

深圳市金逸晨电子有限公司

ShenZhen GoldenMorning Electronic Co.,Ltd

PRODUCT SPECIFICATION

Model No	NT060BH-H12-01
Product Name	0.6TFT LCD Module
Version	V1
Date	2024-07-15

- ☐ Preliminary Specification
- ☒ Final Specification

PREPARED BY	CHECKED BY	APPROVED BY

Revision History

Version	Date	Page	Revise record	Remarks
V1	2024-07-15	-	First issued	ZY

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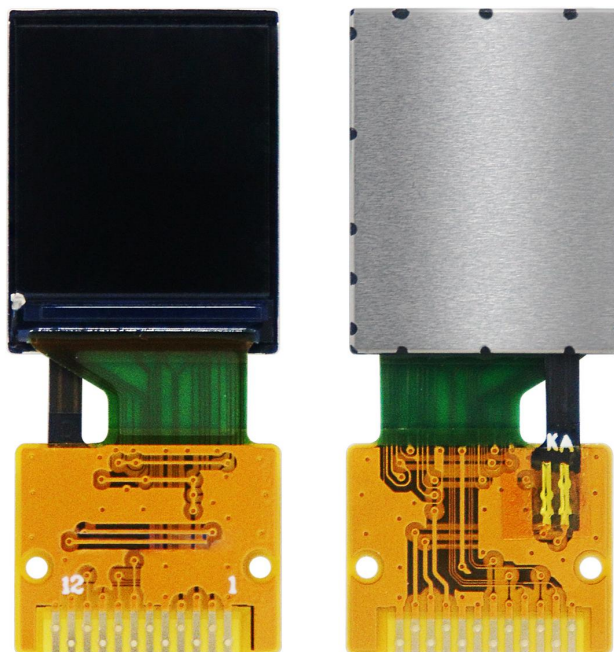
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1. General Parameter

NO.	Features	Details	Unit
1	Display Size(Diagonal)	0.6"	Inch
2	LCD type	IPS TFT	-
3	Display Mode	Transmissive/Normally Black	-
4	Resolution	128 RGB(H) x 150(V)	Pixels
5	Viewing Direction	Free	-
6	Module size	12.16(W) x 15.43(H) x 1.41(T)	mm
7	Active Area	9.29(W) x 10.89(H)	mm
8	Pixel Size	0.0726(W) x 0.0726(H)	mm
9	Color arrangement	RGB Vertical stripe	-
10	Interface	4-line SPI	-
11	Display Colors	262K	-
12	Driver IC	ST7735	-
13	With or Without Touch Panel	Without	-
14	Operating Temperature	-20℃~70℃	℃
15	Storage Temperature	-30℃~80℃	℃
16	Weight	0.53	g

Note 1: Please refer to the mechanical drawing.

