深圳市拓普微科技开发有限公司
SHENZHEN TOPWAY TECHNOLOGY CO., LTD.

LMT070DNCFWD-30

LCD Module User Manual

Prepared by:	Checked by:	Approved by:
LuoLin		
Date: 2026-08-28	Date:	Date:

Rev.	Descriptions	Edit	Release Date
0.1	Preliminary release	LuoLin	2026-08-28

Table of Content

1. Applications

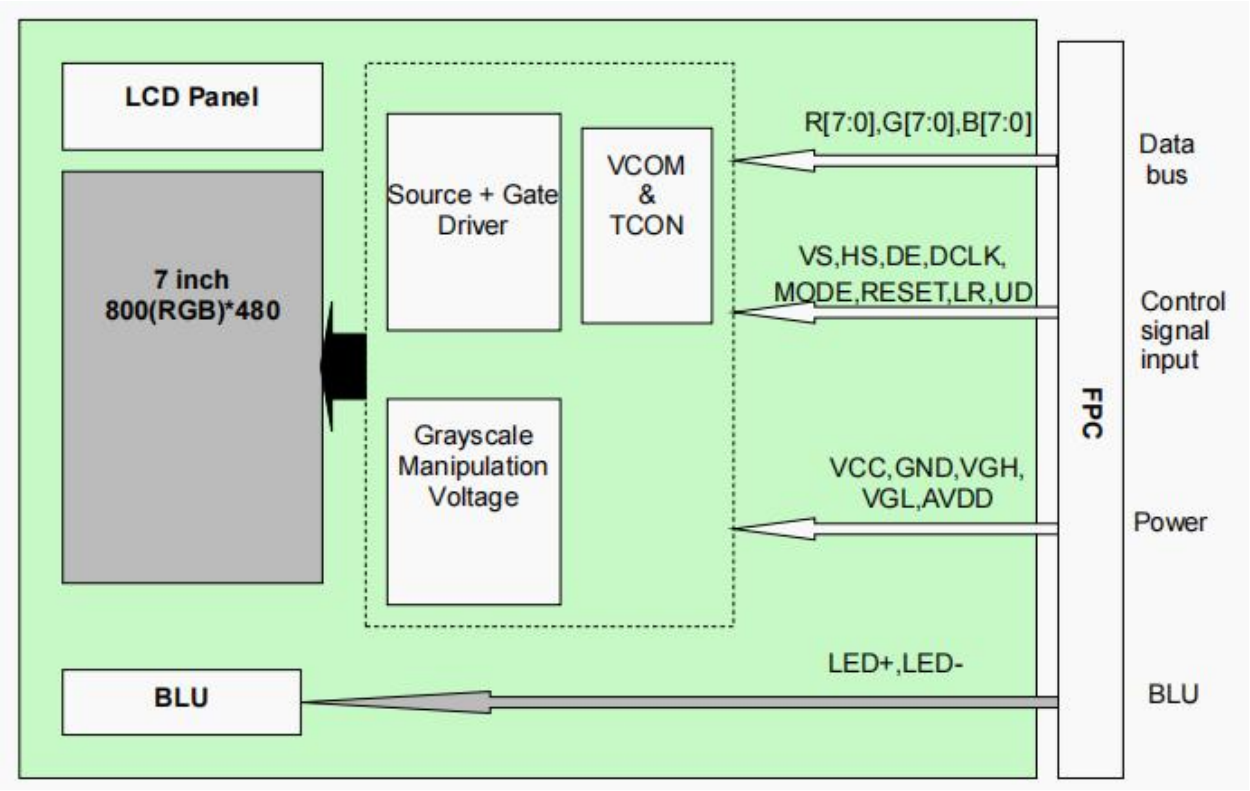
This is a 7.0 inch a-Si TFT-LCD module with normal-black technology. It is composed of a TFT-LCD panel,a driver circuit, FPC, Bezel, and Backlight unit.

2. General Specification

Screen Size(Diagonal) :	7.0”
Active Area :	154.08 x 85.92 (mm)
Number of dots :	800 (RGB) x 480
Pixel Pitch：	0.1926x0.1790(mm)
Color Depth:	16.7M colors
Display Technology :	a-Si TFT active matrix
Display Mode :	Normal Black, Transmissive
Display Interface :	RGB
Viewing Direction :	Full
Surface Treatment :	Anti-Glare
Operating Temperature :	-20 ~ +70°C
Storage Temperature :	-30 ~ +80°C

Note:
*1. For saturated color display content (eg. pure-red, pure-green, pure-blue or pure-colors-combinations).
*2. For “color scales” display content.

3. Block Diagram



4. Terminal Function (Input Terminal)

Pin No.	Pin Name	I/O	Descriptions

1	VLED+	Power	Positive Backlight Power Supply
2	VLED+		
3	VLED-	Power	Negative Backlight Power Supply
4	VLED-		
5	GND	Power	Power GND (0V)
6	NC	-	No connection
7	VCC	Power	Power for Digital Circuit
8	MODE	Input	DE/SYNC mode select (*1)
9	DE	Input	Data input enable
10	VS	Input	Vertical Sync Input
11	HS	Input	Horizontal Sync Input
12	B7	Input	8bit Data for Blue
:	:		
19	B0		
20	G7	Input	8bit Data for Green
:	:		
27	G0		
28	R7	Input	8bit Data for Red
:	:		
35	R0		
36	GND	Power	Power GND (0V)
37	DCLK	Input	Sample clock(*2)
38	GND	Power	Power GND (0V)
39	L/R	Input	Left / right selection (*3)
40	U/D	Input	Up/down selection (*3)
41	VGH	Power	Gate ON Voltage
42	VGL	Power	Gate OFF Voltage
43	AVDD	Power	Power for Analog Circuit
44	RESET	Input	Global reset pin (*4)
45	NC(SCL)	-	No connection(Serial interface clock input for SPI interface.)
46	NC	Input	No connection
47	NC	Input	No connection
48	GND	Power	Power GND (0V)
49	NC(SDI)	-	No connection(Serial interface address and data input/output for SPI interface.)
50	NC(CSB)	-	No connection(Serial interface chip enable siqnal for SPI interface)

Note:

* 1: DE/SYNC mode select. Normally pull high.
  When select DE mode, MODE="1", VS and HS must pull low.
  When select SYNC mode, MODE= "0", DE must pull low.
* 2: Data shall be latched at the falling edge of DCLK.
* 3: Selection of scanning mode

Setting of scan control input		Scanning direction
U/D	L/R	
GND	DVDD	Up to down, left to right
DVDD	GND	Down to up, right to left

*4: Global reset pin. Active low to enter reset state. Suggest to connect with an RC reset circuit for stability. Normally pull high.

