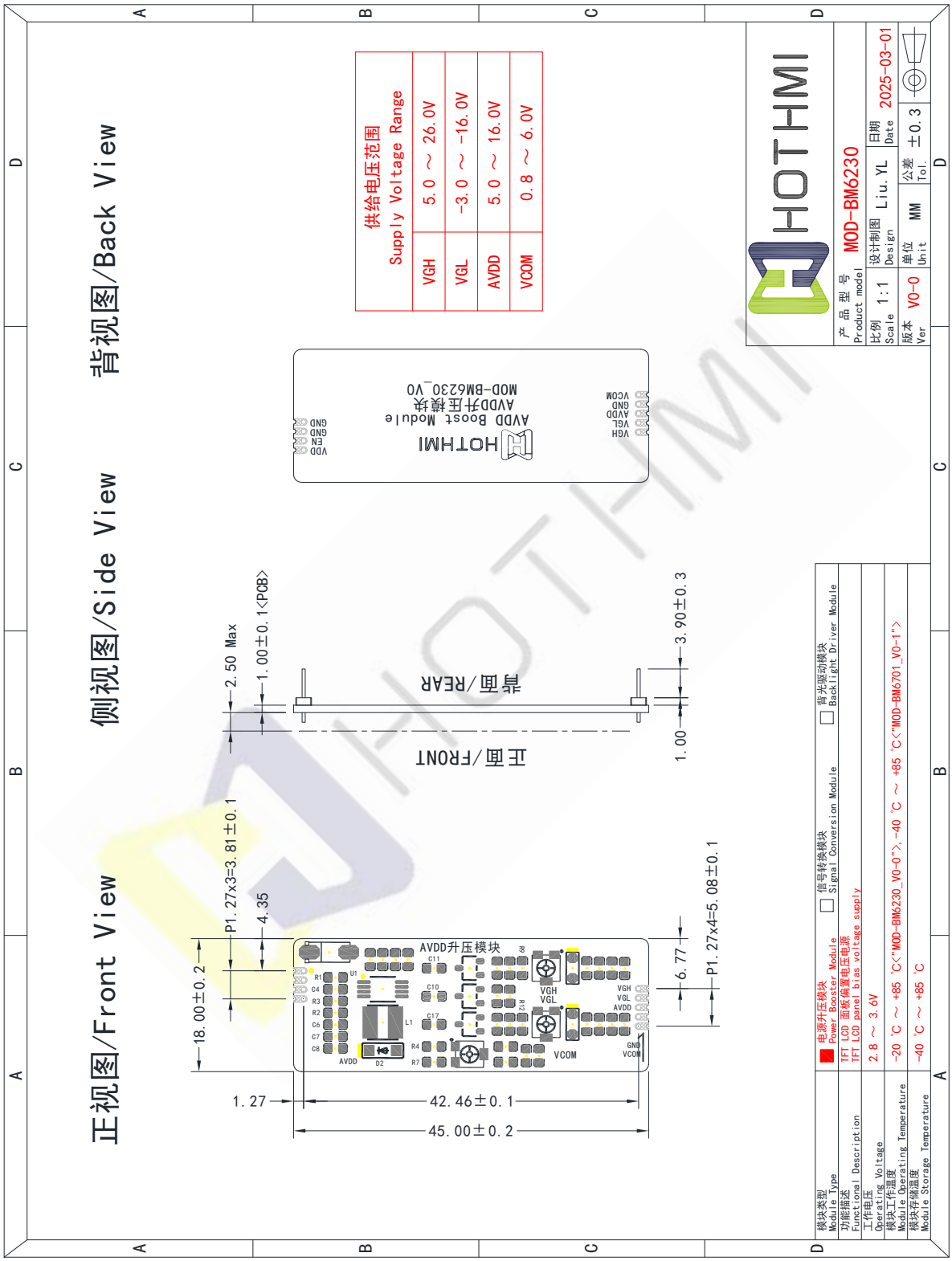
Note 1: In order to facilitate debugging,our company can provide matching drive Module



背光模块尺寸 Backlight Module Dimensions

说明 1：我司所有背光模块长，宽尺寸相同，引脚定义相同。使用的模块以实物为准.

Note 1: All of our backlight modules have the same length and width dimensions and the same pin definition.Modules used are subject to physical.



AVDD 升压模块尺寸

AVDD Boost Module Dimensions

四、电气特性 Electrical Characteristics

4-1 TFT 模组工作条件 TFT LCD Module Operating Conditions

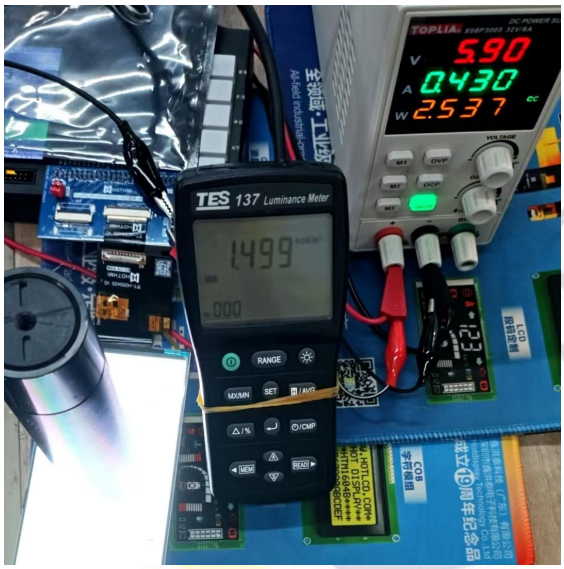
项目 Item	标号 Symbol	条件 Condition	最小值 Min	典型值 Type	最大值 Max	单位 Unit
数字电源 Digital Power	VCI	-	Type -0.3	3.0	Type +0.3	伏 V
接口工作电压 IO Supply Voltage	IOVCC	-	Type -0.1	1.8	Type +0.1	伏 V
模拟电路电源 Power For Analog	AVDD	-	Type -0.3	-	Type +0.3	伏 V
TFT 栅极导通电压 TFT Gate ON Voltage	VGH	-	Type -1.0	-	Type +1.0	伏 V
TFT 栅极关断电压 TFT Gate OFF Voltage	VGL	-	Type -1.0	-	Type +1.0	伏 V
TFT 公共电极电压 TFT Common Electrode Voltage	VCOM	-	Type -0.5	-	Type +0.5	伏 V
工作电流 Operation Current	Ioc	-	-	-	-	毫安 mA
待机电流 Standby Current	Isc	-	-	-	-	微安 uA
TFT 工作温度 TFT Operating Temp	TOPR	-	-20	+25	+70	摄氏度 ℃
TFT 储存温度 TFT Storage Temp	TSTG	-	-30	+25	+80	摄氏度 ℃

备注 Notes：

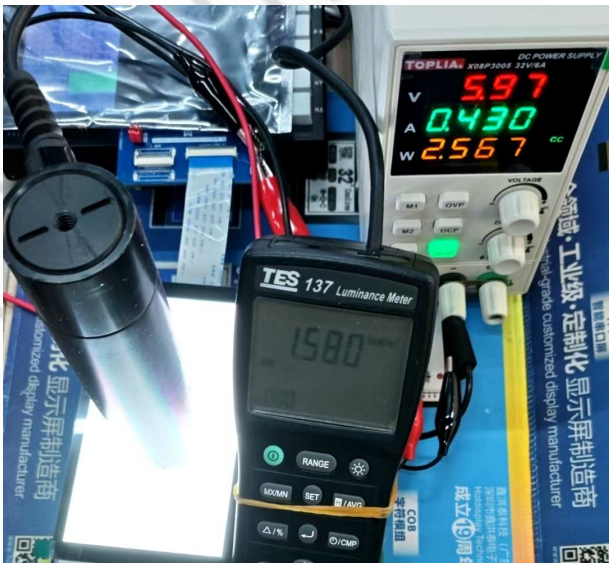
1. VGH 为 TFT 栅极工作电压。VGH is TFT Gate operating voltage.
2. VGL 为 TFT 栅极工作电压。VGL 信号的低电平必须与 Vcom 同相波动。
   VGL is TFT Gate operating voltage. The low voltage level of VGL signal must be fluctuates with same phase as Vcom.
3. 必须调节 Vcom 以优化显示质量，如串扰和对比度等。
   Vcom must be adjusted to optimize display quality, as Crosstalk and Contrast Ratio etc.
4. 该值只是参考值。客户可通过不同的 D-IC 优化设置值。
   The value is just the reference value. The customer can optimize the setting value by the different D-IC.

