



SPECIFICATION FOR TFT LCD MODULE

CUSTOMER : _____

CUSTOMER MODULE : _____

HL MODEL : HG050WV038

☐ Preliminary Specification

☒ Final Specification

Customer Confirmation column:

Approved by : _____ Dept. : _____ Data : _____

Please return one of the copies of the specification with your signature to us within two weeks after you receive this document. If it is not returned, we will assume that you agree to the entire contents of this specification document.

Designed by	Checked by	Approved by



Revision History

Version NO.	DATE	Description	Remak
V1.0	2022.10.14	FIRST ISSUE	



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1. GENERAL INFORMATION

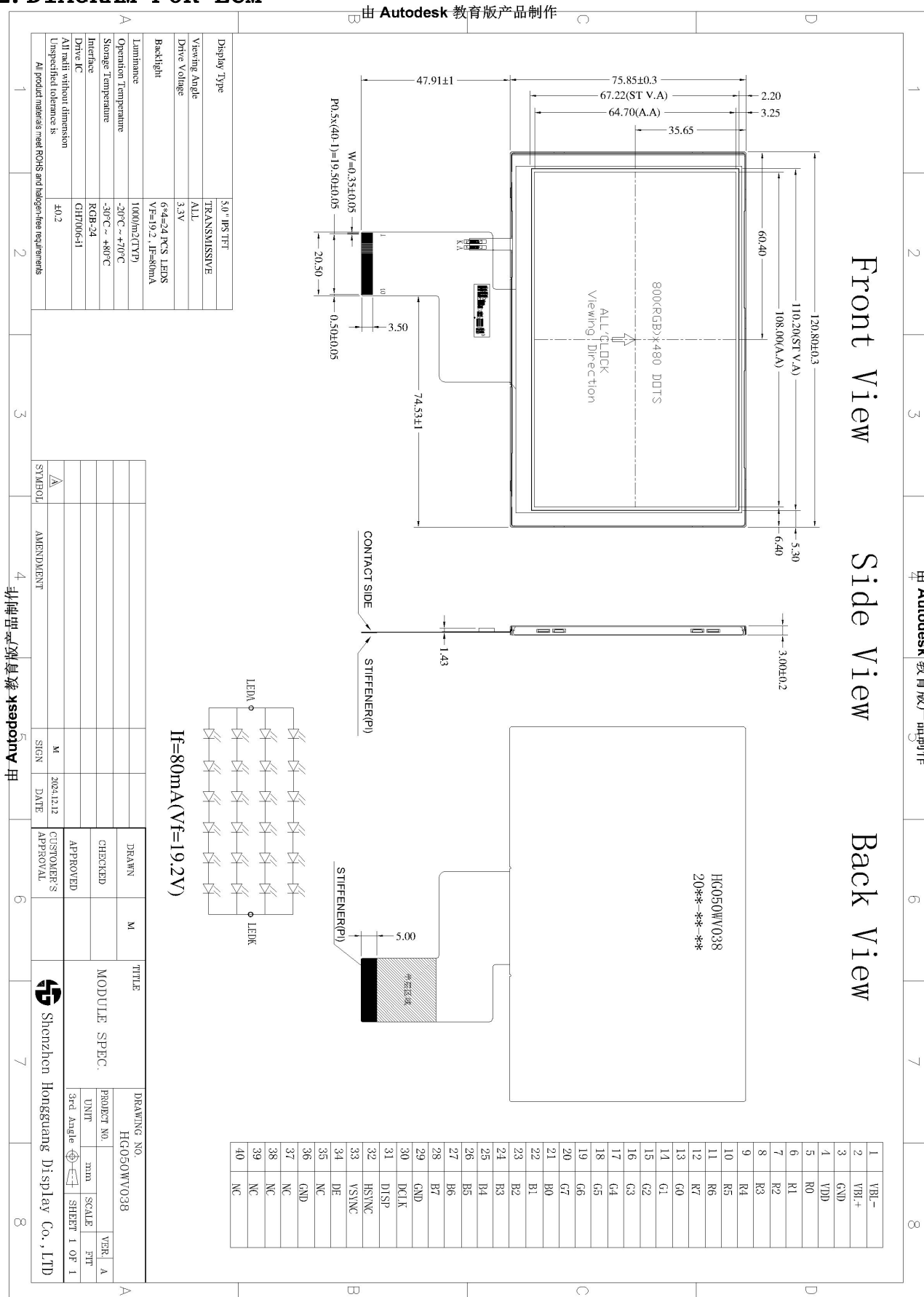
1.1 features

- 1) Structure: TFT PANNEL+IC+FPC+BL
- 2) IPS Type LCD 800 dot-segment and 480 dotcommon outputs
- 3) 252K Color can be selected by software
- 4) White LED back light
- 5) RGB-24 interface
- 6) Operation Temperature:-20~70℃
- 7) Storage Temperature:-30~80℃
- 8) CTP coverlens : -/
- 9) CTP structure : -/
- 10) LEDlifetime : -/

