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

LMT101ENMFWD-10

LCD Module User Manual

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Table of Content

1. General Specification 3
2. Block Diagram 3
3. Terminal Function 4
3.1 K1 TFT Input Terminal(089H50-000100-G2-R or equivalent) 4
3.2 K2 Backlight Terminal (SM02B-BHSS-1-TB or equivalent) 5
4. Absolute Maximum Ratings 5
5. Electrical Characteristics 6
5.1 DC Characteristics for Panel Driving 6
5.2 DC Characteristics for Backlight Driving 6
5.3 Recommended Power ON/OFF Sequence 7
6. Timing Characteristics 8
6.1 24-bit Parallel RGB Data Input Format 8
6.2 Data input timing table 8
6.3 TTL AC Characteristics 9
7. Optical Characteristics 10
8. LCD Module Design and Handling Precautions 12

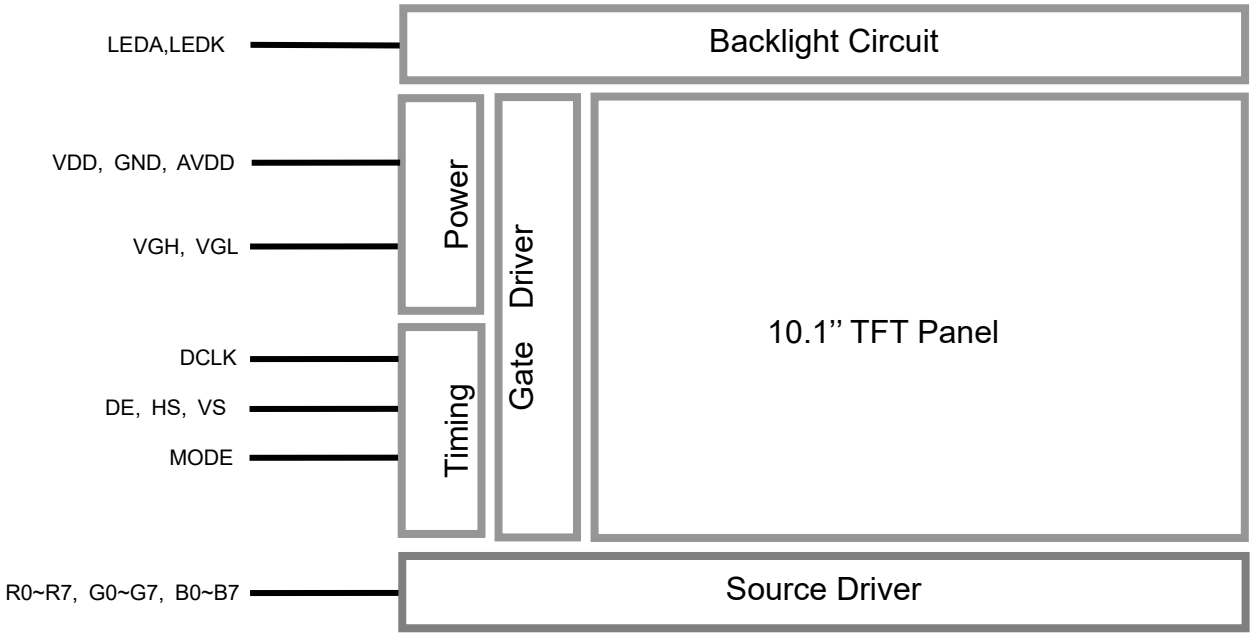
1. General Specification

Screen Size(Diagonal) :	10.1”
Active Area :	222.72x 125.28(mm)
Number of dots :	1024(RGB) x600
Pixel Pitch：	0.2175x0.2088(mm)
Color Depth:	16.7M
Display Technology :	a-Si
Signal Interface:	RGB 24bit
Display Mode:	Normal Black, Transmissive
Outline Dimension:	235.0x143.0x5.3(mm) (see outline drawing for details)
Pixel Configuration:	R.G.B. Vertical Stripe
Viewing Direction :	Full
Backlight :	White LEDs
Operating Temperature :	-20 ~ +70°C
Storage Temperature :	-30 ~ +80°C

Note:

*1. Color tone may slightly change by temperature and driving condition.

