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

LMT101ENMFWD-ACD

LCD Module User Manual

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LINLI		
Date: 2019-06-25	Date:	Date:

Rev.	Descriptions	Release Date
0.1	Preliminary release	2019-06-25

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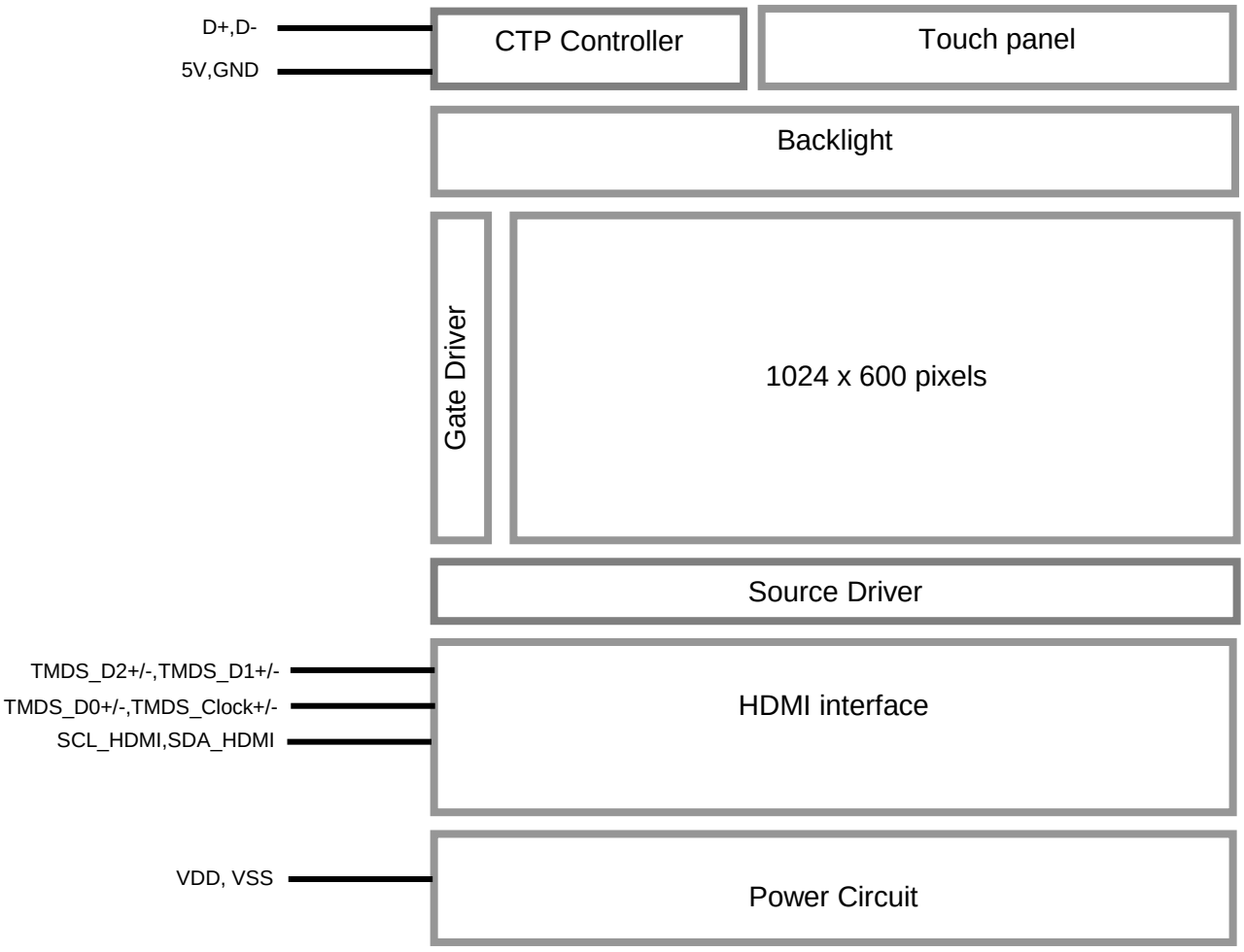
1. General Specification