4-2 背光工作条件 LED back light specification

项目 Item	标号 Symbol	条件 Condition	最小值 Min	典型值 Type	最大值 Max	单位 Unit
工作电压 Forward voltage	VF	恒流 constant current	Type -0.6	6.0	Type +0.6	伏特 V
工作电流 Forward current	IF		-	430	-	毫安 mA
亮度（带 LCD） Luminance(With LCD)	Lv	不带触摸 Without TP	Type -100	1500	Type +100	坎德拉/平方米 cd/m^2
		带玻璃盖板 With Glass cover		1500		
LED 寿命 LED life time	Hr	Ta=25±3 ℃	20,000	30,000	-	小时 Hour



不带触摸 Without TP



带玻璃盖板 With Glass cover

注释 Note:

1. LED 寿命 (Hr) 定义为在 Ta=25±3 ℃,上表所示的典型电压电流值条件下持续工作直至亮度低于 50% 的时间。

LED life time (Hr) can be defined as the time in which it continues to operate under the condition:Ta=25±3 ℃, typical IL value indicated in the above table until the brightness becomes less than 50%.

2. 以上结果是按 MTBF 計算方式预估判定的 LED 失效时间，实际测试 LED 在 Ta=25±3 ℃点亮 5000H，亮度衰减 8%.

The above results are estimated and judged by the MTBF calculation method of the LED failure time. The actual test LED is lit for 5000H at Ta=25±3 ℃, and the brightness decays by 8%.

4-3 电容触摸屏工作条件 CTP Operating Conditions

项目 Item	标号 Symbol	条件 Condition	最小值 Min	典型值 Type	最大值 Max	单位 Unit
表面硬度 Surface hardness	-	铅笔 Pencil	-	6H	-	硬度 Hard
有效数据数 No. of valid data	-	-	-	-	5	点 Point
透光率 Transmittance	-	-	80	-	-	百分比 %
数字电源 Digital Power	VDD	-	Type -0.3	3.0	Type +0.3	伏特 V
I/O 电源 I/O Power	IOVDD	-	Type -0.3	3.0	Type +0.3	伏特 V
工作温度 Operation Temperature	-	20%-90%RH;	-20	+25	+70	摄氏度 ℃
储存温度 Storage Temperature	-		-30	+25	+80	摄氏度 ℃

五、液晶光学规格 TFT OPTICAL SPECIFICATION

5.1 概述 Overview

光学规格的测试应在暗室（环境亮度 1lux，温度=25 2℃）中使用亮度计系统（测角仪系统和TOPCON BM-5)设备进行测量,测试单元应位于大约 在 θ 和 Φ 等于 0 的视角下,距 LCD 表面 50cm 的距离。 显示面上测量点的中心应保持固定。 测量前背光应工作 30 分钟。

The test of Optical specifications shall be measured in a dark room (ambient luminance 1lux and temperature = 25 2℃) 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.

5.2 光学规格 Optical Specifications

参数 Parameter		标号 Symbol	条件 Condition	最小值 Min.	典型值 Typ.	最大值 Max.	单位 Unit	备注 Remark
视角范围 Viewing Angle Range	水平 Horizontal	Θ左/L	CR>10	80	85	-	Deg.	Note 1
		Θ右/R		80	85	-	Deg.	
	垂直 Vertical	Θ上/U		80	85	-	Deg.	
		Θ下/D		80	85	-	Deg.	
对比度 Contrast ratio		CR	Θ = 0°	-	1200	-	-	Note2
色域 Color Gamut		CG	CIE1931	-	70	-	%	
白色色度 White Chromaticity		Wx	Θ = 0°	-0.03	0.292	+0.03	-	Note4 (Based on C Light)
		Wy			0.315		-	
色彩还原 Reproduction of color	红 Red	Rx			-		-	
		Ry			-		-	
	绿 Green	Gx			-		-	
		Gy			-		-	
	蓝 Blue	Bx			-		-	
		By			-		-	
响应时间（上升 + 下降） Response Time (Rising + Falling)		Tr＋Tf	Θ = 0° Ta= 25℃	-	30	40	ms	Note5

注释 Note:

1. 视角是对比度大于10的角度。视角确定为相对于光轴的水平或3、9点钟方向和垂直或6、12点钟方向 垂直于 LCD 表面（见图 1）。

Viewing angle is the angle at which the contrast ratio is greater than 10. The viewing angles 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 (see FIGURE 1).

2. 对比度测量应在 θ= 0 的视角和 LCD 表面的中心进行。 亮度测量时，视场中的所有像素首先设置为白色，然后设置为暗（黑色）状态。（参见图 1）亮度对比度（CR）是通过数学定义的。

Contrast measurements shall be made at viewing angle of Θ= 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 . (see FIGUR 1) Luminance Contrast Ratio (CR) is defined mathematically.

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

3. 透射率是没有 APF 和没有 CG 的值。

Transmittance is the Value without APF and without CG.

4. 上表中规定的色度坐标应由所有像素首先测量的光谱数据计算为红色、绿色、蓝色和白色。 测量应在面板的中心进行。

The color chromaticity coordinates specified in the above table 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 panel.

5. 电光响应时间测量应如图 2 所示，通过打开和关闭“数据”输入信号来进行。 亮度从10%变化到90%所需的时间是Tr，90%到10%是Tf。

The electro-optical response time measurements shall be made as FIGURE 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.