2. Block Diagram



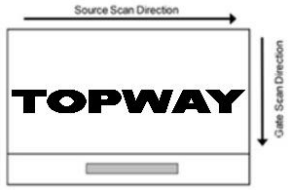
3. Terminal Function

3.1 K1 TFT Input Terminal(089H50-000100-G2-R or equivalent)

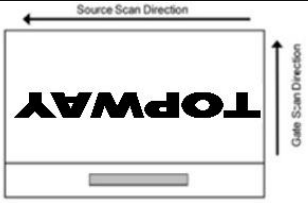
Pin No.	Pin Name	I/O	Descriptions	Comment
1	NC	-	No connection	
2	NC	-		
3	NC	-		
4	NC	-		
5	GND	P	Power GND (0V)	
6	NC	-	No connection	
7	VDD	P	Digital Power	
8	MODE	I	DE/SYNC mode select MODE=H: DE mode MODE=L : SYNC mode	Note 1
9	DE	I	Data input enable	
10	VS	I	Vertical Sync Input	
11	HS	I	Horizontal Sync Input	
12	B7	I	8bit Data for Blue	
:	:	I		
19	B0	I		
20	G7	I	8bit Data for Green	
:	:	I		
27	G0	I		
28	R7	I	8bit Data for Red	
:	:			
35	R0			
36	GND	P	Power GND (0V)	
37	DCLK	I	Latch data at falling edge	
38	GND	P	Power GND (0V)	
39	SHLR	I	Left or right display control	Note 2
40	UPDN	I	UP/down display control	Note 2
41	VGH	P	Positive power for TFT	
42	VGL	P	Negative power for TFT	
43	AVDD	P	Analog power	
44	RESET	I	Global reset pin	
45	NC	-	No connection	
46	NC	-		
47	NC	-		
48	GND	P	Power GND (0V)	
49	NC	-	No connection	
50	NC	-		

Note1: I/O definition: I---Input, O---Output, P---Power/Ground, N---No connection

Note2: Scan direction is shown as below (PCB at down side):



L/R=1,U/D=0



L/R=0,U/D=1

3.2 K2 Backlight Terminal (SM02B-BHSS-1-TB or equivalent)

NO	Symbol	I/O	Description	Comment
1	LEDK	P	LED driving cathode (low voltage)	Black
2	LEDA	P	LED driving anode (high voltage)	Red

Note1: I/O definition: I---Input, O---Output, P---Power/Ground, N---No connection

4. Absolute Maximum Ratings

Items	Symbol	Min.	Max.	Unit	Condition
Power Voltage	VDD	-0.3	3.96	V	
Input voltage	V_{IN}	-0.3	3.96	V	Note1
LED power supply Voltage	BLK	/	/	V	
Operating Temperature	Top	-20	70	℃	Note2、Note3
Storage Temperature	Tst	-30	80	℃	
Relative Humidity Note1	RH	-	≤95	%	Ta≤40℃
		-	≤85	%	40℃＜Ta≤50℃
		-	≤55	%	50℃＜Ta≤60℃
		-	≤36	%	60℃＜Ta≤70℃
Absolute Humidity	AH	-	≤70	g/m³	Ta＞70℃

Note1: Input voltage include REVERSE
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.
When exceeded the maximum ratings, the characteristics of the module may not be recovered, or in an extreme condition, the module may be permanently destroyed.

5. Electrical Characteristics

5.1 DC Characteristics for Panel Driving

VCC=3.3V, GND=0V,Top=25°C

Items		Symbol	MIN.	TYP.	MAX.	Unit	Remark
Supply Voltage		VDD	3.0	3.3	3.6	V	
Input Signal Voltage	Low Level	VIL	GND	-	0.2xVDD	V	
	High Level	VIH	0.8xVDD	-	VDD	V	
Power supply		VDD	3.0	3.3	3.6	V	
		IVDD	-	TBD	TBD	mA	White pattern
		AVDD	10.6	10.8	11.0	V	
		IAVDD	-	TBD	TBD	mA	
		VGH	19.5	20.0	20.5	V	
		IVGH	-	TBD	TBD	mA	
		VGL	-9.5	-9.0	-8.5	V	
		IVGL	-	TBD	TBD	mA	

Note: Input Signal Voltage include MODE,SHLR,UPDN,RESET.