2. Physical drawing



			<table> <thead> <tr> <th>NO.</th><th>PIN NAME</th></tr> </thead> <tbody> <tr><td>1</td><td>GND</td></tr> <tr><td>2</td><td>LEDK</td></tr> <tr><td>3</td><td>LEDA</td></tr> <tr><td>4</td><td>VDD</td></tr> <tr><td>5</td><td>GND</td></tr> <tr><td>6</td><td>GND</td></tr> <tr><td>7</td><td>D/CX</td></tr> <tr><td>8</td><td>CSX</td></tr> <tr><td>9</td><td>SCL</td></tr> <tr><td>10</td><td>SDA</td></tr> <tr><td>11</td><td>RESX</td></tr> <tr><td>12</td><td>GND</td></tr> </tbody> </table>	NO.	PIN NAME	1	GND	2	LEDK	3	LEDA	4	VDD	5	GND	6	GND	7	D/CX	8	CSX	9	SCL	10	SDA	11	RESX	12	GND	NOTES: - Display Size (显示尺寸): 0.6" TFT - Viewing Direction (视角方向): ALL - Display Mode (显示模式): Transmissive / Normally Black - Resolution (分辨率): 128*RGB*150 - Color (颜色): 262K - Drive IC (驱动IC): ST7735 - Interface (接口): 4-Wire SPI - Backlight (背光): White IF=20mA, VF=3.0V(TYP) - Luminance (亮度): 350cd/m2(TYP) - Operating temperature (工作温度): -20°C+70°C - Storage temperature (存储温度): -30°C+80°C - RoHS (欧盟标准): YES - Unspecified Tolerance (未定义公差): ±0.1	深圳市金逸晨电子有限公司 ShenZhen GoldenMorning Electronic Co.,Ltd Backlight Circuit Diagram: (背光电路图) LEDA ○ ———— ———— ○ LEDK <table> <tr> <td data-bbox="1232 264 1297 907">LCM NO:</td><td data-bbox="1232 418 1297 907">NT060BH-H12-01</td><td data-bbox="1232 264 1297 418">VERSION</td><td data-bbox="1232 264 1297 418">V1</td></tr> <tr> <td data-bbox="1297 264 1362 907">UNITS:MM</td><td data-bbox="1297 264 1362 907">SCALE: FIT</td><td data-bbox="1297 418 1362 510">DESIGNED BY:</td><td data-bbox="1297 418 1362 510">YYQ</td></tr> <tr> <td data-bbox="1362 264 1409 907">SHEET: 1 OF 1</td><td data-bbox="1362 264 1409 907">UNIT: MM</td><td data-bbox="1362 418 1409 510">CHECKED BY:</td><td data-bbox="1362 418 1409 510">ZY</td></tr> <tr> <td data-bbox="1362 264 1409 907"></td><td data-bbox="1362 264 1409 907"></td><td data-bbox="1362 418 1409 510">DATE</td><td data-bbox="1362 418 1409 510">2024-07-15</td></tr> </table>	LCM NO:	NT060BH-H12-01	VERSION	V1	UNITS:MM	SCALE: FIT	DESIGNED BY:	YYQ	SHEET: 1 OF 1	UNIT: MM	CHECKED BY:	ZY			DATE	2024-07-15	
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4. Absolute Maximum Ratings

Item	Symbol	Min.	Max.	Unit
System Voltage	VDD	-0.3	4.6	V
Operating temperature	Top	-20	70	°C
Storage temperature	Tst	-30	80	°C

Note 1: If Ambient temperature below 50°C, the maximal humidity is 90%RH, if Ambient temperature over 50°C, absolute humidity should be less than 60%RH.

Note 2: The response time will be extremely slow when the operating temperature is around -10°C, and the back ground will become darker at high temperature operating.

Note 3: If one of the above items is exceeded its maximum limitation momentarily, the quality of the product may be degraded. Absolute maximum limitation, therefore, specify the values exceeding which the product may be physically damaged. Be sure to use the product within the recommend range.

5. DC Characteristics

Item	Symbol	Min.	Typ.	Max.	Unit
System Voltage	VDD	2.5	2.75	3.7	V
Input high voltage	V _{IN}	0.7*VDD	-	VDD	V
Input low voltage	V _{IL}	GND	-	0.3*VDD	V
Output high voltage	V _{OH}	0.8*VDD	-	VDD	V
Output low voltage	V _{OL}	GND	-	0.2*VDD	V
Input Current	I _{IN}	-	2	3	mA

6. Backlight Characteristic

Item	Symbol	Min.	Typ.	Max.	Unit	Condition
Forward Voltage	V _F	2.9	3.0	3.1	V	-
Forward Current	I _F	-	20	-	mA	-
Power dissipation	P _d	-	60	-	mW	-
LED Life Time(25 °C)	-	-	10000	-	Hrs	-