Figure1 Measurement Set Up

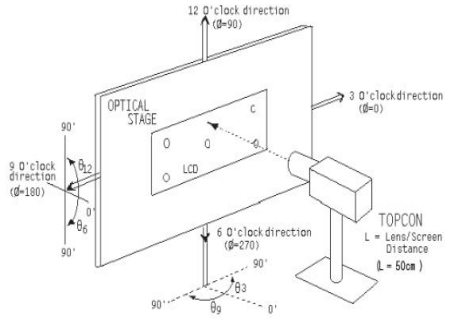


图 1

Optical response

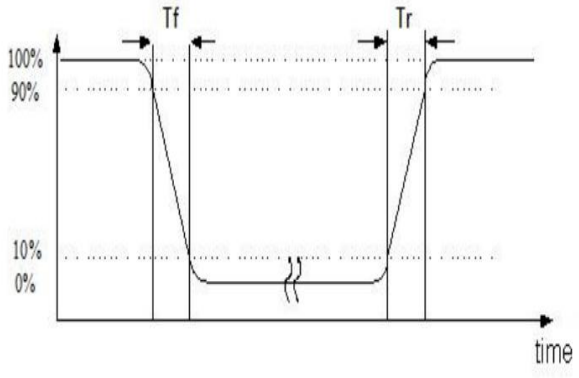
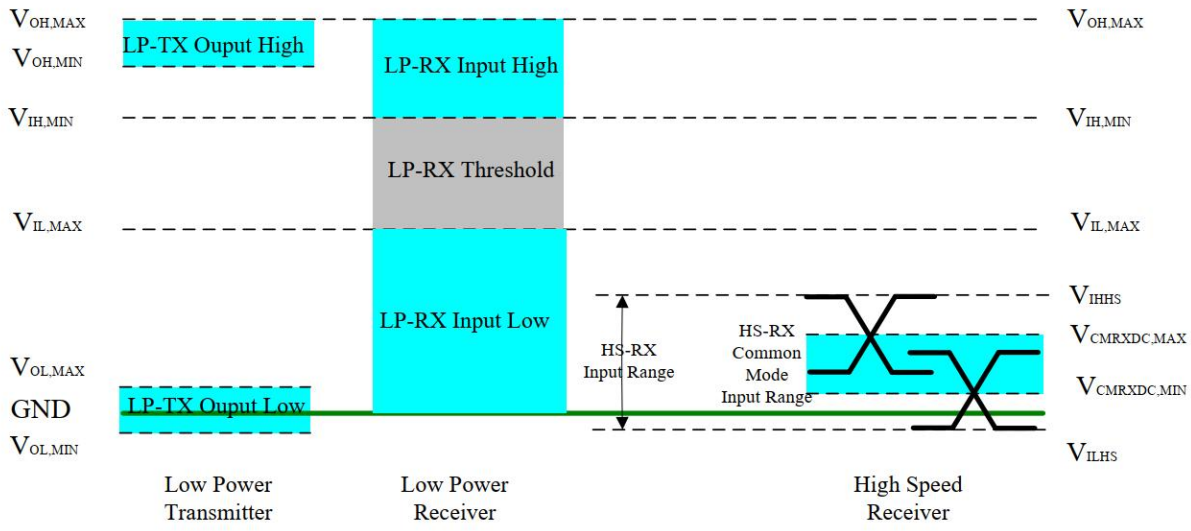


图 2

六、交流特性 AC characteristic

6.1. MIPI 直流特性 MIPI DC characteristic



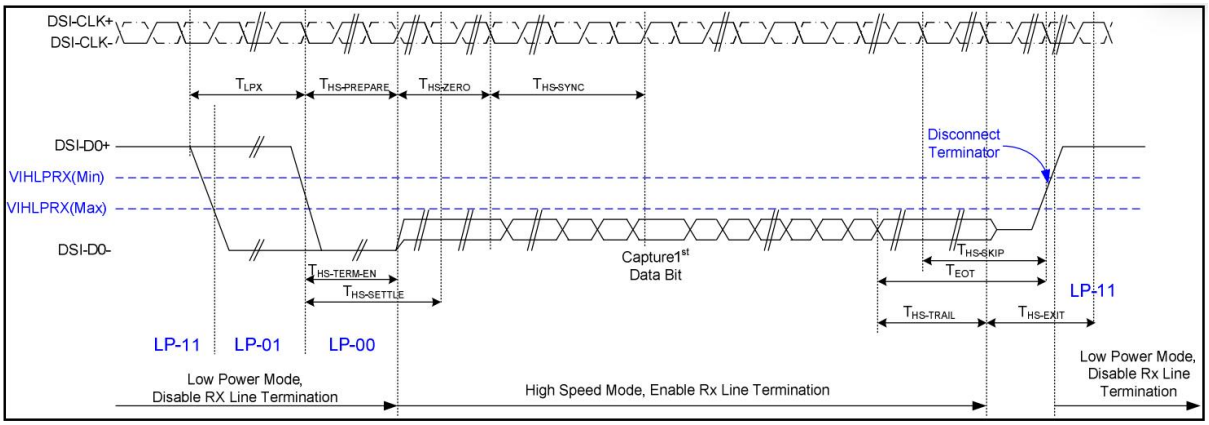
Parameter	Symbol	Specification			Unit
		MIN	TYP	MAX	
Operation Voltage for MIPI Receiver					
Low power mode operating voltage	V_{LPH}	1.1	1.2	1.3	V
MIPI Characteristics for High Speed Receiver					
Single-ended input low voltage	V_{ILHS}	-40	-	-	mV
Single-ended input high voltage	V_{IHHS}	-	-	460	mV
Common-mode voltage	V_{CMRXDC}	70	-	330	mV
Differential input impedance	Z_{ID}	80	100	125	ohm
MIPI Characteristics for Low Power Mode					
Pad signal voltage range	V_I	-50	-	1350	mV
Logic 0 input threshold	V_{IL}	0-	-	550	mV
Logic 1 input threshold	V_{IH}	880	-	1350	mV
Output low level	V_{OL}	-50	-	50	mV
Output high level	V_{OH}	1.1	1.2	1.3	V

6.2. MIPI 交流特性 MIPI AC characteristic

1. MIPI 高速模式 MIPI High Speed Mode

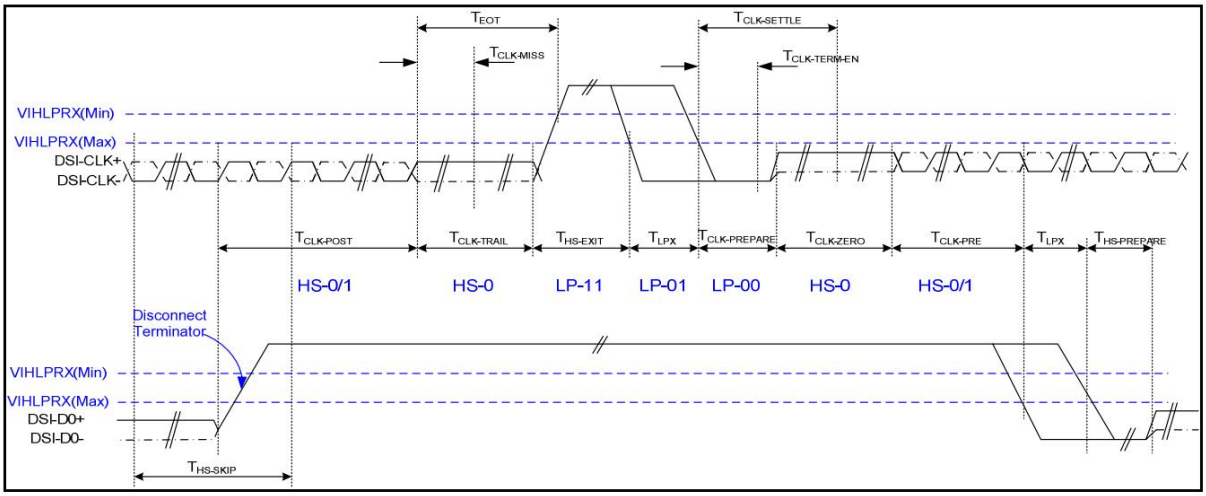
Figure 4 DSI clock channel timing

Signal	Symbol	Parameter	Specification			Unit	Description
			MIN	TYP	MAX		
DSI-CLK+/-	2xUIINST	Double UI instantaneous	2	-	10	ns	
DSI-CLK+/-	UIINSTA ,UIINSTB	UI instantaneous half	1	-	5	ns	
DSI-Dn+/-	TDS	Data to clock setup time	0.15	-	-	UI	
DSI-Dn+/-	TDH	Data to clock hold time	0.15	-	-	UI	