1.2 General specification

Item of	Contents	Unit
Panel Size	5.0	inch
LCD Type	a-si/TRANSMISSIVE	/
Display mode	Normally Black	/
Pixel arrangement	800*3 (RGB)*480	Dots
Pixel pitch (W*H)	0.135 (H)*3*0.135(V)	Mm
Active Area	108.0* 64.8	Mm
Module area (W*H*T)	120.8*75.85*3.0	Mm
Recommended Viewing Direction	ALL	0' clock
LCM-IC	GH7006-i1	/
Interface	RGB-24	/
Luminance for LCM+TP	1000	CD/M2
Weight	TBD	g

2. DIAGRAM FOR LCM





3. I/O CONNECTION & BLOCK DIAGRAM

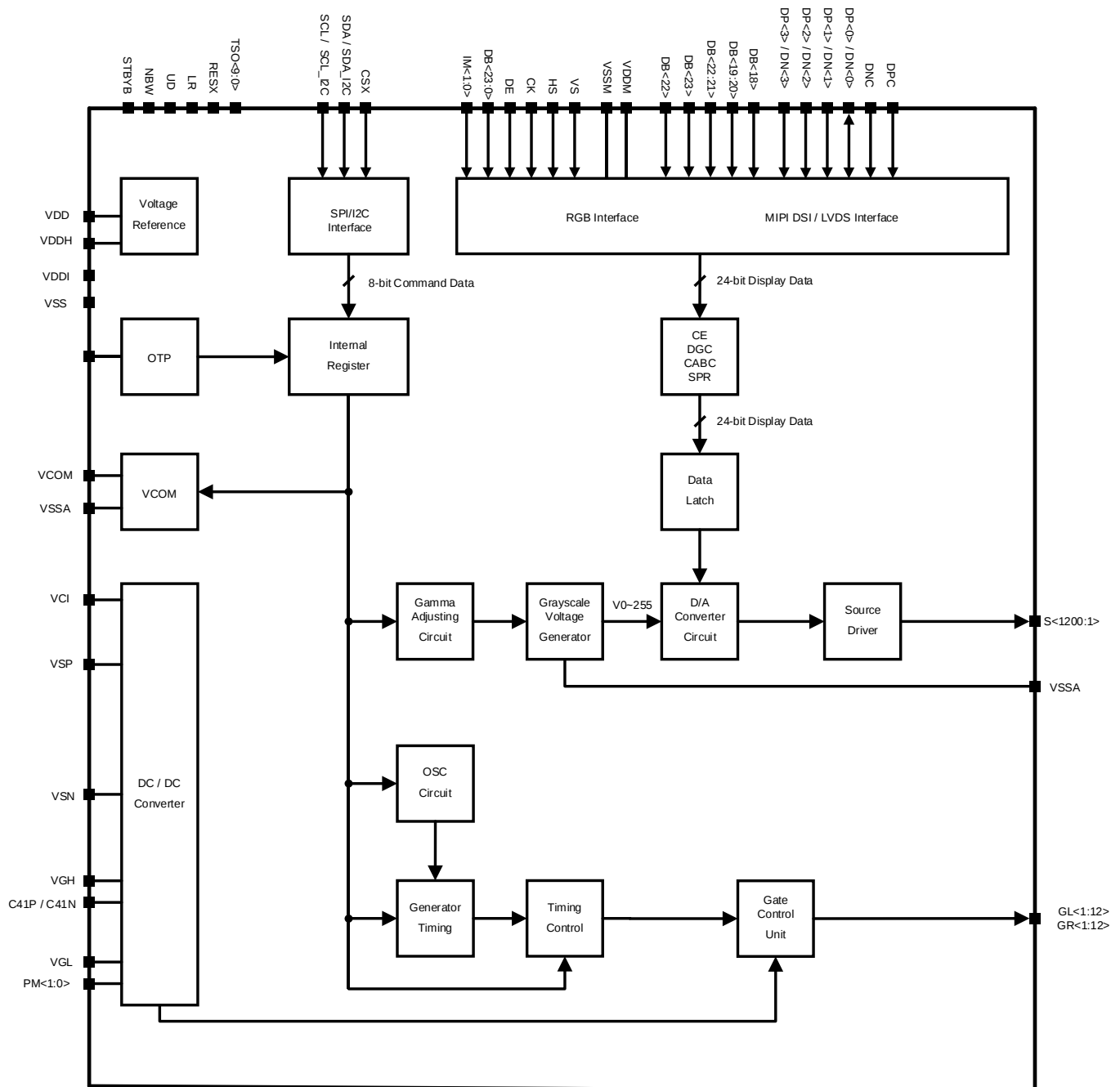
3.1 I/O connection

Pin NO.	Symbol	Description
1	LEDK	LED BACKLIGHT(CATHODE
2	LEDA	LED BACKLIGHT(ANODE
3	GND	GROUND
4	VCC	POWER SUPPLY
5	R0	RED DATA
6	R1	RED DATA
7	R2	RED DATA
8	R3	RED DATA
9	R4	RED DATA
10	R5	RED DATA
11	R6	RED DATA
12	R7	RED DATA
13	G0	Green DATA
14	G1	Green DATA
15	G2	Green DATA
16	G3	Green DATA
17	G4	Green DATA
18	G5	Green DATA
19	G6	Green DATA
20	G7	Green DATA
21	B0	Blue DATA
22	B1	Blue DATA
23	B2	Blue DATA
24	B3	Blue DATA
25	B4	Blue DATA
26	B5	Blue DATA
27	B6	Blue DATA