5.2 DC Characteristics for Backlight Driving

Top=25°C

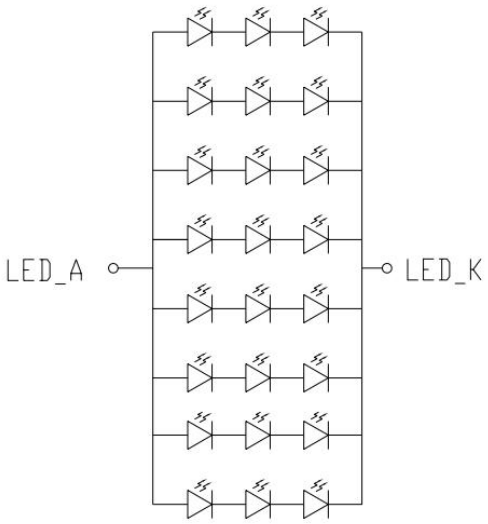
Items	Symbol	MIN.	TYP.	MAX.	Unit	Remark
Forward Current	IF	-	224	-	mA	24 LEDs (3 LED Parallel,8 LED Serial)
Forward Current Voltage	VF	8.7	9.6	10.2	V	
Backlight Power Consumption	WBL	-	2150.4	-	mW	
LED life time	-	-	50000	-	Hrs	

Note1: I_F is defined for total current

Note2: Optical performance should be evaluated at Ta=25℃ only.

Note3: If LED is driven by high current, high ambient temperature & humidity condition,The life time of LED will be reduced.

Note4: Operating life means brightness goes down to 50% of initial brightness. Typical operating life time is estimated data.