High-Speed Data Transmission

Parameter	Symbol	Specification			Unit
		MIN	TYP	MAX	
Time to drive LP-00 to prepare for HS transmission	$T_{HS-PREPARE}$	40+4UI	-	85+6UI	ns
Time from start of t HS-TRAIL or t CLK-TRAIL period to start of LP-11 state	T_{EOT}	-	-	105+12UI	ns
Time to enable data receiver line termination measured from when Dn crosses VILMAX	$T_{HS-TERM-EN}$	-	-	35+4UI	ns
Time to drive flipped differential state after last payload data bit of a HS transmission	$T_{HS-TRAIL}$	60+4UI	-	-	ns
Time-out at RX to ignore transition period of EoT	$T_{HS-SKIP}$	40	-	145+10UI	ns
Time to drive LP-11 after HS burst	$T_{HS-EXIT}$	100	-	-	ns
Length of any Low-Power state period	T_{LPX}	50	-	-	ns
Sync sequence period	$T_{HS-SYNC}$	-	8UI	-	ns
Minimum lead HS-0 drive period before the Sync sequence	$T_{HS-ZERO}$	105+6UI	-	-	ns
Time interval during which the HS receiver should ignore any Clock Lane HS transitions, starting from the beginning of $T_{CLK-PREPAR}$	$T_{CLK-SETTLE}$	95	-	300	ns
Time interval during which the HS receiver shall ignore any Data Lane HS transitions, starting from the beginning of $T_{HS-PREPAR}$. The HS receiver shall ignore any Data Lane transitions before the minimum value, and the HS receiver shall respond to any Data Lane transitions after the maximum value.	$T_{HS-SETTLE}$	85+6UI	-	145+10UI	ns



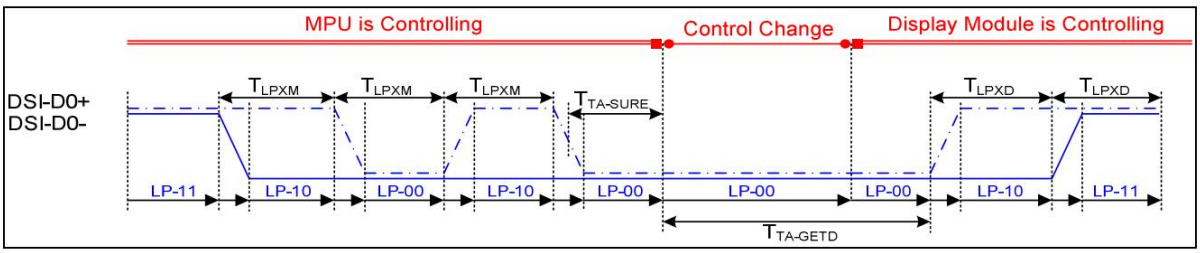
Switching the Clock Lane between Clock Transmission and Low-Power Mode

Parameter	Symbol	Specification			Unit
		MIN	TYP	MAX	
Time that the transmitter shall continue sending HS clock after the last associated Data Lane has transitioned to LP mode	$T_{CLK-POST}$	60+52UI	-	-	ns
Detection time that the clock has stopped toggling	$T_{CLK-MISS}$	-	-	60	ns
Time to drive LP-00 to prepare for HS clock transmission	$T_{CLK-PREPARE}$	38	-	95	ns
Minimum lead HS-0 drive period before starting Clock	$T_{CLK-PREPARE}+T_{CLK-ZERO}$	300	-	-	ns
Time to enable Clock Lane receiver line termination measured from when Dn cross VIL,MAX	$T_{CLK-TERM-EN}$	-	-	38	ns
Minimum time that the HS clock must be set prior to any associated date lane beginning the transmission from LP to HS mode	$T_{CLK-PRE}$	8	-	-	UI
Time to drive HS differential state after last payload clock bit of a HS transmission burst	$T_{CLK-TRAIL}$	60	-	-	ns

*Note: 3-Lane = (1000 / f_{mipi} * 8 * 52 -T_{HS_TRAIL}- 60) / (1000/f_{mipi})*

*4-Lane = (1000 / f_{mipi} * 8 * 39 -T_{HS_TRAIL}- 60) / (1000/f_{mipi})*

*Example: 3-Lane, 600Mbps : n = (1000 / 600 * 8 * 52 - T_{HS_TRAIL}- 60) / (1000/600) = 340*



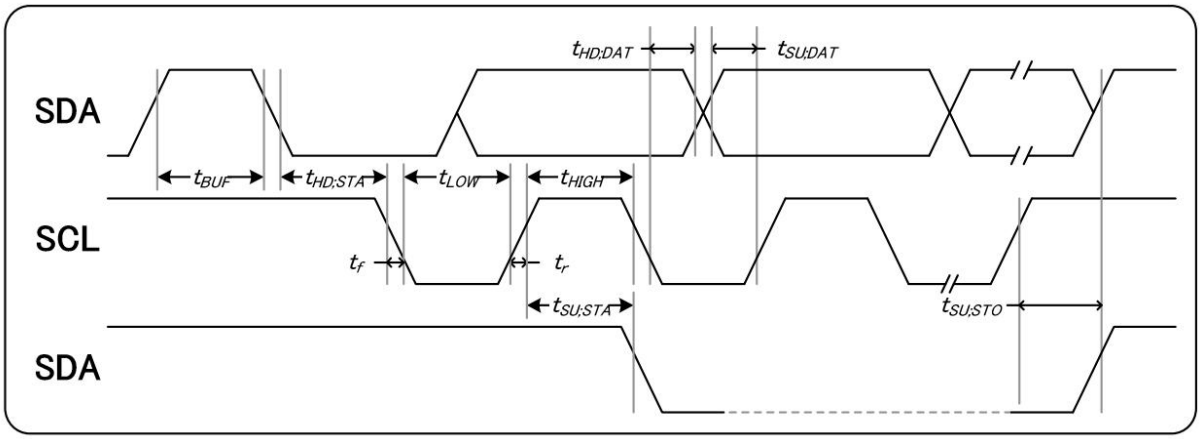
Bus Turn-around Procedure

Parameter	Symbol	Specification			Unit
		MIN	TYP	MAX	
Length of any Low-Power state period : Master side	T_{LPX}	50	-	75	ns
Length of any Low-Power state period : Slave side	T_{LPX}	47.5	-	52.5	ns
Ratio of T_{LPX} (MASTER)/ T_{LPX} (SLAVE) between Master and Slave side	Ratio T_{LPX}	2/3	-	3/2	
Time-out before new TX side start driving	$T_{TA-SURE}$	T_{LPX}	-	2 T_{LPX}	ns
Time to drive LP-00 by new TX	T_{TA-GET}	-	5 T_{LPX}	-	ns
Time to drive LP-00 after Turnaround Request	T_{TA-GO}	-	4 T_{LPX}	-	ns

2. MIPI 接口时序 MIPI Interface Timing

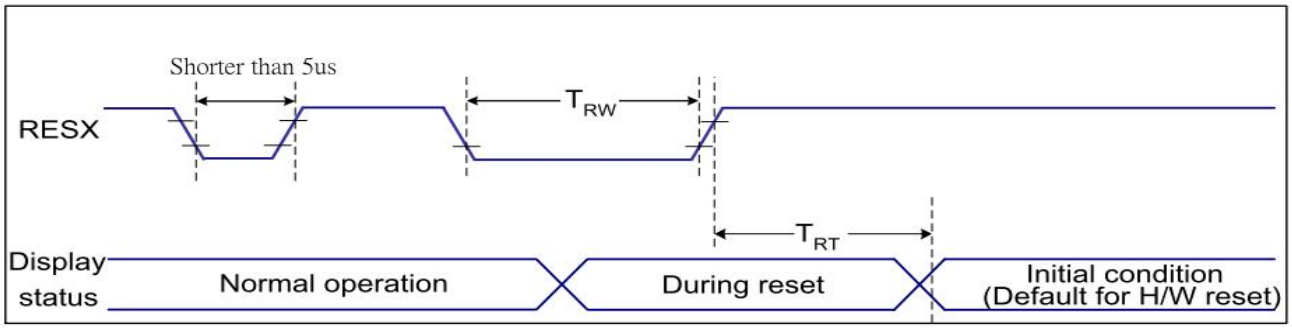
Parameter	Symbol	Min.	Typ..	Max.	Unit
Horizontal Sync. Width	HPW	2	-	-	Byte Clock
Horizontal Sync. Back Porch	HBP	2	-	-	Byte Clock
Horizontal Sync. Front Porch	HFP	4	-	-	Byte Clock
Vertical Sync. Width	VSW	2	-	-	Line
Vertical Sync. Back Porch	VBP	2	-	-	Line
Vertical Sync. Front Porch	VFP	4	-	-	Line
Vertical Frequency		-	60	-	Hz