28	B7	Blue DATA
29	GND	GROUND
30	CLK	CLOCK SIGNAL
31	DISP	DISPLAY ON/OFF
32	HSYNC	HORIZONTAL SYNC INPUT IN RGB MODE
33	VSYNC	VERTICAL SYNC INPUT IN RGB MODE
34	DEN	DATA ENABLE
35	NC	NC
36	GND	GROUND
37	NC	NC
38	NC	NC
39	NC	NC
40	NC	NC



4. Electrical Specifications

4.1. Block Diagram





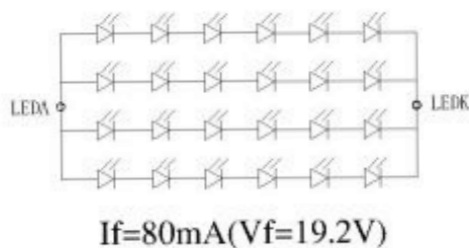
4.2 ELECTRICAL CHARACTERISTICS

<i>Parameter</i>	<i>Symbol</i>	<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>
Supply voltage for logic	Vdd-Vss	3.0	3.3	3.6	V
Input Current	Idd	-	90	-	mA

4.3 Recommended Driving Condition For LED Backlight

Item	Symbol	Values			Unit	Remarks
		Min.	Typ.	Max.		
Power Voltage Supply1	VCC(3.3V)	3.0	3.3	3.6	V	-
Luminance	Lv	-	1000	-	cd/m2	
Backlight Forward Voltage	Vf	-	19.2	-	V	-
LED Forward Current	If	-	80	-	MA	Note

Note:The “LED life time” is defined as the module brightness decrease to 50% of original brightness at $I_L=20\text{Ma}$ (for each led). The LED life time could be decreased if operating I_L is larger than 20mA