5. Absolute Maximum Ratings

Item	Symbol	MIN	MAX	Unit	Remark
Power Voltage	VCC	-0.3	3.96	V	Note1
Input voltage	VIN	-0.3	3.96	V	
Analog supply voltage	AVDD	-0.3	12	V	
Gate on voltage	VGH	-0.3	VGL+32	V	
Gate off voltage	VGL	VGH-32	0.3	V	
Operating Temperature	Top	-20	70	℃	
Storage Temperature	Tst	-30	80	℃	
Relative Humidity Note2	RH	--	≤95	%	Ta≤40℃
		--	≤85	%	40℃<Ta≤50℃
		--	≤55	%	50℃<Ta≤60℃
		--	≤36	%	60℃<Ta≤70℃
		--	≤24	%	70℃<Ta≤80℃
Absolute Humidity	AH	--	≤70	g/m³	Ta>70℃

Note1: Input voltage include R0~R7, G0~G7, B0~B7, DCLK, HS, VS, DE，AVDD,VGH.VGL
Note2: Ta means the ambient temperature. It is necessary to limit the relative humidity to the specified temperature range. Condensation on the module is not allowed.
Note3: The absolute maximum rating values of this product are not allowed to be exceeded at any times. A module should be used with any of the absolute maximum ratings exceeded, the characteristics of the module may not be recovered, or in an extreme condition, the module may be permanently destroyed

6. Electrical Characteristics

6.1 DC Characteristics

Item		Symbol	MIN	TYP	MAX	Unit	Remark
Digital supply Voltage		VCC	3.00	3.30	3.60	V	
Analog supply Voltage		AVDD	-	10.4	-	V	
Gate on voltage		VGH	-	18	-	V	
Gate off voltage		VGL	-	-7.00	-	V	
Input Signal Voltage	Low Level	VIL	0	-	0.2*VCC	V	R0~R7,G0~G7,0~B7,DE, DCLK,HSYNC,VSYNC,MODE, RESET,LR,UD, DITHB
	High Level	VIH	0.8*VCC	-	VCC	V	
Current of digital supply voltage		IVCC	-	-	TBD	mA	All white pattern
Current of analog supply voltage		IAVDD	-	-	TBD	mA	
Current of Gate on voltage		IVGH	-	-	TBD	mA	
Current of Gate off voltage		IVGL	-	-	TBD	mA	

6.2 LED Backlight Circuit Characteristics

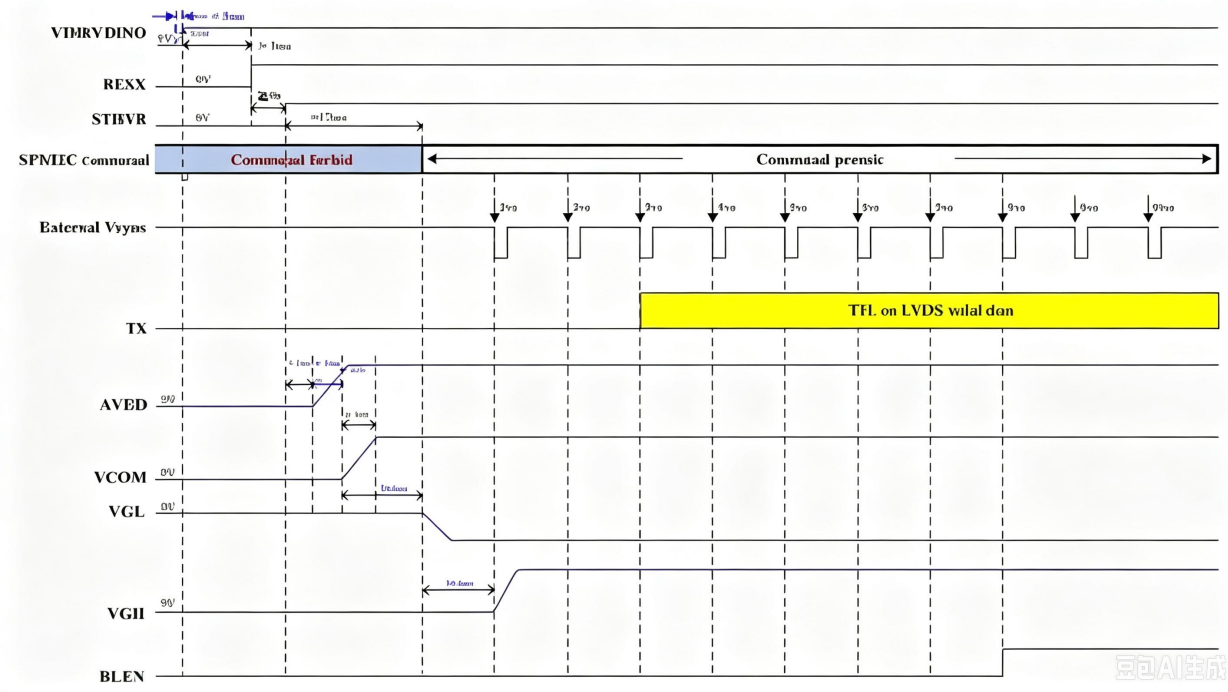
Top=25℃

Items	Symbol	MIN.	TYP.	MAX.	Unit	Note
Forward Voltage	Vf_{BLA}	8.4	9.3	10.2	V	If=160mA
Forward Current	If_{BLA}	-	160.0	-	mA	
Backlight Operating Life Time	-	20000	-	-	Hrs	*1