6.3. I2C 时序 I2C Timing



Item	Signal	Symbol	Condition	Rating		Unit
				Min.	Max.	
SCL clock frequency	SCL	fSCL		-	400	kHZ
SCL clock low period		tLOW		1300	-	ns
SCL clock high period		tHIGH		600	-	
Data set-up time	SDA	tSU;Data		100	-	
Data hold time		tHD;Data		0	-	
Setup time for a repeated START condition	SDA	tSU;STA		600	-	
Start condition hold time		tHD;STA		600	-	
Setup time for STOP condition		tSU;STO		600	-	
Bus free time between a STOP and START		tBUF		1300	-	

6.4. 复位时序 Reset Timing



Reset Timing Characteristics IOVCC=1.65~1.95v Ta=25℃

Parameter	Symbol	Specification			Unit
		Min.	Typ.	Max.	
Reset low width	Trst_width	1	-	-	ms
Reset time	Trst_time	120	-	-	ms
OP noise reject	Trst_op_nrj	-	-	10	us

注释 Notes:

1. 复位取消还包括将 ID 字节、VCOM 设置和其他设置从 NVM（或类似设备）加载到寄存器所需的时间。 每次在 RESX 上升沿后 5 ms 内有硬件复位取消时间（tRT）时，都会执行此加载。

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. 根据下表，由于 RESX 线路上的静电放电引起的尖峰不会导致不规则的系统复位

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

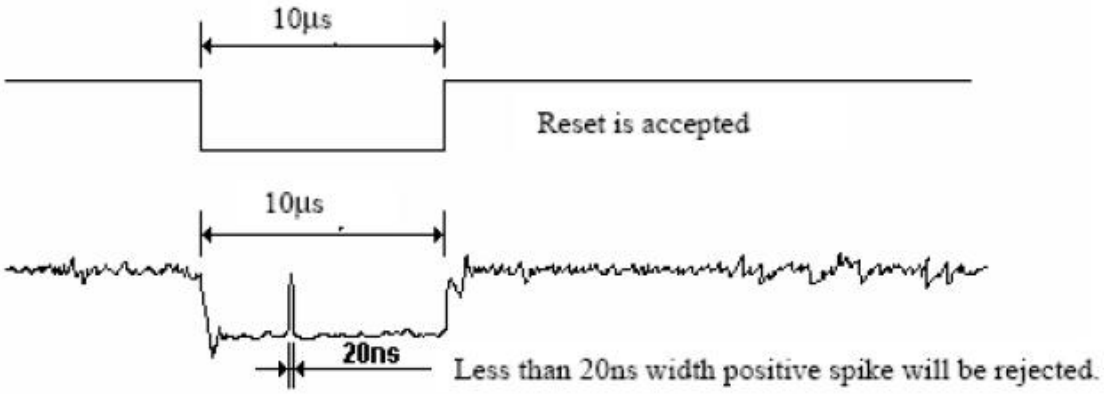
3. 在复位期间，显示屏将被消隐（显示屏进入消隐序列，最长持续时间为 120 毫秒，此时 Reset Starts in Sleep Out –mode。显示屏在 Sleep In –mode 中保持消隐状态。）然后返

回 硬件复位的默认条件。

4. 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. 尖峰抑制也适用于有效复位脉冲期间，如下所示：

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



5. 在进入睡眠期间应用复位时

When Reset applied during Sleep In Mode.

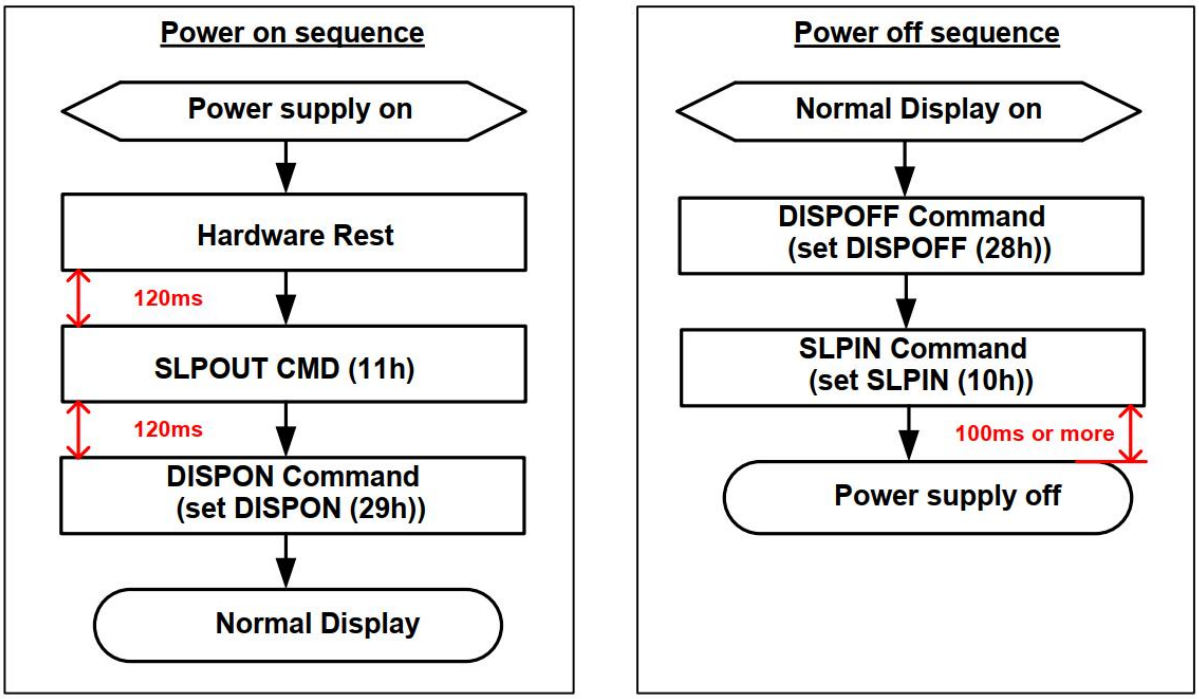
6. 在退出睡眠期间应用复位时

When Reset applied during Sleep Out Mode.

