深圳市拓普微科技开发有限公司
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LMT101DNLFDD-AAC

LCD Module User Manual

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Date: 2018-08-22	Date:	Date:

Rev.	Descriptions	Release Date
0.1	Preliminary release	2018-07-28
0.2	Correct Document Name	2018-08-22

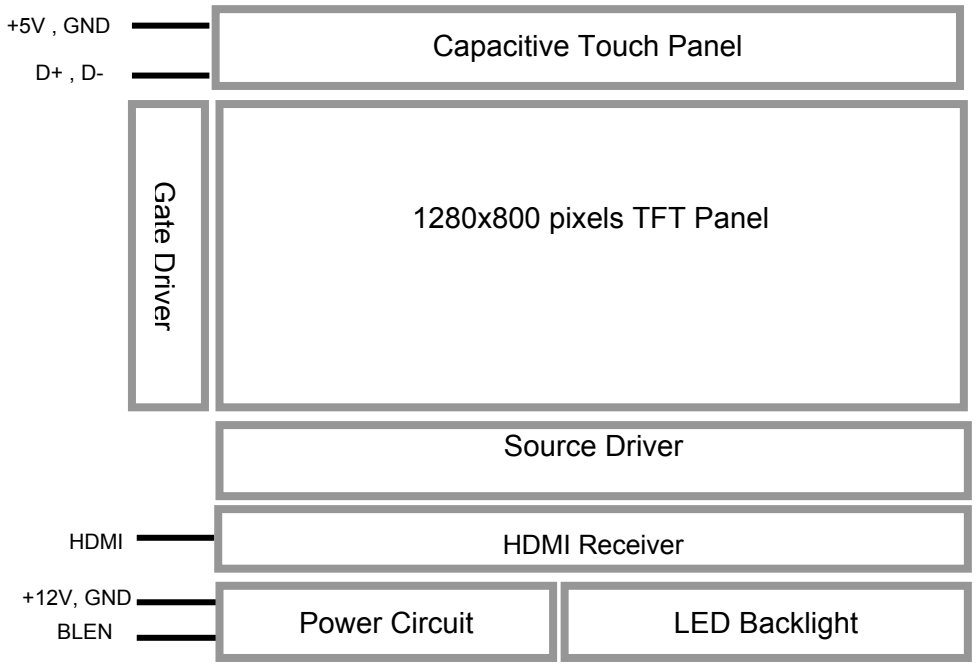
Table of Content

1. General Specification

Signal Interface :	HDMI
Display Technology :	SFT
Display Mode :	Normally Black
Screen Size(Diagonal) :	10.1”
Outline Dimension :	264.9 x 183.5 x 21.5 (mm) (see attached drawing for details)
Active Area :	216.96x135.60 (mm)
Number of dots :	1280x800
Pixel Pitch :	0.178x0.178 (mm)
Pixel Configuration :	R.G.B. Vertical Stripe
Backlight :	LEDs
Viewing Direction :	All direction
Touch Panel:	CTP
Operating Temperature :	0 ~ +50°C
Storage Temperature :	-10 ~ +60°C
Surface Treatment :	HC

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 HDMI Terminal (K1)

Pin No.	Pin Name	I/O	Descriptions
1	TMDS_D2+	Input	HDMI receiver positive signal channel 2
2	TMDS_D2 Shield	Power	Power Supply GND (0V)
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	Power Supply GND (0V)
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	Power Supply GND (0V)
9	TMDS_D0 -	Input	HDMI receiver negative signal channel 0
10	TMDS_Clock+	Input	HDMI receiver positive signal clock
11	TMDS_Clock Shield	Power	Power Supply GND (0V)
12	TMDS_Clock-	Input	HDMI receiver negative signal clock
13	NC	--	No connection
14	NC	--	No connection
15	SCL_HDMI	Input	Serial data clock
16	SDA_HDMI	I/O	Serial data out
17	GND	Power	Power Supply GND (0V)
18	+5_Power	Power	Power supply for DDC memory
19	Hot_Plug_Detect	Output	Hot Plug Detect signal

Note:
*1 Support standard HDMI signal, from PC.
Recommend: 1280x800, 60Hz, 1280x720, 60Hz

3.2 Power Supply Terminal (K2)

Pin No.	Pin Name	I/O	Descriptions
1	BLEN	Input	Backlight driver enable (*1) BLEN=Hi, Backlight Driving Booster enable BLEN=Lo, Backlight Driving Booster disable
2	GND	Power	Power Supply GND (0V)
3	GND		
4	+12V	Power	Positive Power Supply(12V)

Note:
*1. With built in pull up resistor, it could leave open.