Signal Interface :	HDMI
Display Mode :	Transmissive / Normal White
Color Depth:	16.7M
Screen Size(Diagonal) :	10.1”
Outline Dimension :	251.0 x 145.0x 20.1 (mm) (see attached drawing for details)
Active Area :	222.72 x 125.28 (mm)
Number of dots :	1024 x 600
Pixel Pitch :	0.2175 x 0.2088 (mm)
Pixel Configuration :	RGB Stripe
Backlight :	LED
Surface Treatment :	AG,HC(3H)
Viewing Direction :	6 o’clock(*1)(gray-scale inverse) 12 o’clock(*2)
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. Color tone may slightly change by Temperature and Driving Condition.

2. Block Diagram



3. Terminal Function

3.1 K1 Power Terminal

Pin No.	Pin Name	IO	Descriptions
1	VDD	Power	Positive Power Supply(11~26)
2	VDD	Power	Positive Power Supply(11~26)
3	NC	-	No connection
4	NC	-	No connection
5	VSS	Power	Power Supply GND (0V)
6	VSS	Power	Power Supply GND (0V)

3.2 K2 HDMI Terminal

Pin No.	Pin Name	IO	Descriptions
1	TMDS_D2+	Input	HDMI receiver positive signal channel 2
2	TMDS_D2 Shield	Power	Signal Ground
3	TMDS_D2-	Input	HDMI receiver negative signal channel 2
4	TMDS_D1+	Input	HDMI receiver positive signal channel 1
5	TMDS_D1 Shield	Power	Signal Ground
6	TMDS_D1-	Input	HDMI receiver negative signal channel 1
7	TMDS_D0+	Input	HDMI receiver positive signal channel 0
8	TMDS_D0 Shield	Power	Signal Ground
9	TMDS_D0-	Input	HDMI receiver negative signal channel 0
10	TMDS_Clock+	Input	HDMI receiver positive signal clock
11	TMDS_Clock Shield	Power	Signal Ground
12	TMDS_Clock-	Input	HDMI receiver negative signal clock
13	NC	I-	No connection
14	NC	-	No connection
15	SCL_HDMI	Input	Serial data clock
16	SDA_HDMI	Output	Serial data out
17	GND	Power	Ground
18	+5V_Power	Power	Power supply for DDC memory
19	Hot_Plug_Detect	Output	Hot Plug Detect signal

Note:HDMI terminal should be well connect before power on (hot-plug is not allowed)

3.3 K3 Capacitive Touch Panel Terminal

Pin No.	Pin Name	IO	Descriptions
1	GND	Power	Power Supply GND (0V)
2	5.0V	Power	Positive Power Supply
3	GND	Power	Power Supply GND (0V)
4	D+	I/O	USB D+ signal
5	D-	I/O	USB D- signal
6~10	NC	-	No connection

4. Absolute Maximum Ratings

Items	Symbol	Min.	Max.	Unit	Condition
Power Supply voltage	VDD	6	26	V	
Operating Temperature	T_{OP}	-20	70	℃	No Condensation
Storage Temperature	T_{ST}	-30	80	℃	No Condensation
Operating and Storage Humidity	HSTG	10%	90%	%(RH)	

Note:
*1. This rating applies to all parts of the module. And should not be exceeded.
*2. The operating temperature only guarantees operation of the circuit. The contrast, response speed, and the other specification related to electro-optical display quality is determined at the room temperature, T_{OP}=25℃
*3. Ambient temperature when the backlight is lit (reference value)
*4. Any Stresses exceeding the Absolute Maximum Ratings may cause substantial damage to the device. Functional operation of this device at other conditions beyond those listed in the specification is not implied and prolonged exposure to extreme conditions may affect device reliability.