7. 释放 RESX 后需要等待 5 毫秒以上才能发送命令。也不能在 120 毫秒内发送睡眠退出命令。

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

6.5. 电源开启/关闭顺序 Power On/Off Sequence

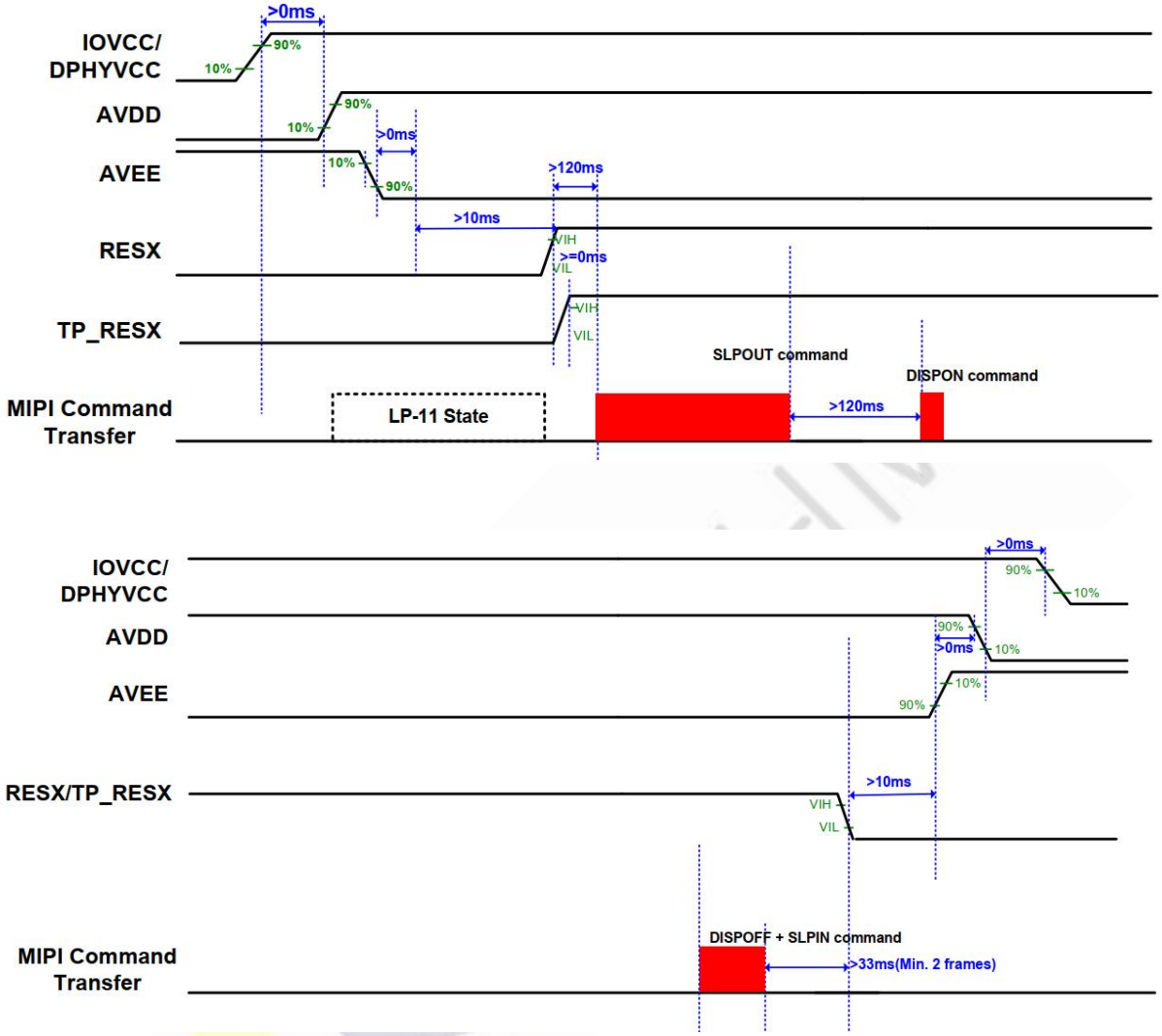


电源接通/断开顺序框图

The power On/Off sequence block diagram

电源开/关顺序如下图所示

The power on/off sequence is illustrated below



注 1：MIPI 通道必须在电源 IOVCC/DPHYVCC 就绪后转到 LP11

注 2：SLPOUT 命令发出后，驱动 IC 将启动内部上电动作。任何其他设置均应在 SLPOUT 命令发出后设置，至少需要 120 毫秒。

注 3：DISPOFF 和 SLPIN 命令应在 SLPOUT 命令之后设置，延迟时间至少为 120mS。

注 4：RESX 为低电平时进入深度待机模式，最短延迟时间为 10ms。

Note 1: MIPI lanes must go to LP11 after Power IOVCC/DPHYVCC is ready

Note 2: After SLPOUT command, driver IC will start internal power on action. Any other settings should be set after SLPOUT commandwith a minimum of 120mS.

Note 3: DISPOFF and SLPIN command should be set after SLPOUT command with a minimum delay time of 120mS.

Note 4: RESX tied low into deep standby mode with a minimum time of 10ms.

七、可靠性测试 RELIABILITY TEST

7-1 温度和湿度 Temperature and Humidity

测试项目 TEST ITEMS	条件 CONDITIONS	注释 NOTE
高温储存 High Temperature Storage	Ta=+80 ℃, 120hrs	
低温储存 Low Temperature Storage	Ta=-30 ℃, 120hrs	
高温运行试验 High Temperature Operation	Ta=+70 ℃, 120hrs	
低温运行试验 Low Temperature Operation	Ta=-20 ℃, 120hrs	
高温高湿（运行测试） High Temperature and High Humidity (Operating)	Ta=+60 ℃, 90%RH, 120hrs	

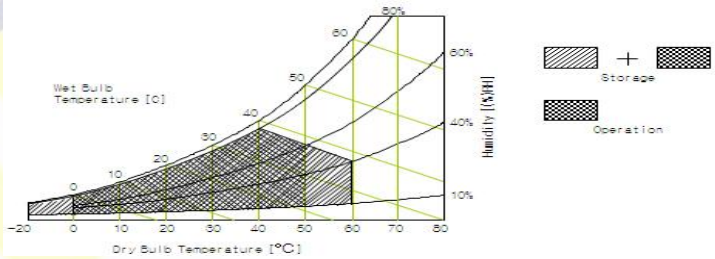
注释 Note:

1. 液晶驱动电压。由于液晶材料的特性，该电压随环境温度而变化。

Liquid Crystal driving voltage。Due to the characteristics of LC Material, this voltage varies with environmental temperature.

2. 温度和相对湿度范围如下图所示。湿球温度最高应为39℃。并且没有冷凝水。

Temperature and relative humidity range are shown in the figure below.Wet bulb temperature should be 39 ℃ max. and no condensation of water.



3. 产品经可靠性测试后，仅保证功能正常，无任何致命缺陷（不显示、线路缺陷、显示异常等）。

After the reliability test, the product only guarantee function normally without any fatal defect(non-display, line defect, abormal display etc).

4. 所有显示判断均在面板温度恢复到室温2小时后进行

All display judgments are made after the panel temperature returns to room temperature for 2 hours

5. Ta：环境温度

Ta：Ambient temperature

7-2 冲击和振动 Shock and Vibration

测试项目 TEST ITEMS	条件 CONDITIONS
包装冲击(非操作) Packing Shock (Non-Operation)	● Shock level:980m/s^2 ● Waveform:1/2 Sine wave,6msec ● ±X, ±Y ±Z,each axis 1 times
包装振动(非操作) Packing Vibration (Non-Operation)	● Frequency range:8-33.3HZ ● Stoke:1.0mm ● Sweep: 10Hz-50Hz ● x,y,z 2 hours for each direction

7-3 静电放电测试 Electrostatic Discharge

测试项目 TEST ITEMS	条件 CONDITIONS
ESD (Non-operation)	150pF,330Ω, Contact±4KV,Air :±8KV.Note 1
	200pF,0Ω, ±200V Contact test.Note 2

测量点 Measure Point:

1. LCD玻璃和金属边框
   LCD glass and metal bezel
2. 连接器引脚
   IF connector pins

八、处理和注意事项 HANDDLING & CAUTIONS

8-1 操作注意事项 Caution For Operation

♦由于液晶模组是玻璃材质，请勿对其施加强烈的机械冲击或静载荷。请小心搬运，因为冲击、振动和粗心的搬运可能会严重影响产品。如果从高处坠落或受到强烈冲击 ，玻璃可能碎了。

Since the LCM is made of glass, do not apply strong mechanical impact or static load onto it.Handling with care since shock, vibration, and careless handling may seriously affect the product.If it falls from a high place or receives a strong shock, the glass maybe broken.