3.3 PC USB Terminal (K3)

Pin No.	Pin Name	I/O	Descriptions
1	GND	Power	Power Supply GND (0V)
2	5V	Power	Positive Power Supply(5V)
3	GND	Power	Power Supply GND (0V)
4	D+	I/O	USB Data Positive Signal
5	D-	I/O	USB Data Negative Signal
6	NC	-	NO Connection
7	NC	-	NO Connection
8	NC	-	NO Connection
9	NC	-	NO Connection
10	NC	-	NO Connection

3.4 Mini USB Terminal(K4)

Pin No.	Pin Name	I/O	Descriptions
1	5V	Power	Positive Power Supply(5V)
2	D+	I/O	USB Data Positive Signal
3	D-	I/O	USB Data Negative Signal
4	NC	-	No Connection
5	GND	Power	Power Supply GND (0V)

4. Absolute Maximum Ratings

Items	Symbol	Min.	Max.	Unit	Condition
Power Supply Voltage	V_{+12V}	-0.3	13	V	GND = 0V
Operating Temperature	T_{OP}	0	50	℃	No Condensation
Storage Temperature	T_{ST}	-10	60	℃	No Condensation

Cautions:

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 LCD Panel

GND=0V, V_{+12V} =12V, T_{OP} =25℃

Items	Symbol	MIN.	TYP.	MAX.	Unit	Applicable Pin
Operating Voltage	V_{+12V}	11.0	12.0	13.0	V	+12V
Operating Current	I_{+12V}	-	680	850	mA	+12V

5.2 Driving Touch Panel

GND=0V, V_{5V}=5V, T_{OP} =25℃

Items	Symbol	MIN.	TYP.	MAX.	Unit	Applicable Pin
Operating Voltage	V_{5V}	4.8	5V	5.2	V	5V
Operating Current	I_{5V}	-	103	120	mA	5V

6. Functions

6.1 SW Functions

Pin Name	Normal Mode	Menu Mode
SW1	Auto adjust	Select/Esc(long press)
SW2	Enter menu mode	Menu/Menu Select
SW3	Backlight +	+
SW4	Backlight -	-

6.2 OSD Functions Descriptions

Main Menu		Function	Note
Color		Brightness adjust	Using SW3/SW4 to adjust
		Contrast adjust	Using SW2 to enter menu mode to adjust
		Color temperature select	
OSD		OSD H Position adjust	
		OSD V Position adjust	
		OSD Timeout	
		OSD Transparent	
Function		System reset	
		Display ratio select	
		Sharpness adjust	