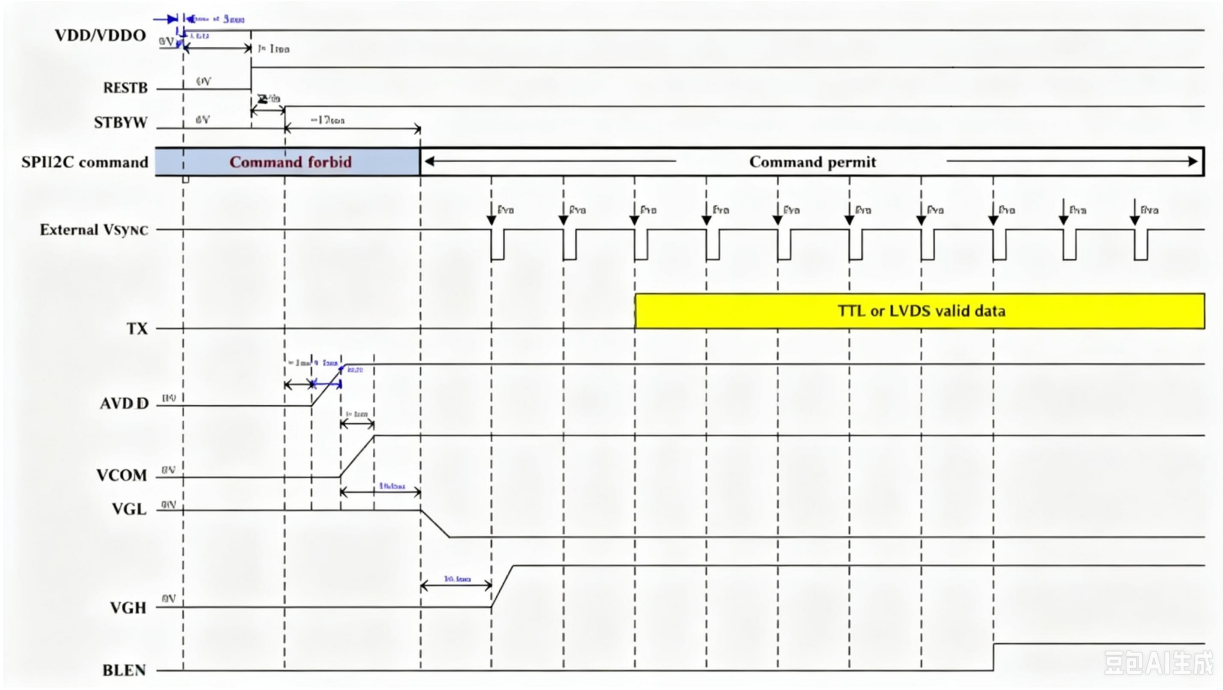
Cautions:

*1. Optical performance should be evaluated at Ta=25℃. Only If LED is driven by high current, high ambient temperature & humidity condition. The life time of LED will be reduced. Operating life means brightness goes down to 50% of initial brightness. Typical operating life time is an estimated data.

6.3 Power ON/OFF Sequence



Power On Sequence



Power Off Sequence

Note1: If input signals stopped for quite a long time, all input power supply should be cut down to avoid abnormal display when next display on.
Note2: The backlight should be turned on within the valid period of display and function signals, in order to avoid unstable data display.
Note4: VS means Vertical Sync. The periodic of VS is frame rate.