♦在规定的电压限制内驱动 LCM 是必不可少的，因为高于限制的电压会导致 LCM 的寿命缩短。 由直流引起的电化学反应会导致 LCM 出现不良劣化，因此应避免使用直流驱动。

It is indispensable to drive the LCM within the specified voltage limit since the higher voltage than the limit causes LCM's life shorter. An electro-chemical reaction due to DC causes undesirable deterioration of the LCM so that the use of DC drive should avoid.

♦请勿在电源开启时将 LCM 连接到系统或从系统断开连接。

Do not connect or disconnect the LCM to or from the system when power is on.

♦切勿在高温高湿的异常条件下使用 LCM。

Never use the LCM under abnormal conditions of high temperature and high humidity.

♦当暴露于剧烈的温度波动（热到冷或冷到热）时，LCM可能会受到影响； 具体来说，从冷到热的剧烈温度波动会在 LCM 表面产生露水，这可能会影响 LCM 上偏振片的运行。

When expose to drastic fluctuation of temperature(hot to cold or cold to hot), the LCM may be affected; specifically, drastic temperature fluctuation from cold to hot, produces dew on the LCM's surface which may affect the operation of the polarizer on the LCM.

♦在低于工作温度范围的温度下，响应时间将极度延迟，另一方面，在高于其工作范围的温度下，LCM 可能会变黑。 然而，这些现象并不意味着 LCM 出现故障或故障。 一旦温度恢复到正常运行的推荐温度范围，LCM 将恢复正常运行。

Response time will be extremely delay at lower temperature than the operating temperature range and on the other hand LCM may turn black at temperature above its operational range. However those phenomenon do not mean malfunction or out of order with the LCM. The LCM will revert to normal operation once the temperature returns to the recommended temperature range for normal operation.

♦为防止LCD产生图像残留，在使用常黑面板时不要长时间显示固定图案。 如果LCD需要显示固定图案，建议时间少于 2 分钟或者更短的时间内刷新显示内容一次或多次。强烈建议使用黑色图像或移动图像作为屏幕保护程序。

In order to prevent the LCD from producing image retention, do not display a fixed pattern for a long time when using a normally black panel. If the LCD needs to display a fixed pattern, it is recommended to refresh the display one or more times in less

than 2 minutes or less. It is strongly recommended to use a black image or moving image as a screen saver.

♦强烈的光照会导致 LCD 偏光片和彩色滤光片退化。 不准在强光或高温高湿下长期存放或直接运行。

Strong sunlight can cause LCD polarizers and color filters to degrade. Long-term storage or direct operation under strong light or high temperature and humidity is not allowed.

8-2 防静电措施 Caution Against Static Charge

♦LCM 使用 C-MOS LSI 驱动器，因此建议客户将任何未使用的输入端连接到 Vdd 或 Vss，上电前不要输入任何信号，并将您的身体、工作/装配区、装配设备接地 防止静电。

The LCM use C-MOS LSI drivers, so customers are recommended that any unused input terminal would be connected to Vdd or Vss, do not input any signals before power is turn on, and ground you body, work/assembly area, assembly equipments to protect against static electricity.

♦缓慢去除保护膜，保持去除方向与面板表面不垂直约 30 度，如有可能，在离子风机等 ESD 控制装置下，工作室内湿度应保持在 50%RH 以上，以减少静电风险

Remove the protective film slowly, keeping the removing direction approximate 30-degree not vertical from panel surface, if possible, under ESD control device like ion blower, and the humidity of working room should be kept over 50%RH to reduce the risk of static charge.

♦避免使用合成纤维制成的工作服。 我们推荐棉质衣服或其他经过导电处理的纤维。

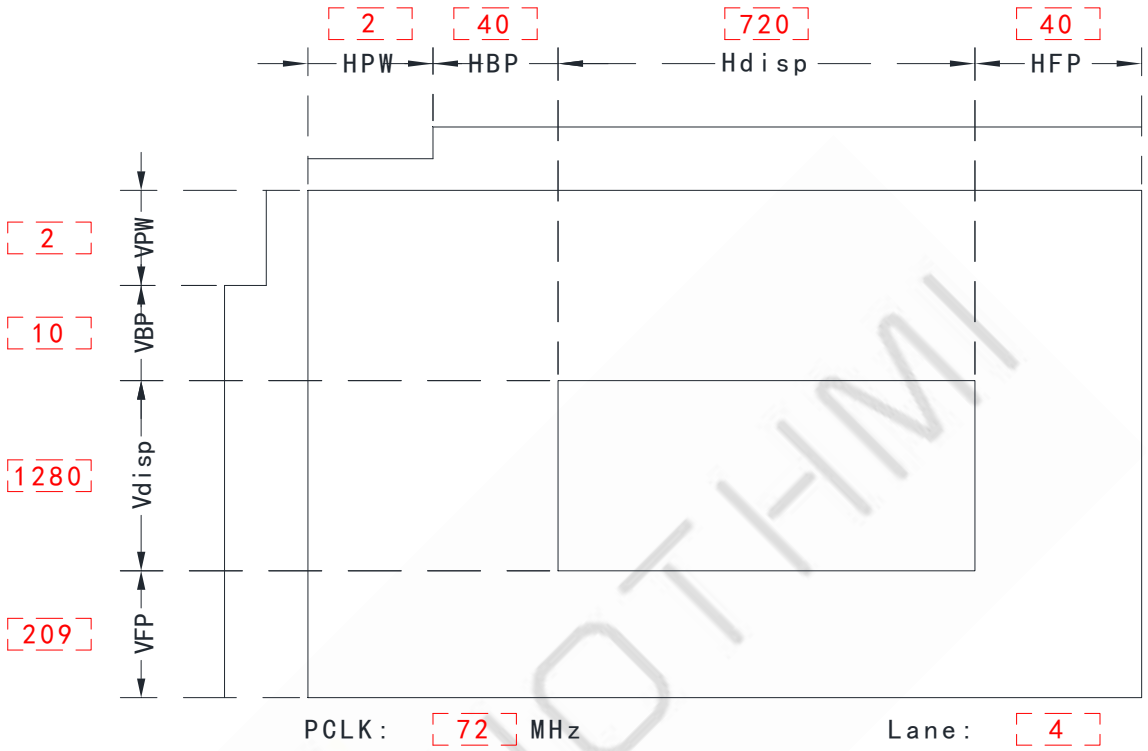
Avoid the use work clothing made of synthetic fibers. We recommend cotton clothing or other conductivity-treated fibers.