背光电路图

5.1 Timing Chart.

Figure 6.7: General timing diagram

Figure 6.8: RGB (800RGB x 480) timing diagram

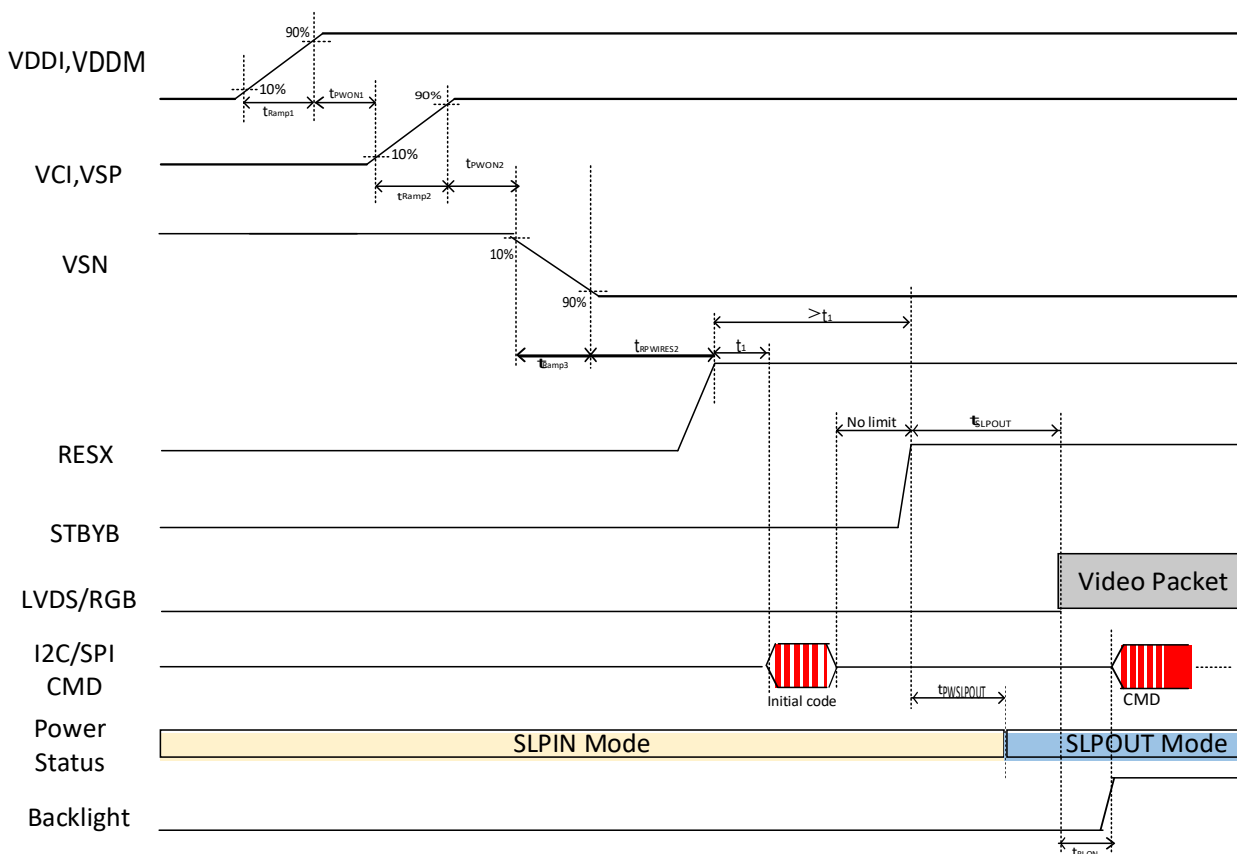


5.2. Power on sequence

The power on sequence timing for different power input modes and interfaces are shown as below table.

Symbol	Value			Unit	Remark
	Min	Typ	Max		
t_{PWON1}	0	5	-	ms	
t_{PWON2}	0	5	-	ms	
t_{PWON3}	0	5		ms	
t_{PWON4}	0	5		ms	
t_{ramp1}	0.2	-	20	ms	VDDI, VDDM
t_{ramp2}	0.2	-	20	ms	VCI, VSP
t_{ramp3}	0.2	-	20	ms	VSN
t_{ramp4}	0.2	-	-	ms	VGL
t_{ramp5}	0.2	-	-	ms	VGH
$t_{RPWIRES1}$	10	-	-	ms	
$t_{RPWIRES2}$	1	-	-	ms	
t_{MIPI_LP11}	-	-	$t_{RPWIRES1}$	ms	
t_{RESETL}	20	-	-	μs	
t_1	5	-	-	ms	
t_{SLPOUT}	120	-	-	ms	
$t_{PWSLPOUT}$	-	45	-	ms	
t_{BLON}	2	-	-	VS	

3 power mode power on sequence – RGB:



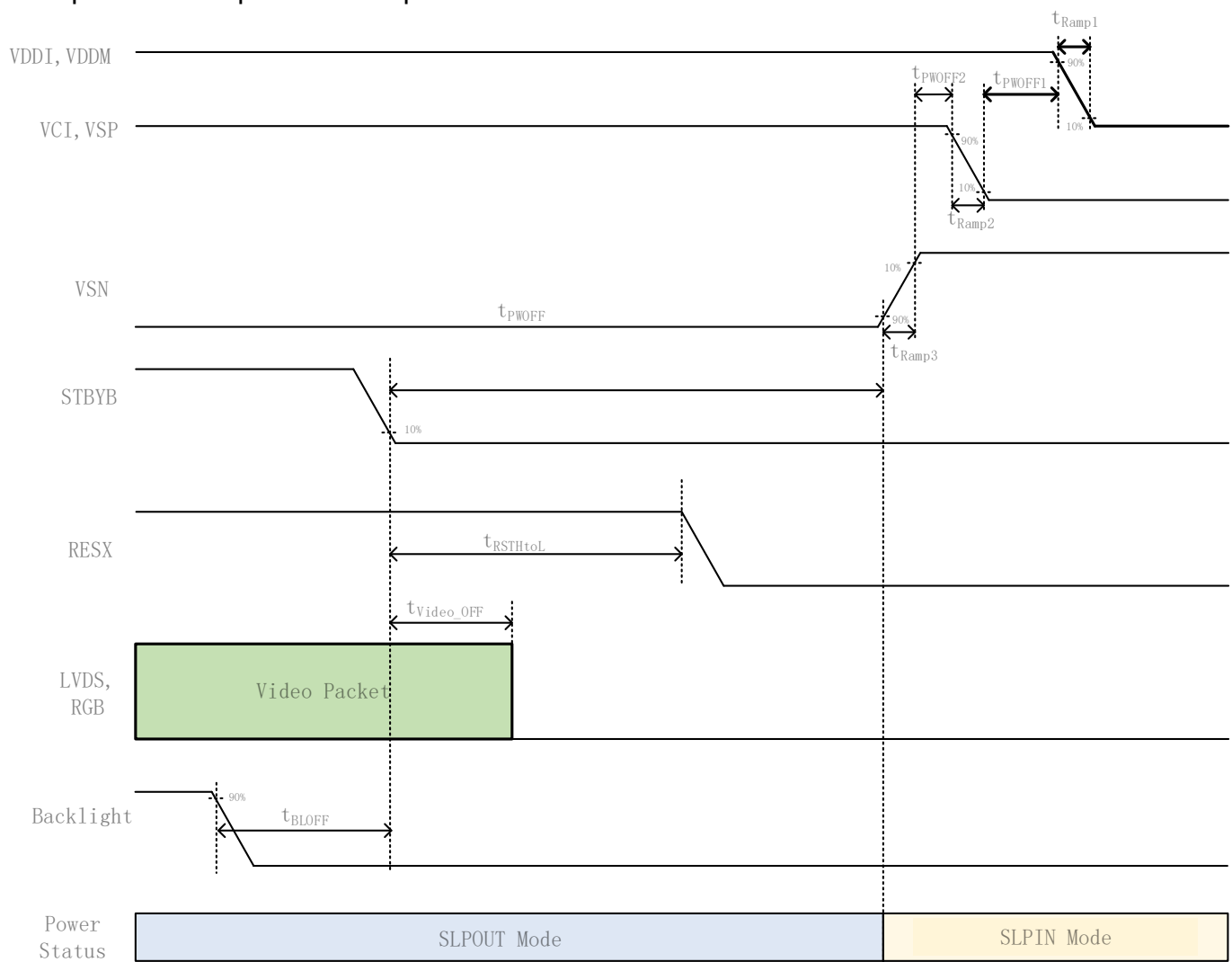


5.3 Power off sequence

The power off sequence timing for different power input modes and interfaces are shown as below table.

Symbol	Value			Unit	Remark
	Min	Typ	Max		
t_{PWOFF1}	0	5	-	ms	
t_{PWOFF2}	0	5	-	ms	
t_{PWOFF3}	0	5	-	ms	
t_{PWOFF4}	0	5	-	ms	
t_{ramp1}	0.2	-	20	ms	VDDI, VDDM, VDDC
t_{ramp2}	0.2	-	20	ms	VCI, VSP
t_{ramp3}	0.2	-	20	ms	VSN
t_{ramp4}	0.2	-	-	ms	5Power: VGL
t_{ramp5}	0.2	-	-	ms	5Power: VGH
t_{PWOFF}	120	-	-	ms	
t_{MIPI_LP11}	0	-	t_{PWOFF}	ms	
$t_{DISPOFF}$	50	-	t_{PWOFF}	ms	
$t_{RSTHtoL}$	50	-	t_{PWOFF}	ms	
t_{Video_OFF}	0	-	t_{PWOFF}	ms	
t_{BLOFF}	0	-	-	ms	

3 power mode power off sequence – RGB:



6. OPTICAL CHARACTERISTICS

<Table 5. Optical Specifications>

[Ta=25±2°C]

Item	Symbol	Condition	Specification			Unit	Remark
			Min.	Typ.	Max.		
Response Time	Tr+Tf	$\theta = 0^\circ, \Phi = 0^\circ$	-	30	40	ms	Note 1,2,3
Contrast Ratio	CR	$\theta = 0^\circ, \Phi = 0^\circ$	800	1000	-		Note 1,2,4
Viewing Angle	Left (9 o'clock)	$CR \geq 10$	70	80	-	deg.	Note 1,2,5
	Right (3 o'clock)		70	80	-		
	Top (12 o'clock)		70	80	-		
	Bottom (6 o'clock)		70	80	-		
Color Chromaticity (CF only with C light, CIE 1931)	Rx	$\theta = 0^\circ, \Phi = 0^\circ$	-0.015	0.634	+0.015		Note 1,6 CF Glass
	Ry			0.335			
	Gx			0.287			
	Gy			0.587			
	Bx			0.137			
	By			0.148			
	Wx			0.305			
	Wy			0.340			
Color Gamut (CF only with C light, CIE 1931)	NTSC	$\theta = 0^\circ, \Phi = 0^\circ$ CIE1931	55	60	-	%	Note 1,6 CF Glass
Transmittance (without APCF)	Tr	$\theta = 0^\circ, \Phi = 0^\circ$	(3.78)	(4.45)	-	%	Note 1,7,8 Normal Pol