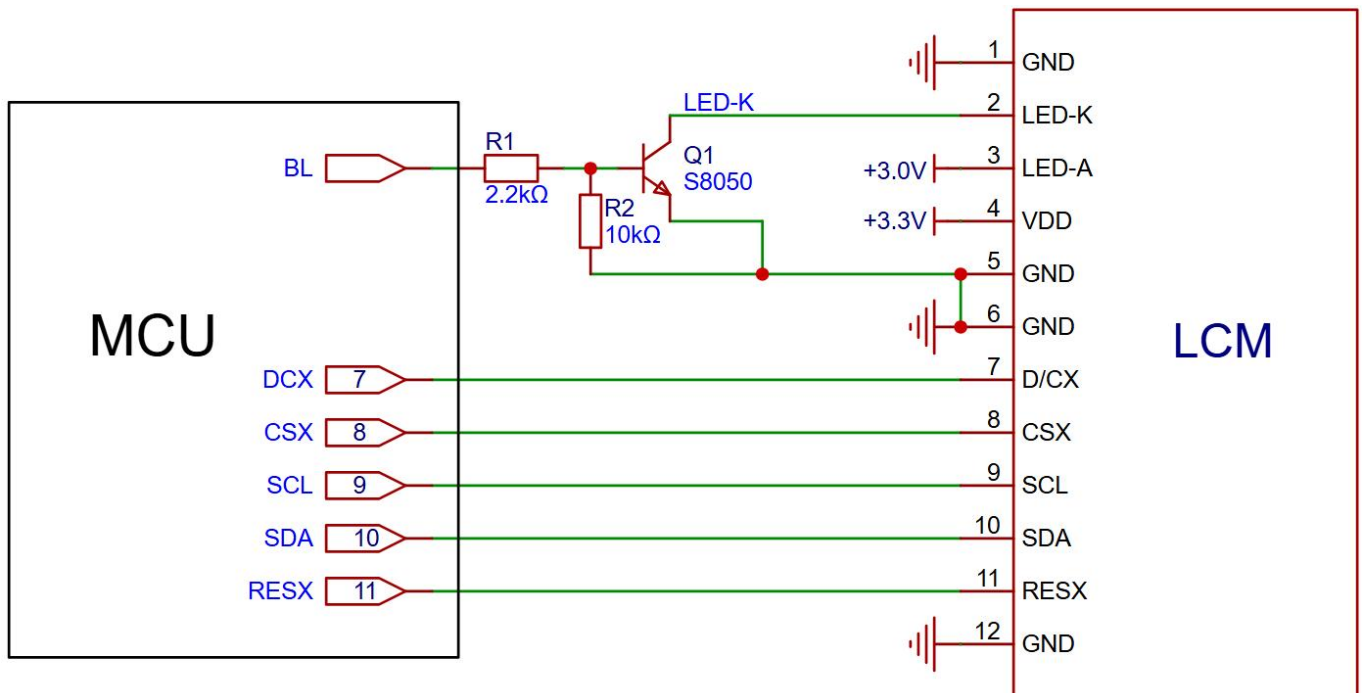
Note: LED life time defined as follows: The final brightness is at 50% of original brightness. Typical operating life time is estimated data.