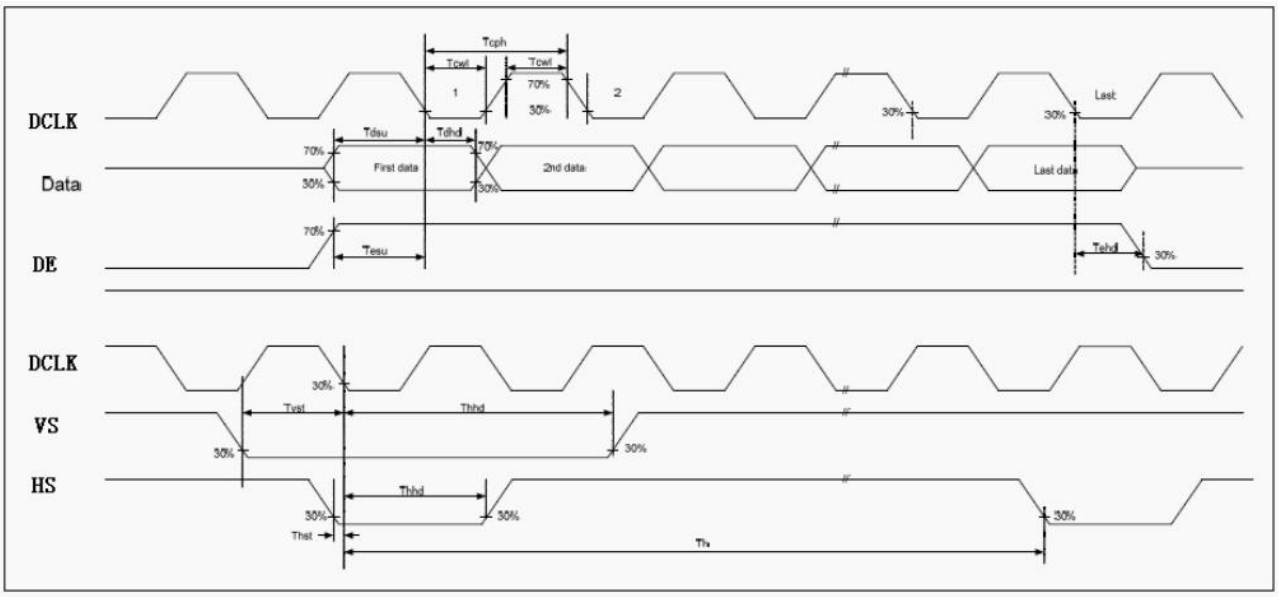
7. AC Characteristics

7.1 Timing Characteristics

Parameter	Symbol	Min	Typ	Max	Unit	Remark
DCLK duty ratio	T_{cw}	40	50	60	%	
VS setup time	T_{vst}	5	-	--	ns	
VS hold time	T_{vhd}	5	-	-	ns	
HS setup time	T_{hst}	5	-	-	ns	
HS hold time	T_{hhd}	5	-	-	ns	
Data setup time	T_{dsu}	5	-	-	ns	Data to DCLK
Data hold time	T_{dhd}	5	-	-	ns	Data to DCLK
DE setup time	T_{esu}	5	-	-	ns	
DE hold time	T_{ehd}	5	-	-	ns	

Note: For the details of the timing, please see the Driver IC data sheet.

7.2 Input Clock and Data Timing Diagram



7.3 Timing

TCON (Embedded In Source IC) Input Timing (DCLK, HS, VS, DE)

Parameter	Symbol	Min	Typ	Max	Unit	Remark
DCLK	Fclk	29	32.4	62	MHZ	
	tclk	16.1	30.9	34.5	ns	
HS	th	900	1000	1300	tclk	
	thd		800		tclk	
	thpw	4	24	Thbp-1	tclk	
	thbp	62	160	250	tclk	
	thfp	38	40	250	tclk	
VS	tv	500	540	680	th	
	tvd		480		th	
	tvpw	1	2	Tvb-1	th	
	tvb	8	23	100	th	
	tvfp	12	37	100	th	
Frame Rate	F	-	60	-	HZ	

Note 1:DE timing refer to HS,VS input timing

7.4 Data Input Format

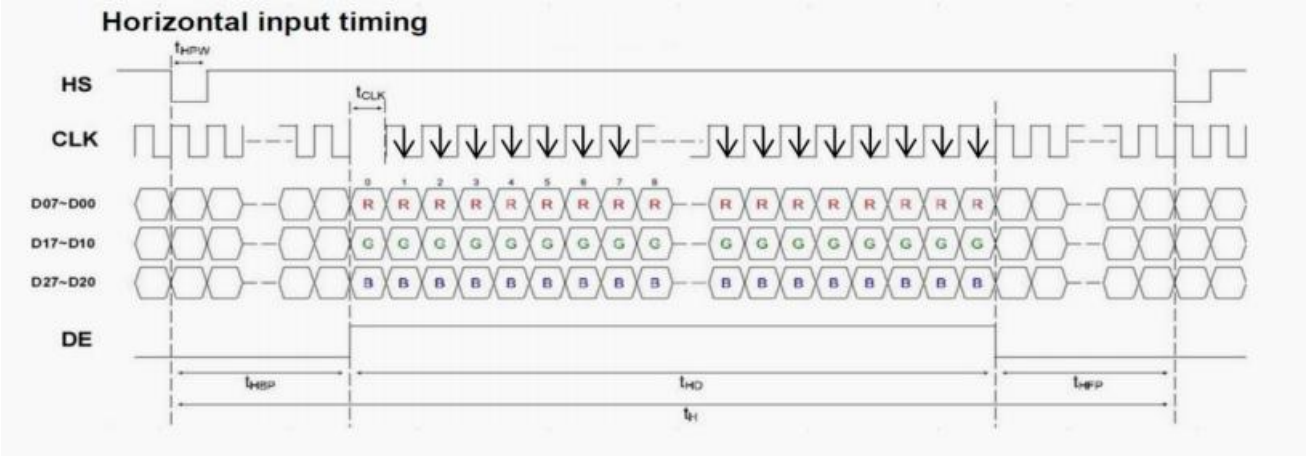


Figure 6-2-1 TCON Horizontal input timing diagram.

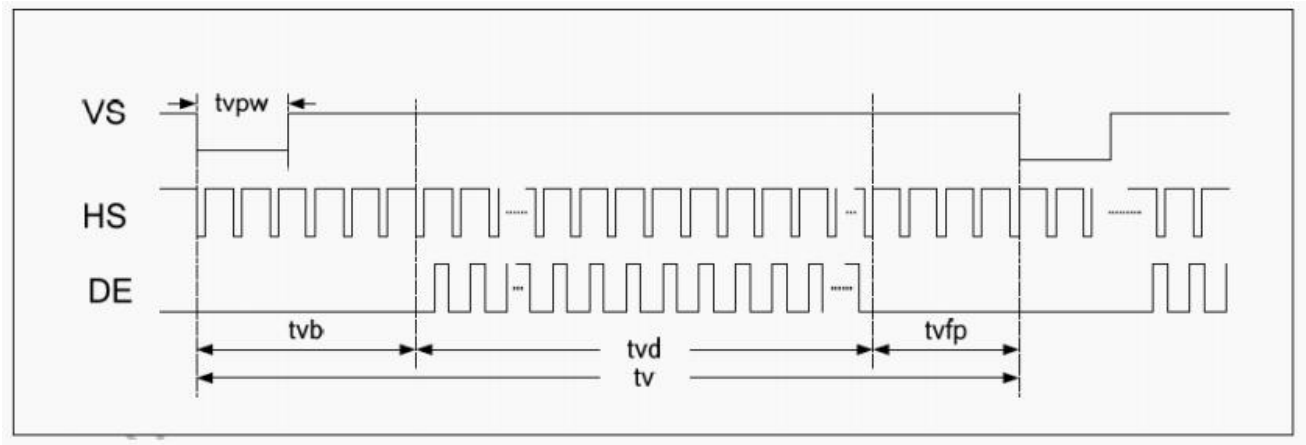
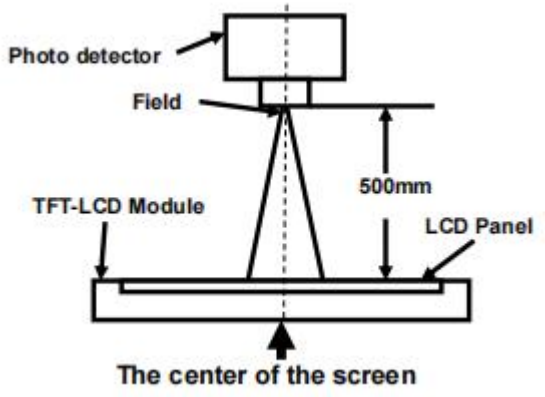


Figure 6-2-2 TCON Vertical input timing diagram HV.