5. Electrical Characteristics

5.1 Driving TFT LCD Panel

Top=25℃, GND=0V

Items	Symbol	MIN.	TYP.	MAX.	Unit	Note
Supply Voltage	VDD	11	12	26	V	
VDD Power Consumption	I_{VDD-IN}	-	TBD	-	mA	*1

Note.
*1. Normal display condition

5.2 Touch Panel Characteristic

Items	Symbol	MIN.	TYP.	MAX.	Unit	Note
Supply Voltage	5.0V	4.5	5.0	5.5	V	
VDD Power Consumption	I_{5V}	-	TBD	-	mA	*1

6. Optical Characteristics

Item	Symbol	Condition	MIN.	TYP.	MAX.	UNIT	Note.
Viewing angle (CR≥10)	θ_L	9 o'clock	-	75	-	degree	*2
	θ_R	3 o'clock	-	75	-		
	θ_T	12 o'clock	-	60	-		
	θ_B	6 o'clock	-	60	-		
Response Time	T_f	Normal θ=0°	-	7	10	msec	*3
	T_r		-	9	18	msec	
Contrast ratio	CR		400	500	-	-	*1
Color chromaticlty	W_X		0.263	0.313	0.363	-	
	W_Y		0.279	0.329	0.319	-	
Luminance	L		-	300	-	cd/m^2	*4
Luminance uniformity	Y_U		70	80	-	%	*4

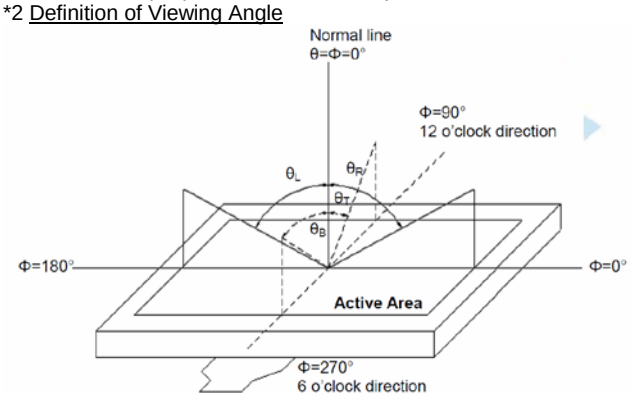
Note:

*1. Definition of Contrast Ratio

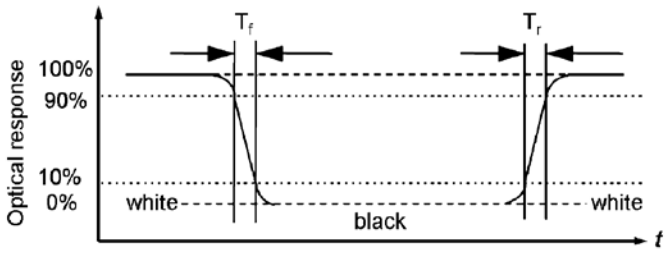
The contrast ratio could be calculate by the following expression:

Contrast Ratio (CR) = Luminanc with all pixels white / Luminance with all pixels black

*2 Definition of Viewing Angle



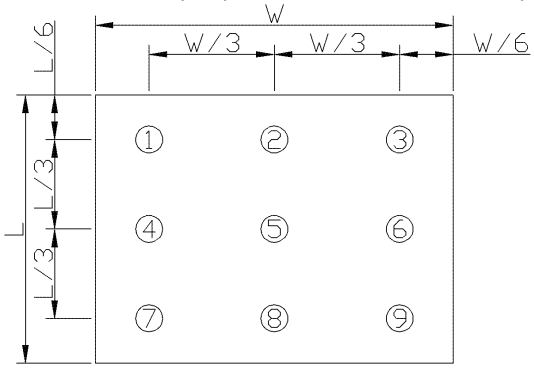
*3 Definition of response time



*4 Definition of Luminance Uniformity

Luminance uniformity (Lu)=

Min. Luminance form pt1~pt9 / Max Luminance form Pt1~pt9



7. CTP Application Precautions

1. CTP Mounting Precaution

1.1 Bezel Mounting (Figure 1)

- The bezel window should be bigger than the CTP active area. It should be≥0.5mm each side.
- Gasket should be installed between the bezel and the CTP surface. The final gap should be about 0.5~1.0mm.
- It is recommended to provide an additional support bracket for backside support when necessary (e.g. slim type TFT module without mounding structure). They should only provide appropriate support and keep the module in place.
- The mounting structure should be strong enough to prevent external uneven force or twist act onto the module.