5.3 Recommended Power ON/OFF Sequence

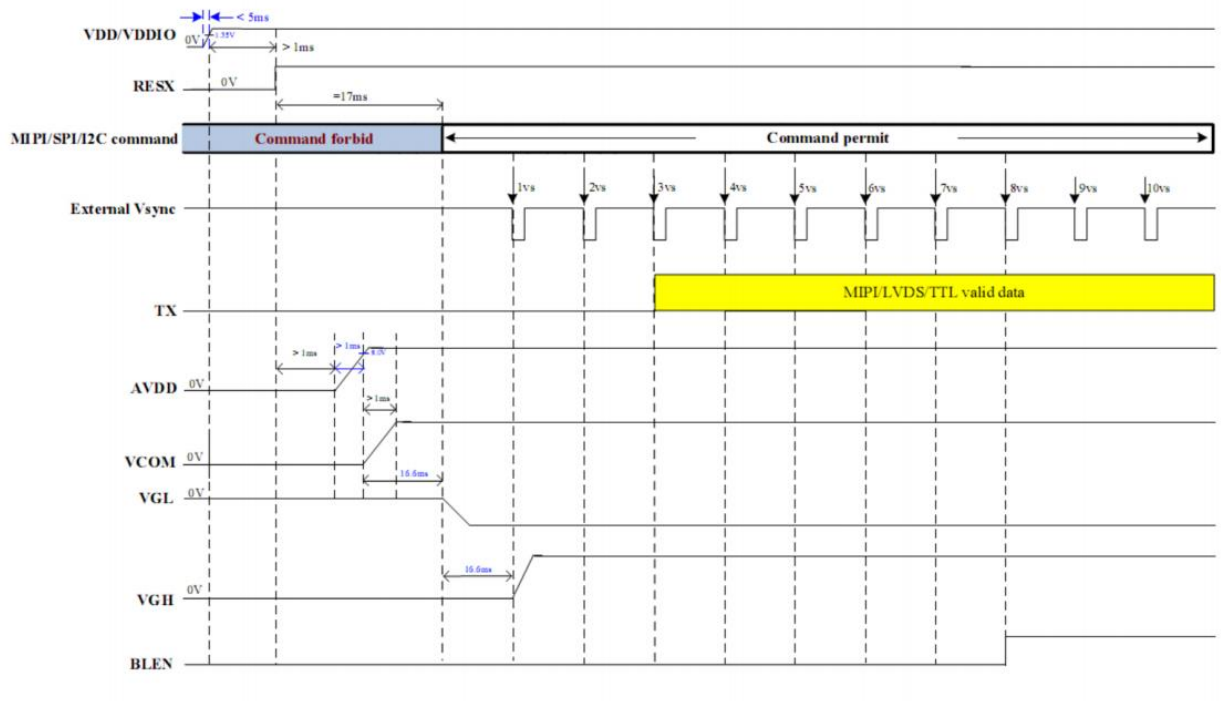


Figure 5.3.1 Power ON Sequence

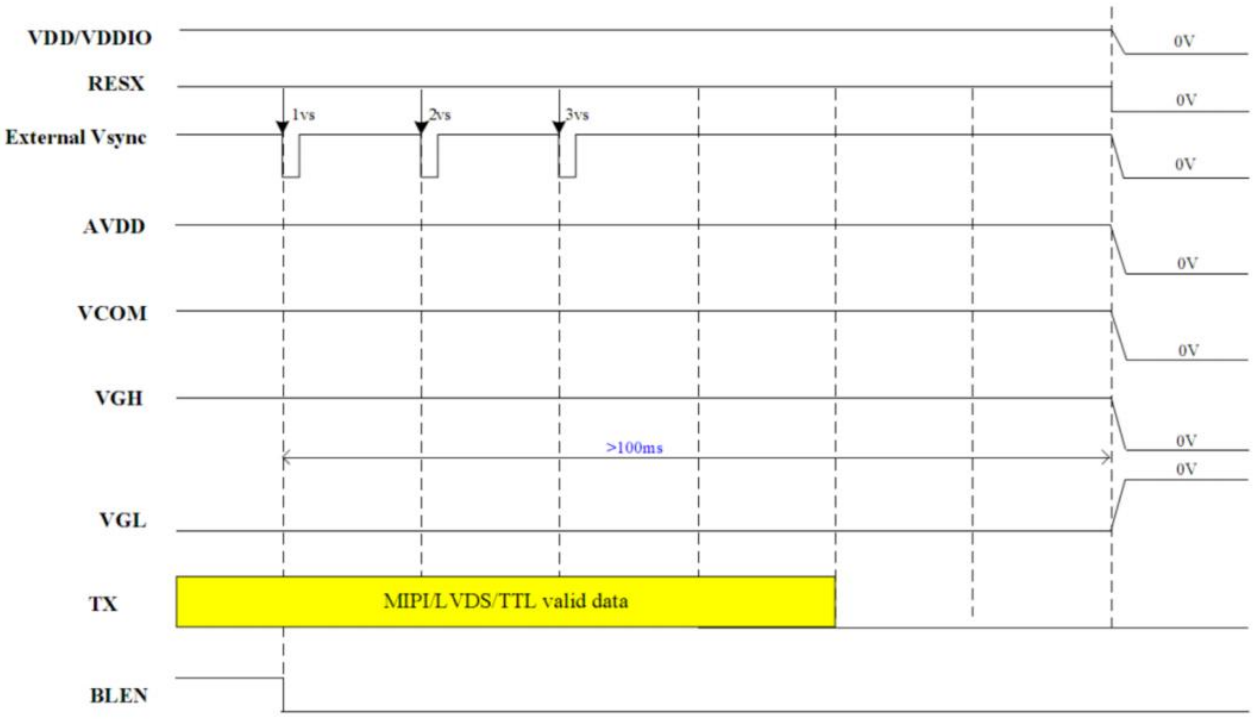


Figure 5.3.2 Power OFF Sequence

Note1: The low level of these signals and analog powers are GND level.
Note2: All of the power and signals should be kept at GND level before power on. If there are residual voltages on them, the LCD might not work properly.
Note3: Keep backlight turned off until the display has stabilized.