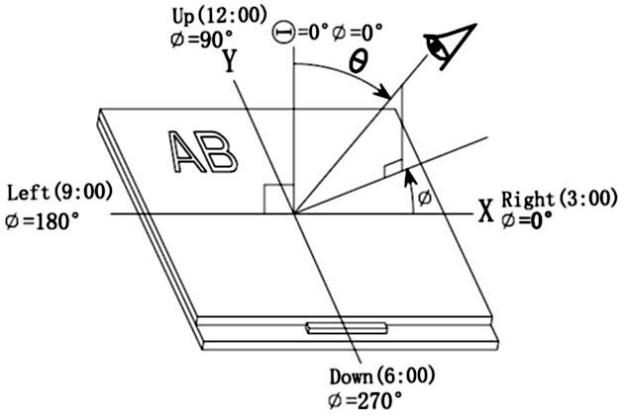
7.5 Optical Characteristics

Item	Symbol	Condition	MIN.	TYP.	MAX.	UNIT	Note.
Viewing angle (CR≥10)	θ_L	9 o'clock	80	88	-	degree	*2
	θ_R	3 o'clock	80	88	-		
	θ_T	12 o'clock	80	88	-		
	θ_B	6 o'clock	80	88	-		
Response Time	T_f	Normal θ=0°	-	35	45	msec	*3
	T_r					msec	
Contrast ratio	CR		800	1000	-	-	*1
Color chromaticlty	W_X		-	TBD	-	-	
	W_Y		-	TBD	-	-	
Luminance	L		350	400	-	cd/m^2	*4
Luminance uniformity	Y_U		70	80	-	%	*4

Note 1:
Definition of optical measurement system.
The optical characteristics should be measured in dark room.
After 5 Minutes operation, the optical characteristics are measured at the center point of the LCD screen.



Note 2:
The definition of viewing angle:
Refer to the graph below marked by θ and Φ

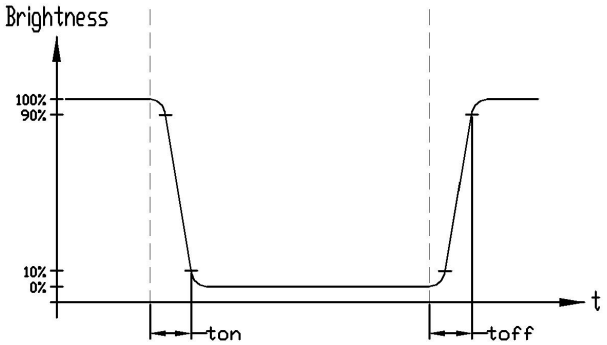


Note 3:
The definition of contrast ratio (Test LCM using SR-3A (1°)):

$$\text{Contrast Ratio(CR)} = \frac{\text{Luminance When LCD is at "White" state}}{\text{Luminance When LCD is at "Black" state}}$$

(Contrast Ratio is measured in optimum common electrode voltage)

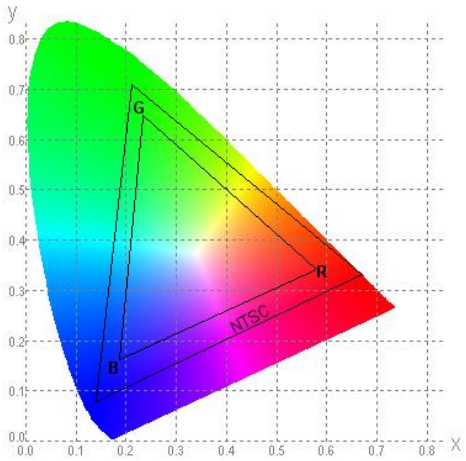
Note 4:
Definition of Response time. (Test LCD using BM-7A(2°)):
The output signals of photo detector are measured when the input signals are changed from "black" to "white"(falling time) and from "white" to "black"(rising time), respectively.
The response time is defined as the time interval between the 10% and 90% of amplitudes.Refer to figure as below.



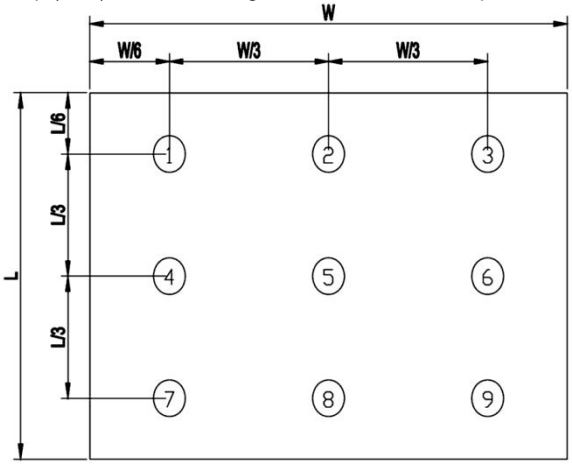
Note 5:
Definition of Color of CIE1931 Coordinate and NTSC Ratio.

Color gamut:

$$S = \frac{\text{Area of RGB triangle}}{\text{Area of NTSC triangle}} \times 100\%$$



Note 6:
The luminance uniformity is calculated by using following formula.
△Bp = Bp (Min.) / Bp (Max.)×100 (%)
Bp (Max.) = Maximum brightness in 9 measured spots
Bp (Min.) = Minimum brightness in 9 measured spots.