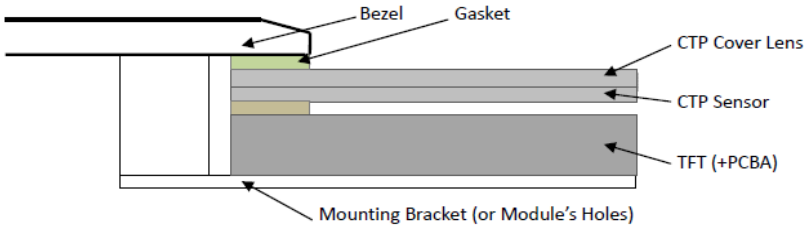


Figure 1

1.2 Surface Mounting (Figure 2)

- As the CTP assembling on the countersink area with double side adhesive. The countersink area should be flat and clean to ensure the double side adhesive installation result.
- The Bezel is recommend to keep a gap (≥0.3mm each side) around the cover lens for tolerance.
- It is recommended to provide an additional support bracket with gasket for backside support when necessary (e.g. TFT module without mounding structure). They should only provide appropriate support and keep the module in place.
- The mounting structure should be strong enough to prevent external uneven force or twist act onto the module.

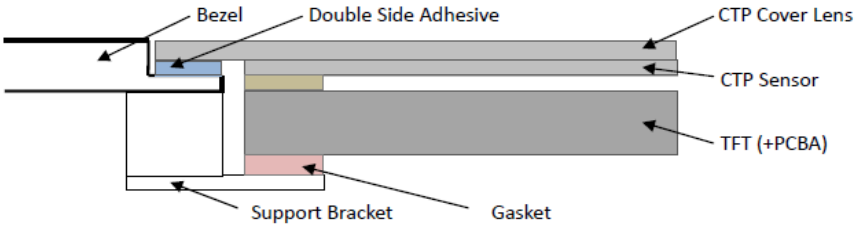


Figure 2

1.3 Additional Cover Lens Mounting (Figure 3)

- For the case of additional cover Lens mounting, it is necessary to recheck with the CTP specification about the material and thickness to ensure the functionality.
- It should keep a 0.2~0.3mm gap between the cover lens and the CTP surface..
- The cover lens window should be bigger than the active area of the CTP. It should be≥0.5mm each side.
- It is recommended to provide an additional support bracket for backside support when necessary (e.g. slim type TFT module without mounding structure). They should only provide appropriate support and keep the module in place.
- The mounting structure should be strong enough to prevent external uneven force or twist act onto the module.

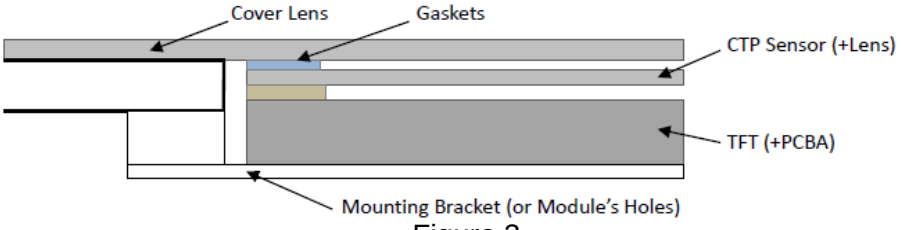


Figure 3

2. Handling Precautions

2.1 The product made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.

2.2 Do not apply excessive or uneven force to the product since this may damage to the performance.

2.3 If the display surface is contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If still not completely clear, moisten cloth with Isopropyl alcohol or Ethyl alcohol solvents. Solvents other than those mentioned above may damage the product. Especially, do not use Water, Ketone, Aromatic solvents.

2.4 Do not attempt to disassemble the CTP Module.

2.5 If the logic circuit power is off, do not apply the input signals.

2.6 To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.

a. Be sure to ground the body when handling the CTP Modules.

b. Tools required for assembly, such as soldering irons, must be properly ground.

c. To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions.

d. The CTP Module is coated with a film to protect the display surface. Be care when peeling off this protective film since static electricity may be generated.