6. Timing Characteristics

6.1 24-bit Parallel RGB Data Input Format

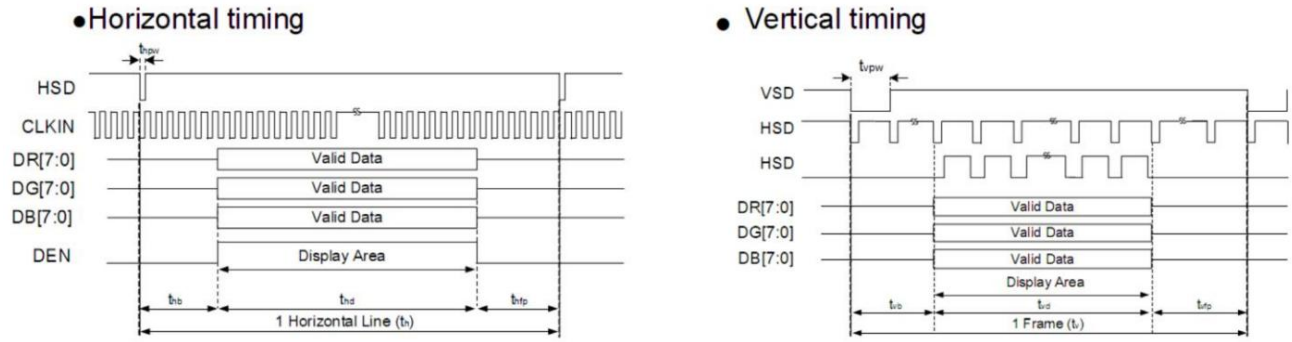


Figure 6.1.1 24-bit parallel RGB mode input timing

6.2 Data input timing table

VCC=3.3V, GND=0V, Ta=25℃

Parameter		Symbol	Min	Typ	Max	Unit	Remark
CLK frequency		Fclk	TBD	51.2	TBD	MHz	Tclk=1/Fclk
Horizontal section	Horizontal Total	tht	TBD	1344	TBD	Tclk	
	Horizontal Front Porch	thfp	TBD	160	TBD	Tclk	
	Horizontal Back Porch	thb	TBD	160	TBD		
	Hsync Pulse Width	ths	TBD	24	TBD		
	Valid Data Width	thd		1024		Tclk	
Vertical section	Vertical Total	tvt	TBD	635	TBD	TH	
	Vertical Front Porch	tvfp	TBD	12	TBD	TH	
	Vertical Back Porch	tvb	TBD	23	TBD		
	Vsync Pulse Width	tvs	TBD	2	TBD		
	Valid Data Width	tvd		600		TH	
	Frame rate			60		Hz	

6.3 TTL AC Characteristics

Parameter	Symbol	Spec.			Unit
		MIN.	TYP.	MAX.	
CLKIN period	T_{cph}	14	-	-	ns
CLKIN duty ratio	Tcw	40	50	60	%
Data setup time	Tdsu	5	-	-	ns
Data hold time	Tdhd	5	-	-	ns
VSD setup time	T_{ss}	5	-	-	ns
VSD hold time	T_{sh}	5	-	-	ns
HSD setup time	T_{ss}	5	-	-	ns
HSD hold time	T_{sh}	5	-	-	ns
DEN setup time	T_{ss}	5	-	-	ns
DEN hold time	T_{sh}	5	-	-	ns