Note 7:
Measured the luminance of white state at center point

8. LCD Module Design and Handling Precautions

- Please ensure V0, VCOM is adjustable, to enable LCD module get the best contrast ratio under different temperatures, view angles and positions.
- Normally display quality should be judged under the best contrast ratio within viewable area. Unexpected display pattern may com out under abnormal contrast ratio.
- Never operate the LCD module exceed the absolute maximum ratings.
- Never apply signal to the LCD module without power supply.
- Keep signal line as short as possible to reduce external

8. 液晶显示模块设计和使用须知

- 请注意 V0，VCOM 的设定，以确保液晶显示模块在不同的使用温度下以及在不同的视角和位置观察模块显示，均能达到最佳对比度，请务必将应用电路上设置为对比度可调。
- 请注意液晶显示模块的显示品质判定是指在正常对比度下以及视窗(V.A)范围内进行的，非正常对比度下液晶可能会出现非预期的显示不良，应注意区分。
- 请勿在最大额定值以外使用液晶显示模块。
- 请勿在没有接通电源的条件下，给液晶显示模块输送信号。
- 请尽可能缩短信号线的连接，以避免对液晶显示模块

noise interference.
- IC chip (e.g. TAB or COG) is sensitive to light. Strong light might cause malfunction. Light sealing structure casing is recommended.

- Make sure there is enough space (with cushion) between case and LCD panel, to prevent external force passed on to the panel; otherwise that may cause damage to the LCD and degrade its display result.
- Avoid showing a display pattern on screen for a long time (continuous ON segment).

- LCD module reliability may be reduced by temperature shock.
- When storing and operating LCD module, avoids exposure to direct sunlight, high humidity, high or low temperature. They may damage or degrade the LCD module.
- Never leave LCD module in extreme condition (max./min storage/operate temperature) for more than 48hr.
- Recommend LCD module storage conditions is 0 C~40 C <80%RH.
- LCD module should be stored in the room without acid, alkali and harmful gas.
- Avoid dropping & violent shocking during transportation, and no excessive pressure press, moisture and sunlight.
- LCD module can be easily damaged by static electricity. Please maintain an optimum anti-static working environment to protect the LCD module. (eg. ground the soldering irons properly)
- Be sure to ground the body when handling LCD module.
- Only hold LCD module by its sides. Never hold LCD module by applying force on the heat seal or TAB.
- When soldering, control the temperature and duration avoid damaging the backlight guide or diffuser which might degrade the display result such as uneven display.
- Never let LCD module contact with corrosive liquids, which might cause damage to the backlight guide or the electric circuit of LCD module.
- Only clean LCD with a soft dry cloth, Isopropyl Alcohol or Ethyl Alcohol. Other solvents (e.g. water) may damage the LCD.
- Never add force to components of LCD module. It may cause invisible damage or degrade the module's reliability.
- When mounting LCD module, please make sure it is free from twisting, warping and bending.
- Do not add excessive force on surface of LCD, which may cause the display color change abnormally.
- LCD panel is made with glass. Any mechanical shock (e.g. dropping from high place) will damage the LCD module.

的信号干扰。
- 集成电路因 IC 芯片(如 TAB 或 COG)对紫外线极为敏感，强光环境下可能会引起液晶显示模块功能失效，故应采用不透光的外壳。
- 请在液晶显示模块与外壳之间保留足够的空间(可使用衬垫)，以缓冲外力对液晶显示模块的损坏或因受力不均而产生的显示不匀等异常现象。

- 避免液晶显示屏在某一画面下长时间点亮，否则有出现残影的风险；请通过软件每隔一段时间改变一次画面。
- 液晶显示模块的可靠性可能因温度冲击而降低。
- 请勿在阳光直射、高湿、高温或低温下储存和使用液晶显示模块，这将造成液晶显示模块的损坏或失效。

- 请勿在极限环境(最大/最小存储/工作温度)下使用或放置液晶显示模块超过 48 小时以上。
- 液晶显示模块建议存储条件为：0 C~40 C <80%RH。
- 请勿让液晶显示模块存储于带有 酸性，碱性，有害气体环境之中。
- 在运输过程中，请勿让液晶显示模块跌落与猛烈震动，同时避免 异常挤压，高湿度，与阳光照射.
- 液晶显示模块极易受静电损坏，请务必保证液晶显示模块在防静电的工作环境中使用或保存。(如：烙铁正确接地,等)
- 拿取液晶显示模块时需注意操作人员的接地情况。
- 请手持液晶显示模块的边沿取放模块，防止热压纸或 TAB 部位受力。
- 焊接液晶模块时，请注意控制烙铁的温度、焊接时间，以免烫坏导光板或偏光片，导致显示不匀等不良现象发生。
- 请勿使用洗板水等腐蚀性液体接触液晶模块，以免腐蚀导光板或模块电路。

- 仅可使用柔软的干布，异丙醇或乙醇清洁液晶屏表面，其他任何溶剂(如:水)都有可能损坏液晶模块。
- 请勿挤压液晶显示模块上的元器件，以避免产生潜在的损坏或失效而影响产品可靠性。
- 装配液晶显示模块时，请务必注意避免液晶显示模块的扭曲或变形。
- 请勿挤压液晶显示屏表面，这将导致显示颜色的异常。
- 液晶屏由玻璃制作而成，任何机械碰撞(如从高处跌落)均有可能损坏液晶显示模块。

9. TFT QA Standard

9.1 INSPECTION CONDITION 检验条件

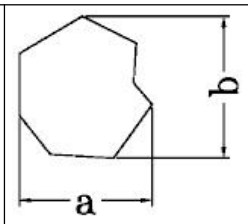
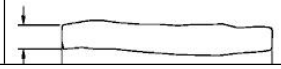
Unless otherwise stated，all the inspections are carryout under the following condition
除非有特别的规定，检验条件按以下执行。

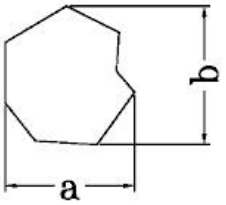
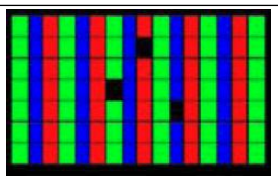
The following standards only apply to the visible area. As long as function good non-visual area appearance can be ignored. Available deerskin with petroleum ether, a clean stains do not apply to the exterior standard. If debris in a certain direction is perpendicular to the direction of three times the length of that line debris; the insulation as granular debris; the silver carbon glue as a rejection of defects.