3. Storage and Transportation Precautions

3.1 When storing the CTP modules, avoid exposure to direct sunlight or to the light of fluorescent lamps.

3.2 The CTP modules should be stored the required temperature range. If the CTP modules will be stored for a long time, the recommend condition is the temperature of 0~40 ℃ and relative humidity of ≤80%.

3.3 The LCD modules should be stored in the room without acid, alkali and harmful gas.

3.4 The CTP modules should be no falling and violent shocking during transportation, and also should avoid excessive press, water, damp and sunshine.

8. Precautions of using LCD Modules

Mounting

- Mounting must use holes arranged in four corners or four sides.
- The mounting structure so provide even force on to LCD module. Uneven force (ex. Twisted stress) should not applied to the module. And the case on which a module is mounted should have sufficient strength so that external force is not transmitted directly to the module.
- It is suggested to attach a transparent protective plate to the surface in order to protect the polarizer. It should have sufficient strength in order to the resist external force.
- The housing should adopt radiation structure to satisfy the temperature specification.
- Acetic acid type and chlorine type materials for the cover case are not desirable because the former generates corrosive gas of attacking the polarizer at high temperature and the latter causes circuit break by electro-chemical reaction.
- Do not touch, push or rub the exposed polarizers with glass, tweezers or anything harder than HB pencil lead. Never rub with dust clothes with chemical treatment. Do not touch the surface of polarizer for bare hand or greasy cloth.(Some cosmetics deteriorate the polarizer.)
- When the surface becomes dusty, please wipe gently with absorbent cotton or other soft materials like chamois soaks with petroleum benzine. Normal-hexane is recommended for cleaning the adhesives used to attach front / rear polarizers. Do not use acetone, toluene and alcohol because they cause chemical damage to the polarizer.
- Wipe off saliva or water drops as soon as possible. Their long time contact with polarizer

Operating

- The spike noise causes the mis-operation of circuits. It should be within the ±200mV level (Over and under shoot voltage)
- Response time depends on the temperature.(In lower temperature, it becomes longer.)
- Brightness depends on the temperature. (In lower temperature, it becomes lower.) And in lower temperature, response time(required time that brightness is stable after turned on) becomes longer.
- Be careful for condensation at sudden temperature change. Condensation makes damage to polarizer or electrical contacted parts. And after fading condensation, smear or spot will occur.
- When fixed patterns are displayed for a long time, remnant image is likely to occur.
- Module has high frequency circuits. Sufficient suppression to the electromagnetic interference shall be done by system manufacturers. Grounding and shielding methods may be important to minimized the interference

Electrostatic Discharge Control

Since a module is composed of electronic circuits, it is not strong to electrostatic discharge. Make certain that treatment persons are connected to ground through wrist band etc. And don't touch interface pin directly.

Strong Light Exposure

Strong light exposure causes degradation of polarizer and color filter.

Storage

When storing modules as spares for a long time, the following precautions are necessary.

- Store them in a dark place. Do not expose the module to sunlight or fluorescent light. Keep the temperature between 5°C and 35°C at normal humidity.
- The polarizer surface should not come in contact with any other object. It is recommended that they be stored in the container in which they were shipped.

Protection Film

- When the protection film is peeled off, static electricity is generated between the film and polarizer. This should be peeled off slowly and carefully by people who are electrically grounded and with well ion-blown equipment or in such a condition, etc.
- The protection film is attached to the polarizer with a small amount of glue. If some stress is applied to rub the protection film against the polarizer during the time you peel off the film, the glue is apt tore main on the polarizer. Please carefully peel off the protection film without rubbing it against the polarizer.
- When the module with protection film attached is stored for a long time, sometimes there remains a very small amount of glue still on the polarizer after the protection film is peeled off.
- You can remove the glue easily. When the glue remains on the polarizer surface or its vestige is recognized, please wipe them off with absorbent cotton waste or other soft material like chamois soaked with normal-hexane.

Transportation

The LCD modules should be no falling and violent shocking during transportation, and also should avoid excessive press, water, damp and sunshine.