7. Optical Characteristics

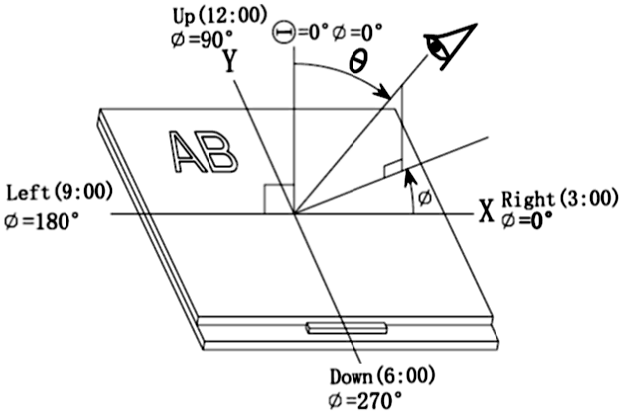
GND=0V, V_{+12} =12V, T_{OP} =25℃

Item		Symbol	Condition	Min	Typ	Max	Unit	Remark
View Angles		θT	CR≧10	75	85	-	Degree	Note2
		θB	CR≧10	75	85	-		
		θL	CR≧10	75	85	-		
		θR	CR≧10	75	85	-		
Contrast Ratio		CR	θ=0°	600	800	-	-	Note1,3
Response Time		$T_{ON+}T_{OFF}$	25℃	-	25	40	ms	Note1,4
Chromaticity	White	x	Backlight is on	0.252	0.302	0.352	-	Note1,5
		y		0.277	0.327	0.377		
	Red	x		0.532	0.582	0.632		
		y		0.274	0.324	0.374		
	Green	x		0.300	0.350	0.400		
		y		0.532	0.582	0.632		
	Blue	x		0.104	0.154	0.204		
		y		0.044	0.094	0.144		
Uniformity		U	-	75	80	-	%	Note1,6
NTSC		-	-	45	50	-	%	Note 5
Luminance		L		-	850	-	cd/m^2	Note1,7

Test Conditions:
1. The ambient temperature is 25±2℃.humidity is 65±7%
2. The test systems refer to Note 1 and Note 2.

Note 1:
The data are measured after LEDs are turned on for 5 minutes. LCM displays full white. The brightness is the average value of 9 measured spots. Measurement equipment SR-3A (1°)
Measuring condition:
- Measuring surroundings: Dark room
- Measuring temperature: Ta=25℃.
- Adjust operating voltage to get optimum contrast at the center of the display.

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

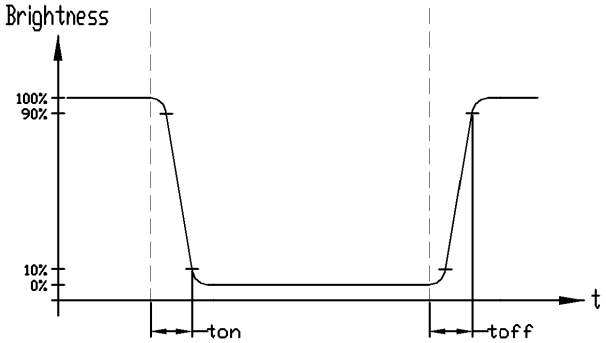


Note 3:
The definition of contrast ratio (Test LCM using SR-3A (1°)):

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

(Contrast Ratio is measured in optimum common electrode voltage)

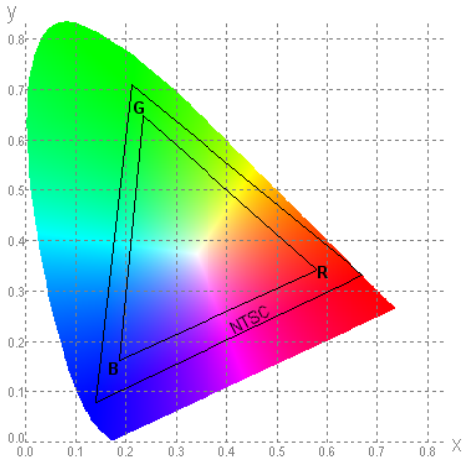
Note 4:
Definition of Response time. (Test LCD using BM-7A(2°)):
The output signals of photo detector are measured when the input signals are changed from “black” to “white” (falling time) and from “white” to “black” (rising time), respectively.
The response time is defined as the time interval between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



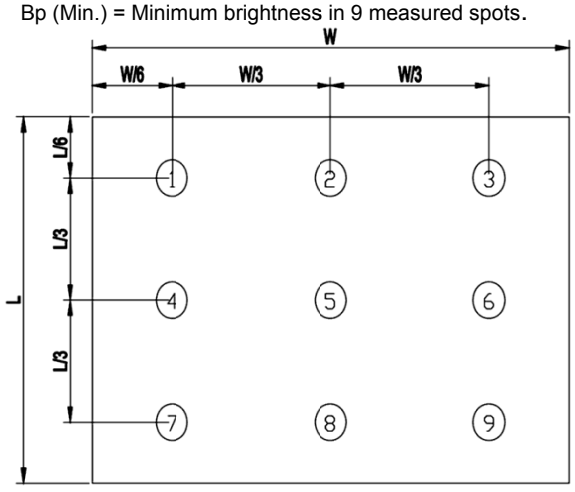
Note 5:
Definition of Color of CIE1931 Coordinate and NTSC Ratio.

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. 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.