以下标准只适用于可视区。只要功能良好非可视区的外观可忽略。可用鹿皮沾石油醚，擦干净的污渍不适用于该外观标准。如 果杂物某方向的长度是垂直方向的 3 倍则认为是线状杂物；多出的绝缘点看作粒状杂物；多出的 银碳胶视为拒收缺陷。

No.	Items 项目	Conditions 条件
1	Lighting 照明	Illumination: Appearance300~700Lux 环境亮度在 300~700LUX
2	Inspection Distance 检验距离	30-40cm form the test sample，within normal viewing angle 眼睛距显示器表面 30~40cm
3	Temperature 环境温度	Room Temperature (25 ºC), no condensation 室温（25 度±5%），无凝水
4	Viewing Angle 视角	U/D: 45º/45º, L/R: 45º/45º 前后 45 度角范围内，左右 45 度角范围内
5	Inspection Time 检验时间	15 seconds 15 秒内
6	Defect Allowance 缺陷总数	5 max 允许 5 个

9.2 Display Pattern 显示缺陷

No.	Items /Contents 检查项目		Type 类别 MA	Type 类别 MI	Standard 标准	Judgment 判定
1	No Display 无显示		√		--	Not Allowed 不允许
2	Line defect 缺少行或列		√		--	Not Allowed 不允许
3	Display abnormally 错误的显示		√		--	Not Allowed 不允许
4	Function Defective 缺少功能		√		--	Not Allowed 不允许
5	Glass Crack 玻璃破碎		√		--	Not Allowed 不允许
6	Spot Defect Including: Black spot, White spot Foreign particle, Polarizer dirt, Cell particle 黑点/白点			√	(a+b)/2≤0.25	Allowed 允许
					0.25<(a+b)/2≤0.5	4 max. 允许 4 个
					(a+b)/2＞0.5	Not Allowed 不允许
7	Line Defect			√	a≤0.1	Allowed 允许

	Including: Black line, White line, Scratch 线				0.1<a≤0.2and b≤5.0	4max. 允许 4 个
					a＞0.2 or b＞5.0	Not Allowed 不允许
8	Polarizer Dent/Bubble 偏光片气泡			√	(a+b)/2≤0.3	Allowed 允许
					0.3< (a+b)/2≤0.6	3 max. 允许 3 个
					(a+b)/2>0.6	Not Allowed 不允许
9	Bright dot defect 亮点 (在全黑屏下多像素点）			√	Random	2 max. 允许 2 个
					3 consecutive dots 3 个或以上连续的点	Not Allowed 不允许
10	Dark dot defect 暗点 （在全红或全绿或全蓝屏下缺像素点）			√	Random	4 max. 允许 4 个
					5consecutive dots 5 个或以上连续的点	Not Allowed 不允许
13	Bright dot defect + Dark dot defect 亮点 + 暗点			√	--	5max. 允许 5 个
14	FPC or FFC FPC/FFC		√		Broken 损坏	Not Allowed 不允许
			√		naked wire、hole 裸线、孔洞	Not Allowed 不允许
				√	FPC kink、indentation Top wound、scratch FPC 折痕、顶伤	Lgnore 忽略
15	PCBA defect PCBA 缺陷		--	--	Refer to IPC-A-610 按照 IPC-A-610	--
16	Bezel scratches,pits,bumps,Don't try dirt 外框划痕，凹点，凸点，赃物			√	Do not affect dispiay,assembly,ignore 不影响显示，组装则忽略	

9.3 Quality Level and Sampling 抽样方法

Items 项目	Standard 标准
Sampling Standard 引用标准	MIL-STD-105E
Sampling Level 抽样等级	II
AQL level 合格判定水平	MA: AQL=0.65 MI: AQL=1.0