Table 6.3.1 TTL mode AC electrical characteristics

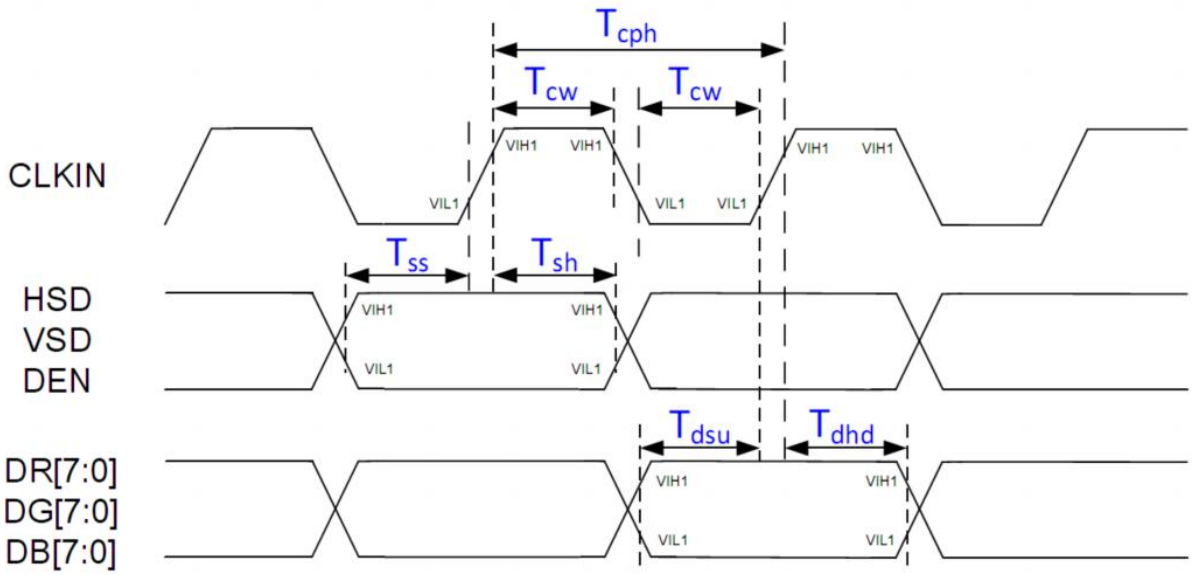


Figure 6.3.2 Input signal timing

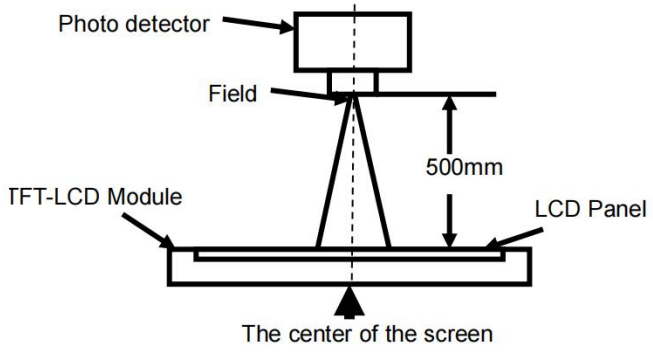
7. Optical Characteristics

Item		Symbol	Condition	MIN	TYP	MAX	Unit	Remark
Viewing angle		θ_T	CR≥10	80	89	-	degree	Note2,3
		θ_B		80	89	-		
		θ_L		80	89	-		
		θ_R		80	89	-		
Contrast Ratio		CR	θ=0°	800	1000	-		Note3
Response Time		T_{ON}	25℃	-	30	40	ms	Note4
		T_{OFF}						
Chromaticlty	White	x	Backlight is on	0.269	0.319	0.369	-	Note1,5
		y		0.287	0.337	0.387		
	Red	x		0.561	0.611	0.661	-	
		y		0.313	0.363	0.413		
	Green	x		0.282	0.332	0.382	-	
		y		0.506	0.556	0.606		
	Blue	x		0.104	0.154	0.204	-	
		y		0.040	0.090	0.140		
Uniformity		U		75		-	%	Note6
NTSC		-		45	50	-	%	Note5
Luminance		L		280	350	-	cd/m²	Note7

Test Conditions:

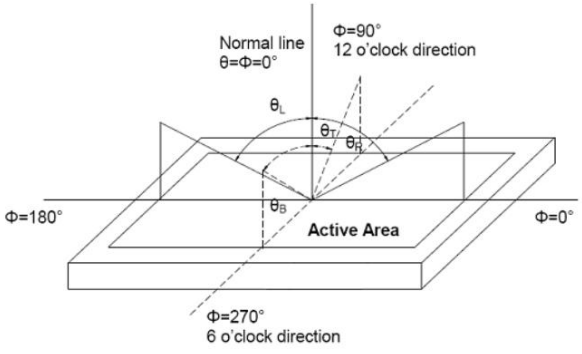
1. IF= XXmA, and the ambient temperature is 25℃..
2. The test systems refer to Note 1 and Note 2.

Note1: 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.



Measurement Set Up

Note2: Definition of viewing angle range and measurement system. Viewing angle is measured at the center point of the LCD 。



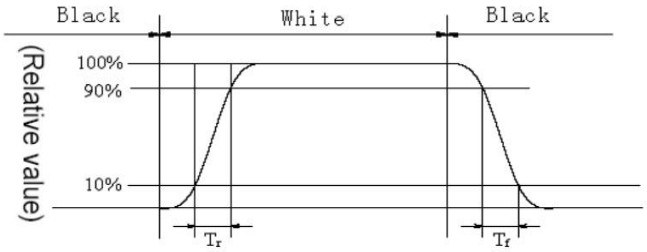
Measurement viewing angle

Note3: Definition of contrast ratio

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

Note4: Definition of Response time

For SFT LCM, the response time is defined as the LCD optical switching time interval between "White" state and "Black" state. Rise time (Tr) is the time between photo detector output intensity changed from 10% to 90%. And fall time (Tf) is the time between photo detector output intensity changed from 90% to 10%.



Response Time Testing(SFT)

Note5: Definition of color chromaticity (CIE1931)

Color coordinates measured at center point of LCD.