Note 1: Measuring Conditions:

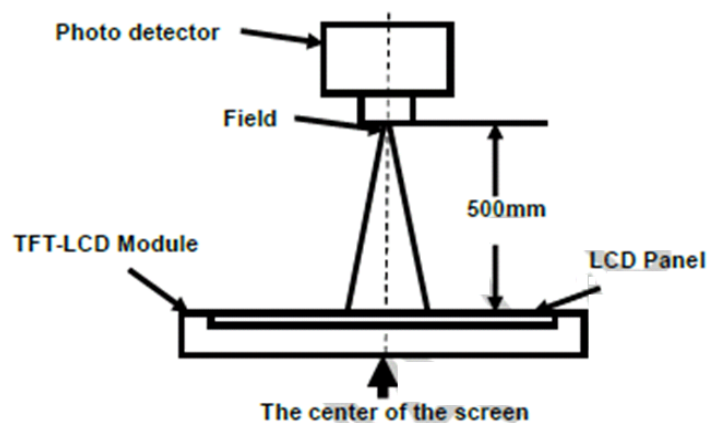
The optical characteristics are determined after the unit has been 'ON' and stable at the maximum brightness, in a dark environment at an ambient temperature at 25°C ± 2°C.



Note 2: Definition of optical measurement system.

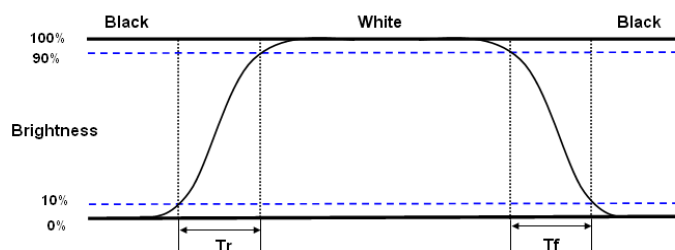
The optical characteristics should be measured in dark room. After 5 minutes operation, the optical properties are measured at the center point of the LCD screen. All input terminals LCD panel must be ground when measuring the center area of the panel.

Item	Photo detector	Field
Contrast Ratio	BM-5A	1 °
Transmittance		
Chromaticity	LCF-2100M	1 °
Response Time	TRD-100	2 °



Note 3: Definition of response time:

The response time is defined as the LCD optical switching time interval between “White” state and “Black” state. Rise time (T_r) is the time between photo detector output intensity changed from 10% to 90%. And fail time (T_f) is the time between photo detector out intensity changed from 90% to 10%.



Note 4: Definition of contrast ratio:

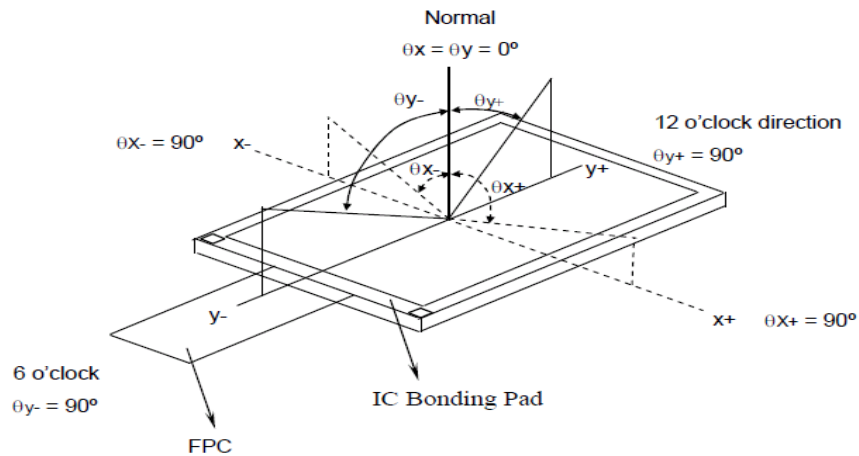
Contrast ratio is measured at the center point of LCD and calculated by the following formula:

$$\text{Contrast Ratio (CR)} = \frac{\text{Luminance measured when LCD on the "White" state}}{\text{Luminance measured when LCD on the "Black" state}}$$



Note 5: Definition of viewing angle range and measurement system:

Viewing angle is measured at the center point of the LCD (With Normal Polarizer) by BM-5A.