9.4 Handling Precaution 使用注意事项

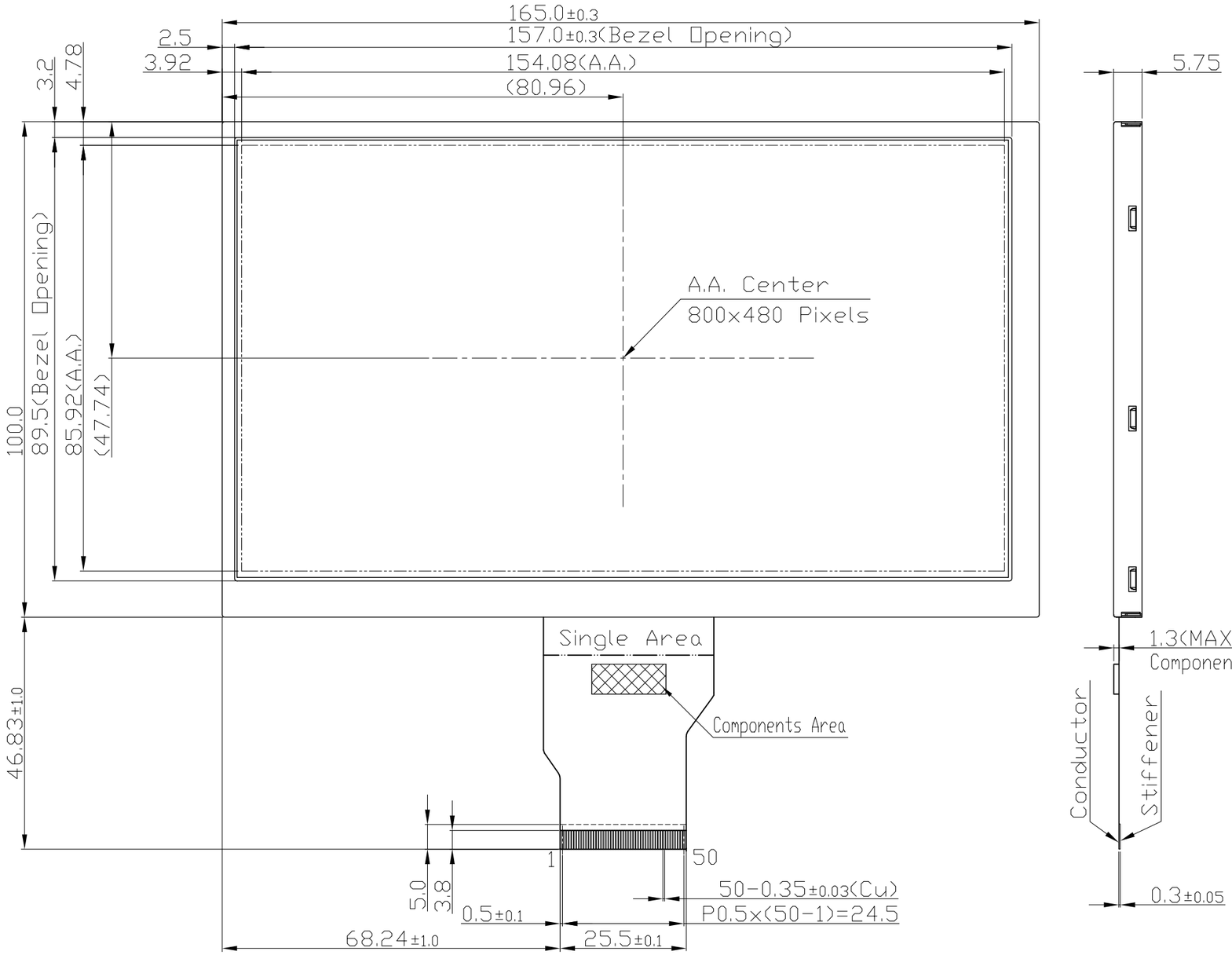
1. Never attempt to disassemble or rework LCD module
   禁止拆卸或改造显示模块
2. Never let LCD module contact with liquids
   禁止液体接触
3. LCD module can be easily damaged by electrostatic charge.
   Please maintain an optimum anti-static working environment.
   请在静电防护环境下打开包装使用
4. LCD panel is made with glass.
   Any mechanical shock (eg. Vibration, distortion, extrusion, impact，drop) will damage the LCD module.
   振动、扭曲、挤压、碰撞、跌落等会造成损失或破裂

5. Avoid showing a display pattern on screen for a long time (continuous ON segment)
   长时间画面停留会造成影像残留
6. The color and evenness of the display may slightly vary with the temperature
   显示颜色和显示均匀度会因外界温度而有所变化
7. Signal and Power supply excess the operation range may damage the LCD module
   错误的输入电压（电流）或电信号会造成电路或元器件烧坏
8. Avoid touching the LCD surface to prevent any scratch on its surface
   避免手指和其他物品接触液晶屏表面

Warranty

This product has been manufactured to our company's specifications as a part for use in your company's general electronic products. It is guaranteed to perform according to delivery specifications. For any other use apart from general electronic equipment, we cannot take responsibility if the product is used in medical devices, nuclear power control equipment, aerospace equipment, fire and security systems, or any other applications in which there is a direct risk to human life and where extremely high levels of reliability are required. If the product is to be used in any of the above applications, we will need to enter into a separate product liability agreement.

- We cannot accept responsibility for any defect, which may arise form additional manufacturing of the product (including disassembly and reassembly), after product delivery.
- We cannot accept responsibility for any defect, which may arise after the application of strong external force to the product.
- We cannot accept responsibility for any defect, which may arise due to the application of static electricity after the product has passed our company's acceptance inspection procedures.
- When the product is in CCFL models, CCFL service life and brightness will vary according to the performance of the inverter used, leaks, etc. We cannot accept responsibility for product performance, reliability, or defect, which may arise.
- We cannot accept responsibility for intellectual property of a third part, which may arise through the application of our product to our assembly with exception to those issues relating directly to the structure or method of manufacturing of our product.



Terminal	
No	Pin Name
1	VLED+
2	VLED+
3	VLED-
4	VLED-
5	GND
6	NC
7	VCC
8	MODE
9	DE
10	VS
11	HS
12	B7
:	:
19	B0
20	G7
:	:
27	G0
28	R7
:	:
35	R0
36	GND
37	DCLK
38	GND
39	L/R
40	U/D
41	VGH
42	VGL
43	AVDD
44	RESET
45	NC(SCL)
46	NC
47	NC
48	GND
49	NC(SDI)
50	NC(CSB)

Note:
*1. LCD Display Type : TFT,Transmissive(Full View)
*2. Pixel Arrangment : RGB-STRIPE
*3. Interface : RGB_24bit
*4. Color Depth : 16.7M color
*5. Operating Voltage : 3.3V
*6. Backlight Supply : 160mA (Constant Current VF=9.3V typ.)
*7. Backlight : White LED
*8. Operating Temperature : -20°C~70°C
*9. Storage Temperature : -30°C~80°C
*10. Unmarked Tolerace : ≤150,±0.3; >150,±0.5

C		
B		
A		
Rev	Note	Date

Dwg Title: LMT070DNCFWD-30 Outline Dwg			
Dwg No.: MK-009192-1-1			Date: 2026-08-27
Scale: 1/1	Tol.	Unit: mm / Paper Size: A3	
Approved	Checked	Drawn: LuoLin	

TOPWAY