Note6: Definition of Luminance Uniformity

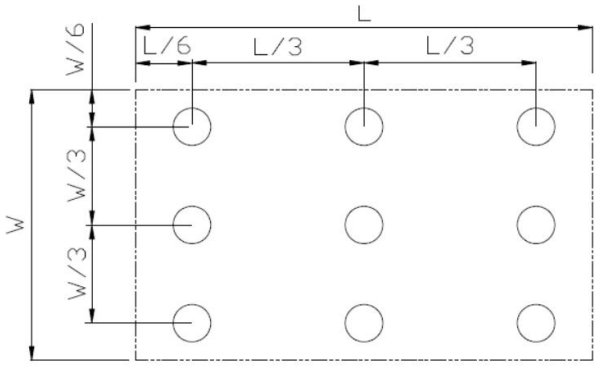
Active area is divided into 9 measuring areas (Refer Fig.5). Every measuring point is placed at the center of each measuring area.

Luminance Uniformity (U) = Lmin/ Lmax

Lmax: The measured Maximum luminance of all measurement position.

Lmin: The measured Minimum luminance of all measurement position.

L-------Active area length; W----- Active area width



Luminance Uniformity Measurement Locations(9 points)

Note7: Definition of Luminance:

Measure 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. （No Hot-plugging）
- WARNING! Be aware of (if any) frame grounding of the LCD Module connection with the system which may cause safety issue(e.g. electric shock,etc).
- Keep signal line as short as possible to reduce external 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℃~40℃ <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

8. 液晶显示模块设计和使用须知

- 请注意 VO, 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。（禁止热插拔）
- 警告！使用前需评估液晶显示模块的金属框架/壳体地(如有)与整机关系和安全性(如：漏电安全性，等)。
- 请尽可能缩短信号线的连接，以避免对液晶显示模块的信号干扰。
- 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℃~40℃ <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。

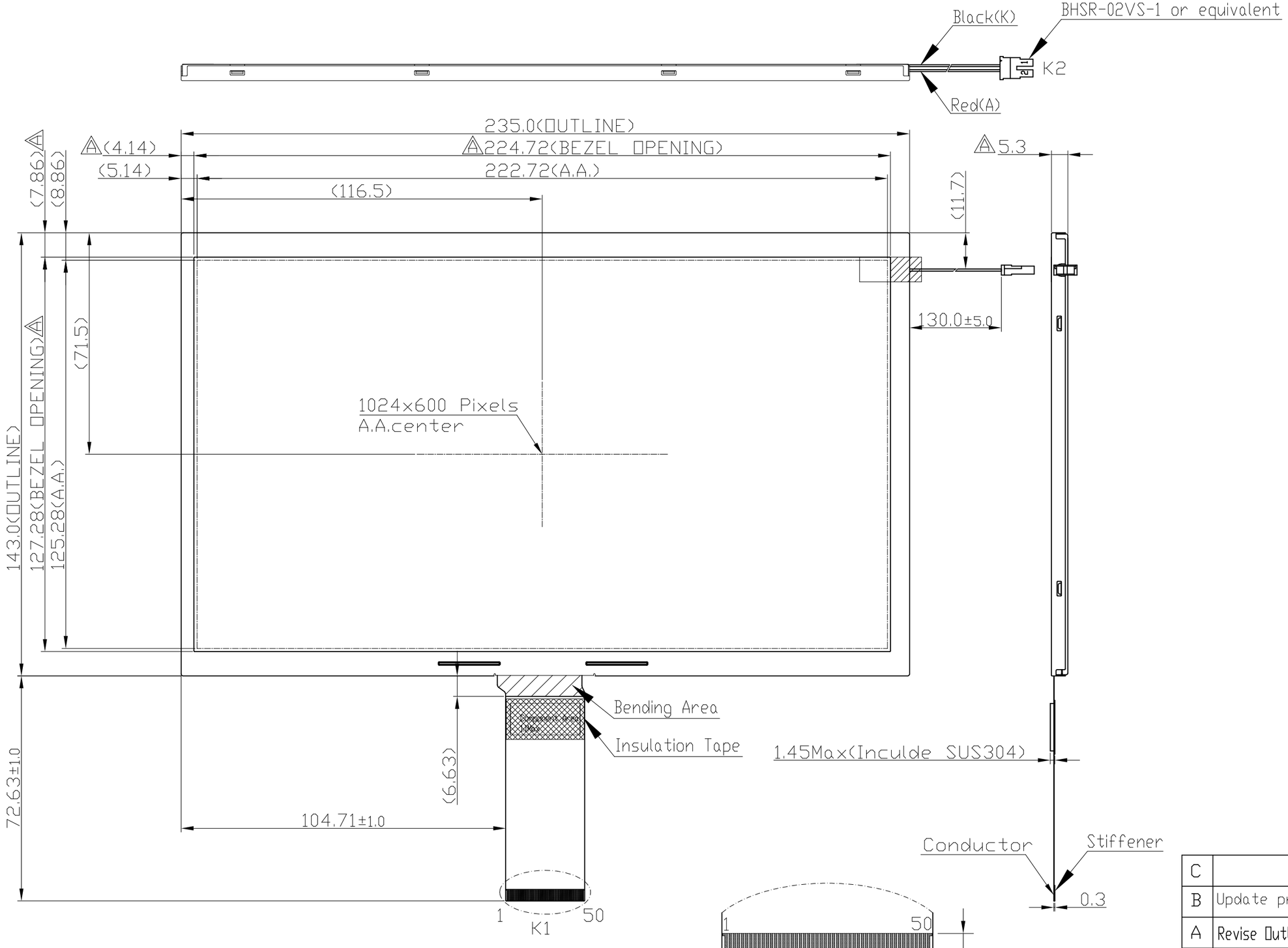
the display color change abnormally.
- LCD panel is made with glass. Any mechanical shock (e.g. dropping from high place) will damage the LCD module.
- Protective film is attached on LCD screen. Be careful when peeling off this protective film, since static electricity may be generated.
- Polarizer on LCD gets scratched easily. If possible, do not remove LCD protective film until the last step of installation.
- When peeling off protective film from LCD, static charge may cause abnormal display pattern. The symptom is normal, and it will turn back to normal in a short while.
- LCD panel has sharp edges, please handle with care.
- Never attempt to disassemble or rework LCD module.
- If display panel is damaged and liquid crystal substance leaks out, be sure not to get any in your mouth, if the substance comes into contact with your skin or clothes promptly wash it off using soap and water.