Note 6: Definition of color chromaticity (CIE1931):

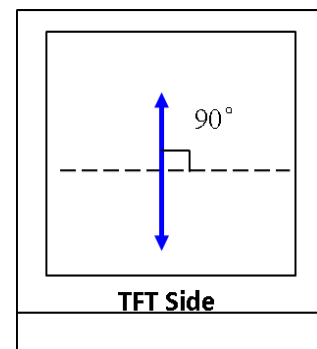
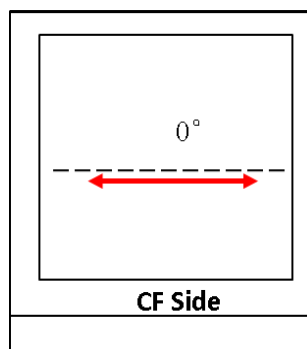
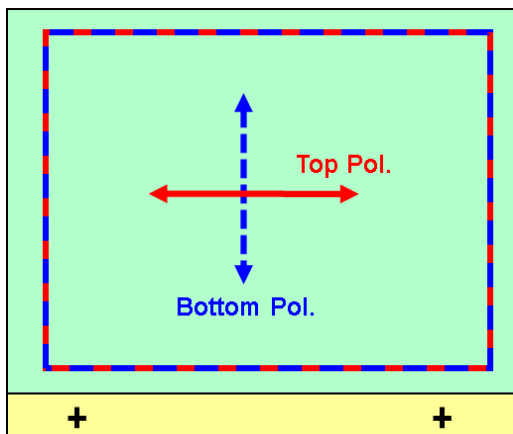
Color coordinates measured at center point of CF Glass under the C light source.

Note 7: Definition of transmittance:

Transmittance of specification is the value with normal polarizer and measured at the center point of LCD.

Note 8: Direction of Pol absorption axis:

The red and blue arrow directions are meant to be absorption axis.



CF Side polarizing absorption angle $\theta_1 = 0^\circ$ (Protective film side up, glue layer face down)

TFT Side polarizing absorption angle $\theta_2 = 90^\circ$ (Protective film side up, glue layer face down)



7. Reliability Tests / Environmental

Test Item	Test Condition	Judgment	Remark
High Temp. Storage	80℃, 240hrs	Note 1	Note 2 Note 3 Note 4
Low Temp. Storage	-30℃, 240hrs	Note 1	
High Temp. Operation	70℃, 240hrs	Note 1	
Low Temp. Operation	-20℃, 240hrs	Note 1	
High Temp.& Hum. Operation	60℃ 90%RH, 240hrs	Note 1	
Thermal Shock (non-operation)	-20℃ (30min)~70℃ (30min),100cycles	Note 1	

Note1: Criteria: Normal display image with no function defect and no line defect.

Note2: All tests above are practiced at module type.

Note3: All the cosmetic specification is judged before the reliability stress. Only a single item of these tests shall be executed on a single panel , no more one test item shall be executed on a single panel.

Note4: Evaluation should be tested after storage at room temperature for more than two hours.

8. INSPECTION STANDARDS

8.1 AQL Sampling inspection standard

使用 GB/T 2828-2003 一般 II 水平, 采用正常检查一次抽样方式; 具体抽检方式参照《成品检验管理程序》、《抽样管理规范》

缺陷区分	AQL 允收水准
严重缺陷	0 收 1 退
重缺	0.4
轻缺	1.0

8.2 Inspect the condition

8.2.1 在 20—40W 日光灯的照明条件下, 样品离检查者眼睛约 30cm 处进行检查。检验方向以垂直线前后左右 45° (以时钟 3 点、6 点、9 点、12 点)

8.2.2 检验者视力需达到标准视力 1.0 以上。

8.2.3 检验者需戴静电手环、两手八个手指套。

8.2.4 外观检验者以目视检查或以菲林对比卡比对。

8.2.5 电性测试使用电测测架, 主板, 电源线及单片机。

8.2.6 若标准与规格书不符时, 以产品发行之规格书特殊检验规格、工程变更为准

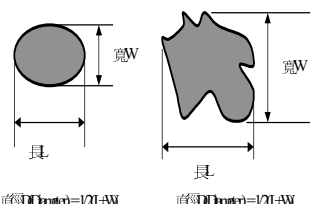
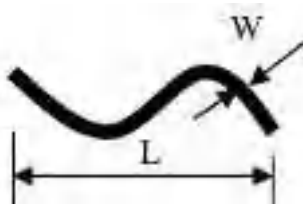
8.2.7 辉色度检测请参照样品, 检测方法依照辉色度检验标准。