♦在处理 LCM 时，请戴上不带电材料的手套。 对地导电手腕和对地导电鞋是必需的

In handling the LCM, wear non-charged material gloves. And the conducting wrist to the earth and the conducting shoes to the earth are necessary

九、初始化代码 Initialisation code

说明：这些参数值仅供参考，可能并不完全适用于所有软件平台，
请根据您使用的平台优化参数。
Description : These parameter values are for reference only and may not be fully applicable to all software platforms, please optimise the parameters according to the platform you are using.




```
Void Panel_Initial_code(void)
{
//================上电复位操作===============//
LCD_RESET=1;
Delayms(1);          //Delay 1ms
LCD_RESET=0;
Delayms(10);          //Delay 10ms
LCD_RESET=1;
Delayms(120);         //Delay 120ms
//============================================//
  //=== HS Clock Disable
  mipi.clock.disable
  delay 20
  mipi.video.disable
  delay 20
  mipi.write 0x05 0x10
  mipi.write 0x05 0x28
  //------------ KEY ----------------
```

```
    mipi.write 0x29 0x60 0x71 0x21 0xa2
    mipi.write 0x29 0x60 0x71 0x21 0xa3
    mipi.write 0x29 0x60 0x71 0x21 0xa4
    //-----------------------------------

    mipi.write 0x39 0x78 0x21
    mipi.write 0x29 0x79 0xEF    //0xcf hostdownlaod ; 0xef flash

    //mipi.write 0x29 0x86 0x25 0x19 0xC0 0x15 0xF5 0x01 0x00 0x25 0xD9 0x15
    mipi.write 0x29 0xA5 0xF0 0x03

    ////--------LCD voltage setting----------------////
    mipi.write 0x29 0xB7 0x00 0x00 0x73 0x73      ////VOP=5.3V

    mipi.write 0x29 0xB0 0x22 0x57 0x11 0x75 0x25 0x57 0x57////VGH=14V/VGL=-14V

    mipi.write 0x29 0xBF 0xBE 0xCC////VCOM

    ////--------------GIP SETTING----------------------
    ////------------------  1     2   3    4    5    6    7    8    9    10   11   12
13   14   15   16   17   18   19   20   21   22   23   24   25   26   27   28   29
30   31   32   33   34   35   36   37   38   39   40   41   42   43   44   45   46
47   48   49   50   51   52   53   54   55   56   57   58   59   60
    ////-------------------------LongV ---------------------
    mipi.write 0x39 0xD7 0x10 0x0C 0x12 0x2A 0x80 0x80
    ////---------version 20240628-----------------------////
    mipi.write 0x29 0x90 0x71 0x23 0x5A 0x20 0x24 0x03 0x28

    mipi.write 0x39 0xA3 0x80 0x01 0x8C 0xFF 0x45 0x00 0x00 0x00 0x00 0x00 0x46 0x00 0x00
0x1E 0x5C 0x1E 0x80 0x10 0x00 0x05 0x00 0x00 0x00 0x00 0x00 0x46 0x00 0x00 0x1E 0x5C 0x1E
0x80 0x10 0x20 0x58 0x00 0x00 0x00 0xFF

    mipi.write 0x39 0xA6 0x02 0x00 0x24 0x55 0x34 0x00 0x35 0x00 0x67 0x67 0x91 0xFF 0x00
0x24 0x77 0x2F 0x00 0x30 0x00 0x67 0x67 0x91 0xFF 0x00 0x24 0x77 0x32 0x00 0x33 0x00 0x67
0x67 0x91 0xFF 0x00 0xAC 0x51 0x00 0x04 0x00 0x00 0x67 0x67 0xFF 0xFF 0x00 0x08 0x80 0x08
0x80 0x06 0x00 0x00 0x00 0x00

    mipi.write 0x39 0xA7 0x18 0x18 0xC0 0x64 0x40 0x43 0x52 0x41 0x02 0x40 0x00 0x67 0x67
0x91 0xFF 0x08 0x80 0x64 0x40 0x61 0x70 0x43 0x04 0x00 0x00 0x67 0x67 0x91 0xFF 0x08 0x80
0x64 0x40 0x4B 0x5A 0x40 0x00 0x02 0x01 0x67 0x67 0x91 0xFF 0x08 0x80 0x64 0x40 0x69 0x78
```

```
0x00 0x00 0x20 0x00 0x67 0x67 0x91 0xFF 0x08 0x80 0x53

    mipi.write 0x39 0xAC 0x19 0x06 0x00 0x1E 0x1C 0x1D 0x18 0x08 0x0A 0x13 0x11 0x1E 0x1E
0x1E 0x1E 0x1E 0x1E 0x1E 0x1E 0x1E 0x1E 0x1E 0x1E 0x19 0x06 0x01 0x1E 0x1C 0x1D 0x18 0x09 0x0B
0x12 0x10 0x1E 0x1E 0x1E 0x1E 0x1E 0x1E 0x1E 0x1E 0x1E 0x1E 0x1E

    mipi.write 0x39 0xAD 0x0C 0x40 0x46 0x00 0x07 0x4B 0x4B 0xFF 0xFF 0xF0 0x40 0x0E 0x01
0x07 0x42 0x42 0xFF 0xFF 0x01 0x00 0x00 0xFF 0xFF 0xFF 0xFF

    mipi.write 0x39 0xAE 0xFF 0x07 0x00 0xFF 0x07 0x00 0x00

    mipi.write 0x39 0xB2 0x15 0x19 0x05 0x23 0x49 0xAF 0x03 0x2E 0x5C 0xD2 0xFF 0x10 0x60
0xFD 0x20 0xC0 0x00
    mipi.write 0x39 0xE8 0x20 0x67 0x04 0x8D 0x8D 0x3E 0x04 0xDC 0xDC 0x3E 0x06 0xFA 0x26
0x3E
    mipi.write 0x29 0x75 0x03 0x04

    mipi.write 0x39 0xE7 0x4B 0x00 0x00 0xBC 0x4B 0x8C 0x20 0x1A 0xF0 0x7D 0x14 0x7D 0x14
0x7D 0x14 0x7D 0x14 0xFF 0x00 0x32 0x30 0x73 0x00 0x00 0xC8 0x6A 0xFF 0x5A 0x64 0x38 0x88
0x15 0xB1 0x01 0x01 0x64 0x01 0x01 0x7C 0xFF 0x1A 0x01

    mipi.write 0x29 0xE1 0x0C 0x0C
    mipi.write 0x29 0xEA 0x15 0x00 0x55
    ////--------------gamma2.2setting--------------------------
    mipi.write 0x29 0xC8 0x00 0x00 0x1C 0x33 0x5A 0x00 0x90 0x05 0xD9 0x07 0x11 0x36 0x07
0xA2 0x04 0x21 0xEC 0x02 0x2A 0x01 0x22 0x66 0x0F 0xA6 0x0A 0x33 0x00 0x0A 0x4D 0x0E 0xF3
0x8A 0x0F 0xB9 0xE5 0x03 0xFB
    mipi.write 0x29 0xC9 0x00 0x00 0x1C 0x33 0x5A 0x00 0x90 0x05 0xD9 0x07 0x11 0x36 0x07
0xA2 0x04 0x21 0xEC 0x02 0x2A 0x01 0x22 0x66 0x0F 0xA6 0x0A 0x33 0x00 0x0A 0x4D 0x0E 0xF3
0x8A 0x0F 0xB9 0xE5 0x03 0xFB
    //------------- Lock KEY -----------------
    mipi.write 0x29 0x60 0x71 0x21 0x00
  //-----------------------------------
  //mipi.write 0x29 0x36 0x03
  mipi.write 0x05 0x11
  delay 120
  mipi.write 0x05 0x29
  mipi.write 0x29 0x35 0x00
  }
```

```
Void Panel_SleepIn_Mode (void)
{
mipi.write 0x05 0x28
delay 120
mipi.write 0x05 0x10
delay 120
}

Void Panel_SleepOut_Mode (void)
{
mipi.write 0x05 0x11
delay 120
mipi.write 0x05 0x29
delay 120
}
```

文档修订记录 Document revision history ：

版本 Version	日期 DATE	修改说明 Modify description	编著 Editorial
0-0	2025-08-05	初次编制 First compilation.	YL
0-1	2025-12-02	增加显示屏控制信号电平电压说明 Add description of display control signal voltage level.	YL

- - 结束 - -

- - END - -