- 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。
- 液晶屏表面带有保护膜，揭除保护膜时需要注意可能产生的静电。
- 因液晶显示屏表面的偏光片极易划伤，安装完成之前请尽量不要揭下保护膜。
- 请缓慢揭除保护膜，在此过程中液晶显示屏上可能会产生静电线，此为正常情况，可在短时间内消失。
- 请注意避免被液晶显示屏的边缘割伤。
- 请不要试图拆卸或改造液晶显示模块。
- 当液晶显示屏出现破裂，内部液晶液体可能流出；相关液体不可吞吃，绝对不可接触嘴巴，如接触到皮肤或衣服，请使用肥皂与清水彻底清洗.

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.



K1 Terminal	
No	Pin Name
1~4	NC
5	GND
6	NC
7	VDD
8	MODE
9	DE
10	VS
11	HS
12~19	B7~B0
20~27	G7~G0
28~35	R7~R0
36	GND
37	DCLK
38	GND
39	SHLR
40	UPDN
41	VGH
42	VGL
43	AVDD
44	RESET
45	NC
46	NC
A 47	NC
48	GND
49	NC
50	NC

Note:
*1. Display Type: TFT (Full View)
*2. Pixel Arrangment: RGB STRIPE
*3. Color Depth : 16.7M colors
*4. Operating Voltage : 3.3V
*5. Backlight : White LED
*6. Backlight Supply: If=224mA (Vf=9.6V (Typ))
*6. Interface : 24bit_RGB
*7. Operating Temperature : -20°C~70°C
*8. Storage Temperature : -30°C~80°C

Rev	Note	Date
C		
B	Update product descriptions	Zhangwenbo 2026-09-02
A	Revise Outline & Typing Correction	Zhangwenbo 2026-05-15

Dwg Title: LMT101ENMFWD-10 Outline Dwg (B)
Dwg No.: MK-009028b-1-1
Date: 2025-12-19
Scale: 4/1 | Tol.: ±0.5 | Unit: mm | Paper Size: A3
Approved | Checked | Drawn: Zhangwenbo

TOPWAY