8.2.8 电测检验环境: 照度为 200LUX 以下, 外观检验环境: 照度为 600LUX-1000LUX, 检验时间: 1 秒-3 秒。

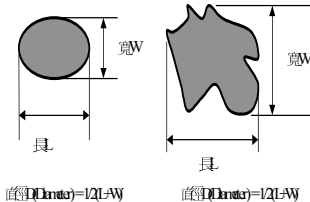
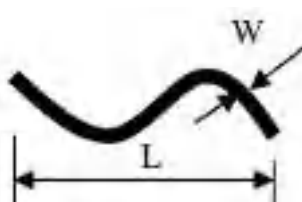
8.2.9 检验工具: 电测测架, 主板, 电源线及单片机, 菲林对比卡, 游标卡尺, 放大镜, 实体显微镜 (必要时) 等等。

8.3 Judgment criterion

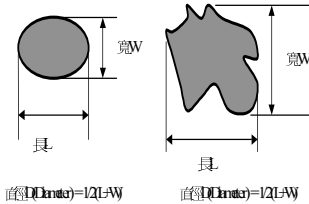
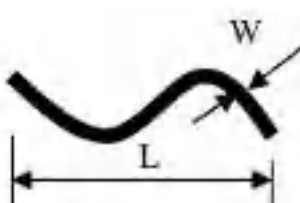
小尺寸点、线判定标准: (6.2 寸以内)

1	点状缺陷 (磨伤、异物、针孔、凹痕、缺膜、气泡、白点、彩点、脏点)		判定 (A/B/C 区)	$D \leq 0.10$, 忽略不计, 但密集型不允许	MI	OK
				$0.1 < D \leq 0.15$, $ds \geq 10$		$N \leq 2$
				$0.15 < D \leq 0.2$, $ds \geq 10$		$N \leq 1$
				LCD 亮点: $0.15 < D$		$N \leq 1$
				$D > 0.2$		NG
2	线状缺陷 (磨伤、无感划伤、毛屑、纤维等)		判定 (A/B/C 区)	同背面丝印油墨区杂质判定标准	MI	
				注: 1) D 区的点状缺陷需在不影响 CTP 功能、客户组装及整机的外观的情况下, 判定 OK		
				$W \leq 0.03mm$, $L \leq 3mm$, $ds \geq 10$		$N \leq 2$
				$0.03mm < W \leq 0.05mm$, $L \leq 3mm$, $ds \geq 10$		$N \leq 1$
				$W > 0.05mm$ 或 $L > 3mm$		NG

中尺寸点、线判定标准：（6.2~8 寸以内）

1	点状缺陷 (磨伤、异物、针孔、凹痕、缺膜、气泡、白点、彩点、脏点)		判定 (A /B/C 区)	$D \leq 0.10$, 忽略不计, 但密集型不允许 $0.15 < D \leq 0.25, ds \geq 10$ $0.25 < D \leq 3, ds \geq 10$ LCD 亮点: $0.2 < D$ $D > 0.3$	MI	OK
						$N \leq 2$
						$N \leq 1$
						$N \leq 1$
						NG
			判定 (D 区)	同背面丝印油墨区杂质判定标准		
			注: 1) D 区的点状缺陷需在不影响 CTP 功能、客户组装及整机的外观的情况下, 判定 OK		MI	
2	线状缺陷 (磨伤、无感划伤、毛屑、纤维等)		判定 (A /B/C 区)	$W \leq 0.03mm, L \leq 3mm, ds \geq 10$	MI	$N \leq 2$
				$0.03mm < W \leq 0.05mm, L \leq 3mm, ds \geq 10$		$N \leq 1$
				$W > 0.05mm$ 或 $L > 3mm$		NG

大尺寸点、线判定标准：（8.1~13.3 寸以内）

1	点状缺陷 (磨伤、异物、针孔、凹痕、缺膜、气泡、白点、彩点、脏点)		判定 (A /B/C 区)	$D \leq 0.1$, 忽略不计, 但密集型不允许	MI	OK
				$0.15 < D \leq 0.3, ds \geq 10$		$N \leq 2$
				$0.3 < D \leq 0.35, ds \geq 10$		$N \leq 1$
				LCD 亮点: $0.25 < D$		$N \leq 1$
				$D > 0.35$		NG
判定 (D 区)	同背面丝印油墨区杂质判定标准					
注: 1) D 区的点状缺陷需在不影响 CTP 功能、客户组装及整机的外观的情况下, 判定 OK				MI		
2	线状缺陷 (磨伤、无感划伤、毛屑、纤维等)		判定 (A /B/C 区)	$W \leq 0.05mm, L \leq 5mm, ds \geq 10$	MI	$N \leq 2$
				$0.05mm < W \leq 0.07mm, L \leq 5mm, ds \geq 10$		$N \leq 1$
				$W > 0.07mm$ 或 $L > 5mm$		NG



9 . PACKAGE DRAWING