7. Pins Definitions.

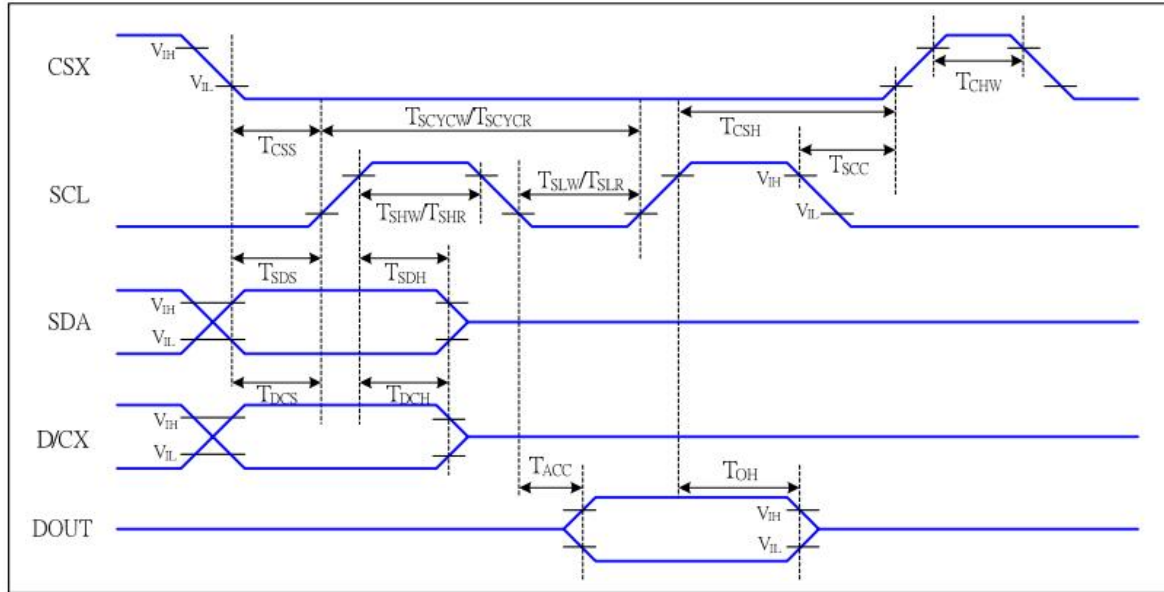
Pin.No	Symbol	Description
1	GND	Ground.
2	LED-K	Backlight cathode
3	LED-A	Backlight anode
4	VDD	Power supply for Analog.
5	GND	Ground.
6	GND	Ground.
7	DCX	Display data/command selection pin
8	CSX	Chip selection pin, Low enable, High disable.
9	SCL	Serial interface clock.
10	SDA	SPI interface input pin.
11	RESX	This signal will reset the device and it must be applied to properly initialize the chip. -Signal is active low
12	GND	Ground

Note: The backlight LED is recommended to be powered independently by constant current drive.

8. Schematic Diagram.



9. Timing Characteristics.



4-Line serial Interface Timing Characteristics

VDD=2.5 to 3.7V, GND=0V, Ta=25°C

Signal	Symbol	Parameter	MIN	MAX	Unit	Description
CSX	T _{CSS}	Chip select setup time (write)	45		ns	
	T _{CSH}	Chip select hold time (write)	45		ns	
	T _{CSS}	Chip select setup time (read)	60		ns	
	T _{SCC}	Chip select hold time (read)	65		ns	
	T _{CHW}	Chip select "H" pulse width	40		ns	
SCL	T _{SCYC}	Serial clock cycle (Write)	20		ns	-write command & data ram
	T _{SHW}	SCL "H" pulse width (Write)	10		ns	
	T _{SLW}	SCL "L" pulse width (Write)	10		ns	
	T _{SCYC}	Serial clock cycle (Read)	150		ns	-read command & data ram
	T _{SHR}	SCL "H" pulse width (Read)	60		ns	
	T _{SLR}	SCL "L" pulse width (Read)	60		ns	
D/CX	T _{DCS}	D/CX setup time	10		ns	
	T _{DCH}	D/CX hold time	10		ns	
SDA (DIN)	T _{SDS}	Data setup time	10		ns	
	T _{SDH}	Data hold time	10		ns	
DOUT	T _{ACC}	Access time	10	50	ns	For maximum CL=30pF For minimum CL=8pF
	T _{OH}	Output disable time	15	50	ns	

4-Line serial Interface Characteristics

Note : The rising time and falling time (Tr, Tf) of input signal are specified at 15 ns or less. Logic high and low levels are specified as 30% and 70% of VDDI for Input signals.

10. Optical Characteristics.

Item	Symbol	Measuring Conditions		Min.	Typ.	Max.	Unit	Remark
Response Time	Tr+Tf	$\theta = 0^\circ$ $\phi = 0^\circ$	25 °C	-	30	35	ms	
Viewing Angle	θ	$\phi = 0^\circ$	25 °C	-	80	-	Deg	Note
		$\phi = 180^\circ$	25 °C	-	80	-		
	θ	$\phi = 90^\circ$	25 °C	-	80	-		
		$\phi = 270^\circ$	25 °C	-	80	-		
Contrast Ratio	CR	-	25 °C	800	1200	-	-	Note
Color of CIE Coordinate	White	X	25 °C	0.300	0.302	0.304	-	
		Y	25 °C	0.323	0.325	0.327		
	Red	X	25 °C	0.622	0.624	0.626		
		Y	25 °C	0.327	0.329	0.369		
	Green	X	25 °C	0.286	0.288	0.290		
		Y	25 °C	0.520	0.522	0.524		
	Blue	X	25 °C	0.134	0.136	0.138		
		Y	25 °C	0.135	0.137	0.139		
Transmittance (with polarizer)	-			3.5	4.5	-	%	

Note1:Definition of Response Time.(white-black)

The response time is defined as the time interval between the 10% and 90% amplitudes

11. Reliability

11.1. MTBF

The LCD module shall be designed to meet a minimum MTBF value of 50000 hours with normal.

11.2. Test Condition

No	Item	Condition	Criteria
1	High Temperature Operating	70℃*24Hrs	1. No Defect Of Operational Function In Room Temperature Are Allowable. 2. IDD of LCM in Pre-and Post-Test Should Follow Specification.
2	Low Temperature Operating	-20℃*24Hrs	
3	High Humidity Storage	50℃*90%RH*24Hrs	
4	High Temperature Storage	80℃*24Hrs	
5	Low Temperature Storage	-30℃*24Hrs	
6	Thermal Cycling Test Storage	-	
7	Packing vibration	-	
8	Electrical Static Discharge	-	
		-	
9	Drop Test (Packaged)	-	

Note1. The test samples should be applied to only one test item.

Note2. Sample size for each test item is 2pcs.

Note3. No defection function allowable.

12. Precautions

12.1. Storage Conditions

- 12.1.1. Store the panel or module in a dark place where the temperature is $23\pm5^{\circ}\text{C}$ and the humidity is below $45\pm20\%\text{RH}$.
- 12.1.2. Store in anti-static electricity container.
- 12.1.3. Store in clean environment, free from dust, active gas, and solvent.
- 12.1.4. Do not place the module near organics solvents or corrosive gases.
- 12.1.5. Do not crush, shake, or jolt the module.
- 12.1.6. Strong light exposure causes degradation of polarizer and color filter.

12.2. Handling Precautions

- 12.2.1. Avoid static electricity, which can damage the CMOS LSI.
- 12.2.2. The polarizing plate of the display is very fragile, please handle it very carefully.
- 12.2.3. Do not give external shock.
- 12.2.4. Do not apply excessive force on the surface.
- 12.2.5. Do not wipe the polarizer with dry cloth, as it might cause scratch. If the surface of the LCD needs to be cleaned, wipe it swiftly with cotton or other soft cloth soaked with petroleum IPA, do not use other chemicals.
- 12.2.6. Reverse and use within ratings in order to keep performance and prevent damage.
- 12.2.7. Do not remove the panel or frame from the module.
- 12.2.8. Except for soldering the interface, do not make any alterations or modifications with a soldering iron; Ensure welding temperature at 320°C to 350°C , the welding time control within the 10 s, welding note don't stay too long in the same place to avoid scald FPC.

12.3. Limited Warranty

- 12.3.1. Our warranty liability is limited to repair and/or replacement. We will not be responsible for any consequential loss. (我们的保证责任仅限于修理和/或更换。我们将不负任何相应的损失。)
- 12.3.2. If possible, we suggest customer to use up all modules in six months. If the module storage time over twelve months, we suggest that recheck it before the module be used. (如果可能，我们建议客户在6个月内用完所有模块。如果模块存放时间超过12个月，我们建议在使用模块前重新检查。)
- 12.3.3. The warranty period is twelve months from the date of delivery. Buyer shall complete the assembly of all processes within twelve months of validity. During the warranty period, if the product quality problems, our company will be responsible for repair and replacement. All products must be stored and handled in accordance with regulations. Under warranty. When the goods do not comply with the above terms, we do not provide warranty services. (保修期为交货之日起十二个月。买方应在12个月内完成所有流程的组装。在保修期内，如果产品出现质量问题，我公司将负责维修和更换。所有产品必须按照规定储存和处理。在保修期内。当货物不符合上述条款时，我们不提供保修服务。)